

DOCUMENTING INTONATIONAL PROSODY: COMPARISON OF THREE DENE/ATHABASKAN (ISO 639-3) LANGUAGES USING DATA FROM DIFFERENT TASKS

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One complication for intonational fieldwork is the difficulty of adapting the methods used in larger, better studied languages for the analysis of prosody in smaller, understudied languages, especially those with reduced numbers of speakers or in typologically distinct languages. Methods used in larger populations may not be appropriate for work in endangered language communities, as methodologies for smaller communities or for work on previously collected data. Another issue is the relatively sparse phonetic documentation of word- and phrase-level prosody in many understudied languages, which limits our knowledge of existing typologies on which to build hypotheses. Here, for the purpose of demonstration, a simple comparison of data previously collected from three Athabaskan/Dene languages is offered: Navajo (nav), Tsuut'ina (srs), and Dene Sųline (chp), from three distinct types of speech: elicitation (nav), storytelling (srs), and a conversation game (chp).

1 Introduction

Intonational prosody is a difficult area of research in understudied languages. Several studies have been done (Fortescue 1983; Fletcher and Evans, 2002; McDonough, 2002; Tuttle, 2005; Gordon 2005; Holton, 2005; Tuttle and Lovik, 2007—to name a few), but involve very different kinds of data, making cross-comparison difficult, even between closely related languages. This study concerns a simple demonstration of the data and methodology for documenting and describing intonational prominence spoken texts taken from three related under-resourced languages, in three distinct types of data, focusing on a comparison of the prosody present in their sentence types. The goal is to shed some light on what distinct types of data may provide to the general documentation of prosody in a language and to an understanding of prosodic typology. A preliminary sketch of fundamental elements of intonation based on F0 shapes and timing is offered, with an eye to

understanding their linguistic function. The languages chosen are the Athabaskan or Dene¹ language family, a group of closely related languages with a highly complex verbal morphology, spoken in historically small, isolated communities spread across a large and still largely inaccessible area of North America. These languages are striking for their resistance to change and borrowing; they are remarkably stable over time, demonstrated by their strong structural resemblances and their similarities at the phonological and phonetic level. Despite their isolation from each other and their extensive dispersal over difficult terrain, and with considerable time depth, they remain closely related.

The Dene languages of the Mackenzie River Basin and surrounding areas carry both lexical and grammatical tone. They are primarily bitonal, H vs L, with the exception (so far) of Tsuut'ina (Sarcee), which has a three tone system: H, M, L (Sapir, 1925; Cook, 1971). Tsuut'ina is one of the languages examined in this study. Tonal distribution in the Dene lexicon is asymmetric due to several factors: noun and verb stems are closed-class and the verb stems are inflected for aspect, which may be marked by tone. The left-of-the-stem domain consists of arguably inflectional morphemes which receive the language's default tone. These languages also exhibit a type of tonal polarity; in some languages, the default is L tone and in other, sometimes neighboring, communities the default is H (Krauss 2007). This polarity does not appear to bother speakers. In Athabaskan literature, contrary to the general usage of the term, the default tone is called the 'marked' tone. Thus Navajo is a low tone-marked language because L is the default tone. Comparative tone has been described in (primarily) nouns (Krauss 2007, Kingston 2007) across these languages. With few exceptions, little to no study has been done of the function and distribution of grammatical and lexical tone.

While these languages have strikingly similar morphological structure and phonotactics, the languages differ in how sentences are prosodically marked (see volume on Athabaskan prosody edited by Hargus and Rice, 2007). But for the larger part, utterance level prosody has not been well-studied, and the range of prosodic types in these languages is not known. Given the fact that these speech communities are under-documented and rapidly changing, comprehensive studies of the prosody of these communities are unlikely to occur. What we learn of their prosodic types may be dependent on data that has already been collected. With this in mind, this study offers a very preliminary investigation of prosodic variation in three Dene tone languages, comparing data from available sources from three different types of data: elicitation materials (Navajo), performative storytelling (Tsuut'ina) and natural conversation (Dene Sł̄liné), focusing on intonational phrases and sentence types. The goal is to note any persistent prosodic variation found among these three languages given the distinct types of data and data collection techniques, and the limits that the different data types impose on the analysis. There is no assumption that the three languages under discussion have similar prosody, only that they are closely related and share a morphological structure that marks the language family.

2 Intonational Phrases and Sentence Types

An utterance may be as small as a word (for instance, a word in reciting a wordlist), or partial or complete grammatical or syntactic units like sentences. The broad goal of this comparison study

¹ While the family name preferred by the northern members of this family group is Dene, the southern or Apachean people prefer the name Athabaskan or Apachean.

is to describe any significant prosodic categories observed in each language using available materials. The present report focuses on pitch contours, that is, variation in fundamental frequency (F0) used to mark particular events in the utterance. The working theoretical assumptions of this investigation are outlined below, but use the standard conventions of autometrical (AM) phonology (Ladd 2008) which propose prosodic elements as phonological units. We're concerned with three highest levels, as in (1). Prosodic structure is defined as a hierarchical structure of prosodic units within and up to the level of utterance.

(1) AM model

- Intonational Phrase (IP)
- Accentual Phrase (AP)²
- Prosodic Word (PW)

Our goal is to observe the features of the utterance level prosody using two main types of tones, pitch accents and boundary tones (2), where T represents any tone.

(2) Intonation tone types

Pitch accents, starred tones (PA)	*T
Boundary or edge tones	
Utterance initial/final (IP)	%T ~ T%
Intermediate/Accentual (AP)	-T

Starred tones (T*) represent pitch accents; 'T%', boundary tones, or the edge tones; -T intermediate or accentual (AP) tones. We will observe pitch contour patterns for two types of boundary tones that mark domain edges, possibly on both the left (%T) and right (T%) edges of a domain, as well as an intermediate or accentual level tone (-T).

Evidence for initial, final, or utterance-internal boundary tones is adapted from the literature. An Intonational Phrase (IP) is defined after Jun (2014) as a utterance produced with neutral focus, and often used to compare one type of utterance to a more pragmatically marked utterance for the differences in the types and placement of prosodic units. For AP and IP boundary tones, we will look for a consistent pitch reset at the beginning of boundary domain (%T), and a consistent tonal marking at the end (T% or -T), with a pitch reset after the tone. Pitch accents (*T) mark prominence within the utterance, or delimit domains; are often attracted to stressed or otherwise prominent syllables in a word; often have a 'neutral' position in the utterance (usually assumed to be a declarative utterance); and, are independent of any other lexical or grammatical tone (i.e. tone, stress and pitch accent languages may also carry intonational PA's). One working assumption in the literature on prosody is that all languages have intonational prosody, though how that is defined is an open question and is often closely linked to any pitch excursions associated to pragmatic functions.

The data sets available for this study were also chosen because of the variety of the styles of utterances in the collected data, from word list recitations in which the utterances are likely to be all of a type, i.e. list recitations or declarative-like, to more casual or natural conversation. This study focused on three types of utterances in the data, in (3).

² I use AP to avoid confusion between small cap ip and IP notation. Nothing rests on this.

- (3) Utterance types
- a. Statements or ‘neutral’ focus - intonation of declaratives/statements
 - i. ‘Dog.’ (word list)
 - ii. ‘I have a white dog’
 - b. Question types: yes/no questions (Y/NQ’s) and clarification questions (CQ’s)
 - i. Do you have a white dog?
 - ii. You want me to put the white dog on the circle?
 - c. Focus constructions
 - i. I have a WHITE dog.

Note that in English Y/N Q’s do not necessarily have a rising pitch contour, nor are the contours different from statements. A strict parsimonious approach to the annotation of prosody in our data is adopted to avoid overly broad generalizations based on a paucity of data.

2.1 Morphological Effects

I also assume an uncontroversial belief that the Dene/Athabaskan languages share a common morphological structure, as presented in (4) in its gross format. There are three domains in the verbal complex, from right to left, a stem domain (which includes the ‘classifier’³ or valence marker), and conjunct and disjunct⁴ domains. The disjunct domain has forms that are more easily separable (i.e. more prefix-like morphemes), and contains a class of morphemes that phonotactically resemble stems (called ‘postpositional stems’ in Young and Morgan 1986). The conjunct domain is much more synthetic, or fused, in form and variation. The core or minimal verb is the final two syllables in the word, from two distinct domains, and thus a morphological bisyllabicity; in Navajo, it contains the minimal obligatory marking in the verb that is always present (McDonough 1990, 1999, 2000a, 2000b, 2003, 2016; McDonough and Wood 2008).

The final syllable in the complex is the STEM; it conflates a classifier plus the stem element (McDonough, 2001, 2014) and comprises a distinct and separable domain in the verbal complex. The element to its left is in a separate domain, and comprises minimally a composite element of conjugation marked for person and number which acts as the base of that domain. These two elements are the core verb and base of the verbal complex (Young and Morgan 1987, McDonough 1990, 2003), likely true of all Athabaskan languages. Both elements in the core verb are marked for aspect; the combination of their individual aspectual marking result in the rich set of aspectual categories found among these languages. Thus the verbal complex always includes a core verb (4a) and is extended systematically by various types of prefixes (4b), some of which are necessary to the meaning of the verbal complex (somewhat coinciding structurally with the term ‘verb base’ or ‘verb theme’ in the Athabaskan literature). The core verb in (4c) is in red; the language is Navajo, from Young and Morgan. In (4c) The prefix /há/ is necessary to its meaning (part of its ‘theme’). There is a clear internal domain boundary between the STEM domain and the preceding domain in many, if not all Athabaskan languages (see McDonough 2003, 2012, 2014; McDonough

³ A misnamed element. It is not a classifier but it appears to have been a type of valence marker, no longer productive (Young and Morgan 1986)

⁴ Another oddly named set of terms, borrowed from Sino-Tibetan and found in Mary Haas’s notes from Sapir’s class (Golla pc) and adopted.

and Wood, 2008; Young and Morgan, 1987 for details on Navajo, and the Dene Speech Atlas on several northern languages).

(4a) Core or minimal verb (two syllables) as a morphological constraint:

$$\begin{array}{ccc} \sigma & & \sigma \\ [[\text{base}]_x & & [\text{base}]_y]_{VComplex} \\ \text{Mode.1s} & & (\text{cl}).\text{STEM} \end{array}$$

(4b) Verbal complex: Disjunct Conjunct STEM
 [(af) [(af) **base**]_x [**base**]_y]_{VComplex}

(4c) Example verbal form—Navajo:

háníst'ááh “I’m fly in to pick something up”
 há - **nish** ł.t’ááh
 af - NIPV.1S cl.STEM

The Mode.subject morph to the left of the STEM constitutes a separate conjugational BASE. Also important is the likewise uncontroversial observation that the variation within the verbal complex is paradigmatic rather than syntagmatic, that is, units within the complex, STEM for instance or the conjugational BASE, may be changed out, resulting in contrastive relationships among sets of related words in the lexicon. One observation not fully laid out in this paper is that the strong paradigmatic nature of this rich verbal complex is likely to constraint the phonetic realizations of prosody, an observation that originates in Sapir (1925), and is (conversely) inherent to Jun and Fletcher (2014), who rely on syntagmatic processes for their methods for testing prosodic variation.

Since these languages are verb-final (and verbal complex-final), and the STEM units are prominent by distribution, phonotactics and phonetics (McDonough 1990, 2003, McDonough & Whalen 2008, McDonough & Wood 2012), one working hypothesis is to assume the final syllable in the verbal complex, the stem, is a neutral position in the utterance for any PA that a language may carry. This is a working hypothesis carried over from English and has no value for this data other than something to prove wrong.

In general, intonational prosody functions at the level of discourse; it does not usually serve as a lexical contrast. In AM theory, the proposed units are phonological, and thus by definition contrastive. Given that the noise source in speech is the vibration of the vocal folds, all spoken languages have a fundamental frequency, or pitch. It further appears that all languages use F0 grammatically (phonologically or phonetically) in one way or another, and often as a powerful and systematic tool in the organization of speech and communication. But the typology of prosody is under-documented cross-linguistically.

Languages will differ in how utterances are intonationally marked, including, we will assume, not at all. Some of those intonational features are accent, stress and boundary tones as phonological categories, which are realized by a range of phonetic properties such as fundamental frequency and pitch range, pitch contour and slope, duration, phonation, alignment or a combination of these cues. These same features, phonological and phonetic, are likely to be used to cue ‘focus’ constructions and information structure in a given language. In these type focus constructions, prosody is used to highlight a word or a constituent via prosodic cues for informational or presentational (vs ‘neutral’) style for pragmatic or semantic function (‘the WHITE dog’).

A confounding factor is the use of PA's and boundary tones in tone languages, since separating out the pitch contours of lexical tone from the post-lexical or intonational level pitch is challenging, doubly challenging in morphologically complex languages. Jun and Fletcher (2014) lay out a practical method for doing so, by placing words in different places in an utterance, or moving them around, to see how the utterance and word level prosody adjusts to changes, or it doesn't. We refer the reader to this excellent article. With the material of this study, and all pre-collected material, we do not have the option of moving words around, but the heart of the enterprise is systematicity. What are the consistencies in the utterances? One task, the Toy Game, a conversation task between two speakers, is set up to provide a small set of items that are manipulated in the game, talked about, and are likely to show up in different utterances, with different emphasis and in different places in the utterances. This is an excellent field tool and easy to set up on the fly. The other two styles of speech, the prosody elicitation (Navajo) and the storytelling (Tsuut'ina) are less amenable to these analysis methods, but nevertheless useful.

With respect to the variety of intonational marking in a dataset, we expect the more natural, conversational data in the Toy Game task recorded in Dene Sų́líné to have a richer inventory of prominence marking and pitch excursions, and to have more variation in phrasing than in the storytelling data of Tsuut'ina or in the word list elicitation of the Navajo data, which we predict to be the least variable.

All speakers in these studies are fluent native speakers who are bilingual & educated in English.

3 Three Languages

3.1 Navajo

The Navajo materials come from a prepared list of elicitation sentences composed to investigate intonational related F0 contours in Navajo utterances in three contexts: neutral, yes, no questions (Y/NQ's) and focus (FC) constructions. The observation is that Navajo does not have intonational units defined by pitch contours, instead uses particles to mark pragmatic and semantic function in an utterance (5). The data is taken from data collection of 18 speakers recorded at Shiprock, New Mexico with Martha Austin of Dine College and a later session with Paul Platero, recorded in 2011 using the same data set. Neutral or declarative utterances were contrasted with focus constructions (F) or with yes/no questions (Y/N Q). Interrogatives are marked by both or one of two particles: da [ta], and -ish [-ɪʃ] after the first noun. Focus constructions are marked with a -ga' [-kaʔ] particle. Sample utterances are listed in (5). Since Navajo has tone, the utterances are given with both H and L tone contrasts in final position. In focus constructions, the ga' particle (underlined) follows the focused noun. Mary Willie (pc) has pointed out that these constructions are not true focus constructions, but rather more like cleft constructions in English, as the translations in (5) read.

(5) Focus constructions ga' particle (underlined) after the focused noun:

(a) H tone

Statement: shich'iyą hóló *'I have food'*

Focus: shich'iyą ga' hóló *'It's food that I have'*

(b) L tone final

Statement: sitsilí hoozdohdi bighan *'My little brother lives in Phoenix'*

Focus: sitsilí **ga'** hoozdohdi bighan *'It's my little brother that lives in Phoenix'*

In (6) are the interrogative constructions with both H and L tone final utterances. In these forms the interrogative particles is an initial da, and the morpheme -'ish is attached to the noun, both particles are in red and underlined.

(6)

(a) H tone final utterance

Statement: nich'i ya hóló *'You have food'*

Yes/no: da' nich'i ya 'ish hóló *'Do you have food?'*

(b) L tone final utterance

Statement: nimá hoozdohdi bighan *'Your mother lives in Tucson'*

Yes/no: da' nimáash hoozdohdi bighan *'Does your mother live in Tucson?'*

More or less following Jun and Fletcher (2014), Himmelman and Ladd (2008) and Himmelman (2006), we looked for evidence of differences in the tonal contours between neutral and focus or neutral and Y/N Q's utterances that might be associated to intonational marking in phrases.

In Figure 1 are graphs of statements (neutrals) and Y/N Q's (data from McDonough 2002). The points represent the F0 value for each syllable taken at the peak or valley in the contour for both utterances from (6a) and (6b). If the contour was flat it was taken at the mid point. The red is the statement and (b) is the Y/N Q. Note that in the Y/N Q, there are two additional particles, da in the initial position and -ish after the low toned *nich'i ya* 'your food', with a rise on the final two syllables of the verb *hóló*. The value was measured at the F0 peak in the syllable.

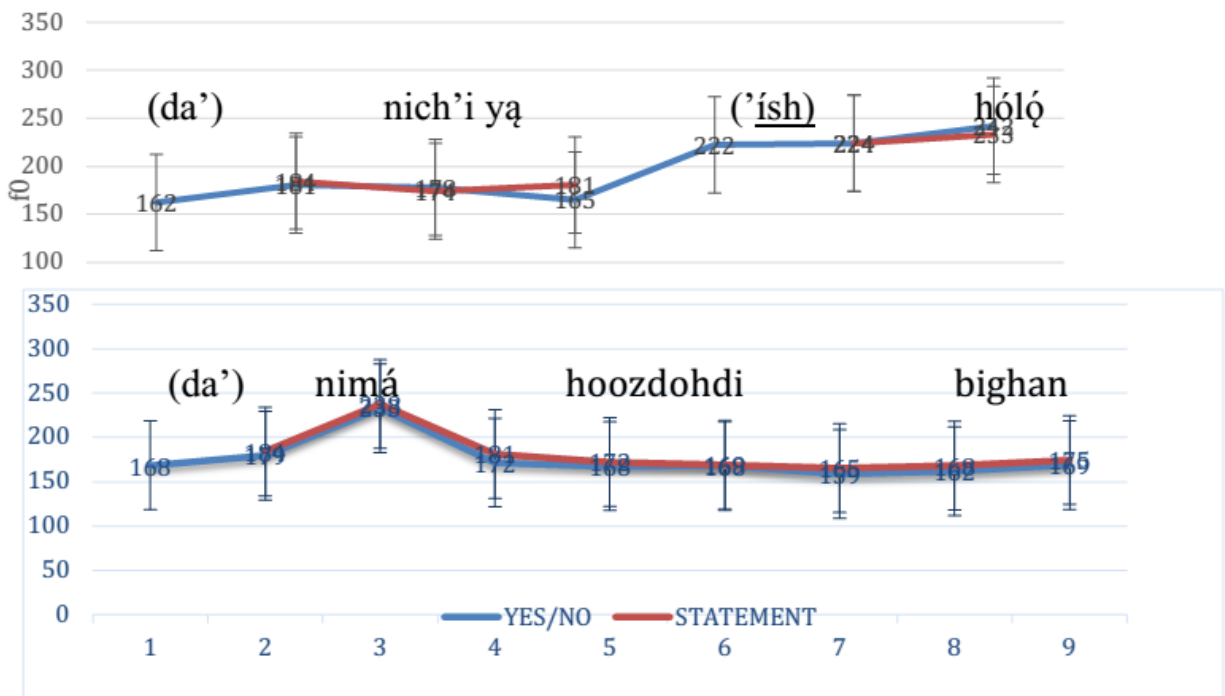


Figure 1: The F0 value for each syllable in the utterances in (6), for utterances ending in H and L tones. Red is the neutral, blue is the yes/no Q.

In Figure 2 are statement vs focus particle (ga') constructions. As with the Y/N Q's and statements, the contours are strikingly similar, with no evidence of any intonational F0 marking.

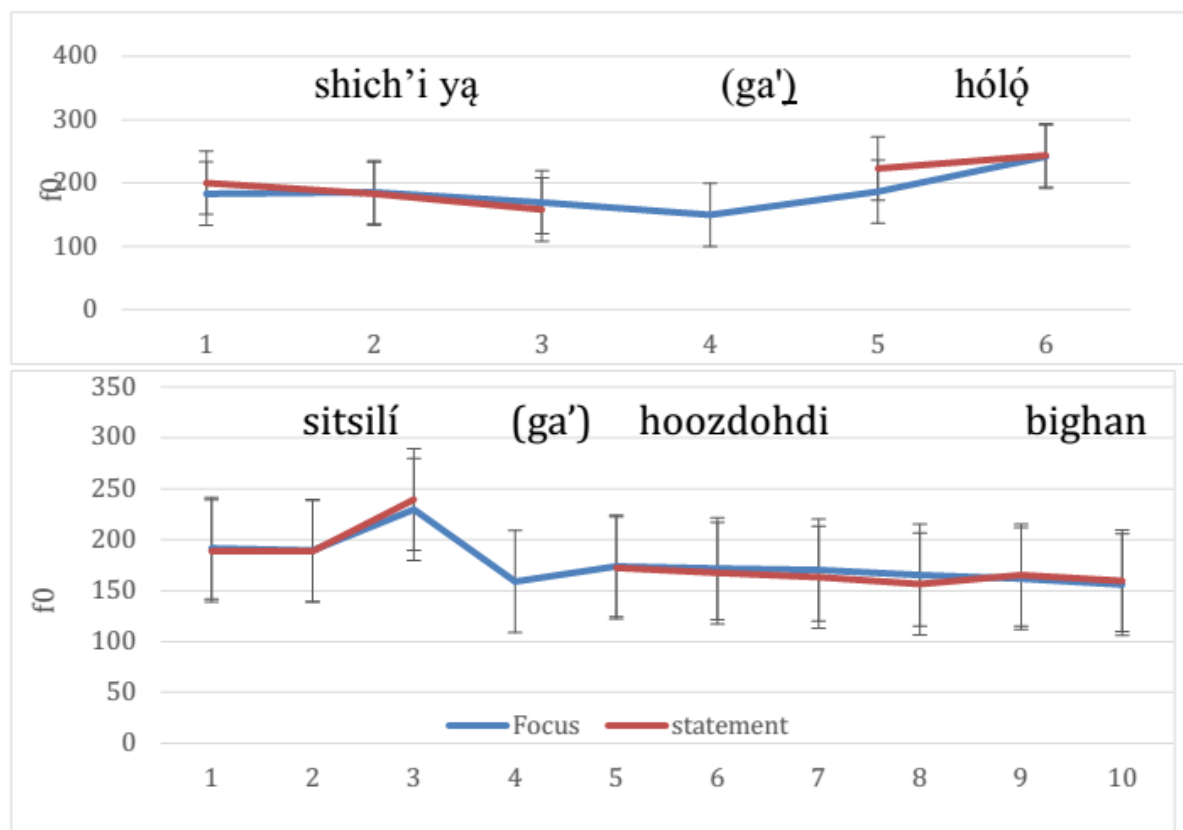


Figure 2 The F0 value for each syllable in the utterances in (6), for utterances ending in H and L tones. Red is the neutral, blue is the Focus construction.

The similarities between the two utterance types in these examples is striking. No evidence of any pitch related intonation marking was found in the elicitation materials: as noted, this is not unexpected if the speakers treated the Y/N Q's as statements (as possible in English). This lack of pitch movement accords with the consistent observations of native speakers. If intonational units are marked in Navajo, there is no evidence that it is marked by F0 excursions in this data.

While it is the case the Y/N Q's do not necessarily produce a rising intonation pattern in English, the lack of any excursions in these utterances was consistent in the elicitations in Navajo, and it matched native speaker intuitions. Furthermore we found no excursions associated to so called 'focus' constructions in the data. A study of both duration and glottalization (Walker 2003) also produced the same results. No intonational marking associated to these utterance types was found. This accords with the consistent observations of native speakers. The pragmatic function of Y/N Q's and focus-type constructions appear to be marked by morphemes alone.

The limitations of this study are in the type of elicitations performed, word list elicitations. Fuller study is need in more natural or casual speech, where speakers are more likely to use the full range of expression that their prosody grammar allows. However, it is worth noting that no evidence of any pitch excursions associated to particular types of utterances was identified in this data.

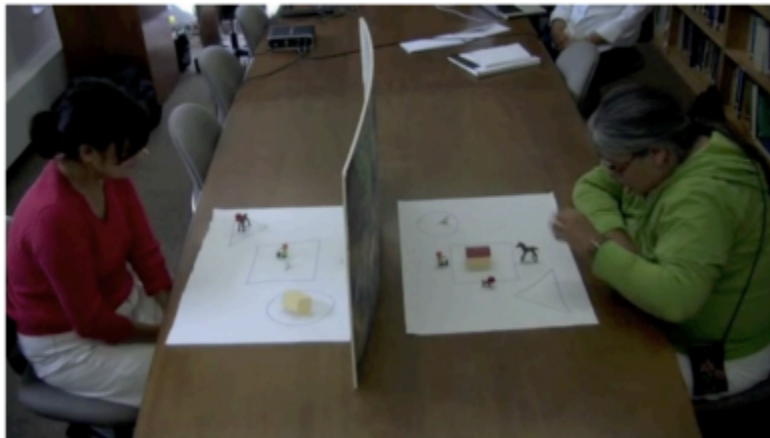
3.2 A Conversation Game in Dene Sųline

The material from Dene Sųline is taken from an audio and video recording of a conversation game between two native speakers of Dene Sųline (figure 3). This is a game between two fluent native speakers who are separated by a screen, and are asked to collaborate on the arrangement of a set of items placed in front of each of them, set on a piece of paper with three geometric shapes drawn on it, a circle, square and triangle. The game is a hands-on version of the Map Task, invented to allow the manipulation of objects in real space. The goal of the Toy Game is to have speakers identify the objects and their placement and position on the sheet with respect to the drawn geometric shapes.

There are several interesting aspects to this game: the need to determine direction, the identification of the objects (white dog, black dog, fence, etc) the identification of the geometric shapes (not part of the native lexicon), the elicitation of clarification questions (which dog? The WHITE dog), yes/no questions, statements commands. The annotations were done in ELAN by a native speaker of Dene Sųline trained in transcription practices at CILLDI at the University of Alberta, Edmonton.

The recordings and annotations are available online on the [Dene Speech Atlas](#) website at the University of Rochester.

Cold Lake Dene Sųliné Conversation : Toy Game



[Download Audio with Praat Annotations \(stereo\)](#) - [Download Audio with Praat Annotations \(separate channels\)](#)

Figure 3. Screen capture from the Toy Game video with two participants, each with a set of small toys on a board marked with geometric shapes.

The words *l̥i* ‘dog’ and *l̥icho* ‘horse’ (large dog) are in different contexts in Figures (4-5). In Figure (4), the word *l̥icho* is in initial position in an utterance. In (7) is the utterance and gloss. Note the axes in the spectrograms, the y-axis is frequency in Hz, the x-axis is time in seconds. These utterances are taken from the Dene S̥l̥ine Toy Game, available online.

- (7) *l̥icho* *nádher* *̥l̥esi* *eyer*
 horse NEG DEM 3rd.live
The/A horse doesn't live there

The same pitch contour is repeated in the statement below, in Figures (2) and (3).

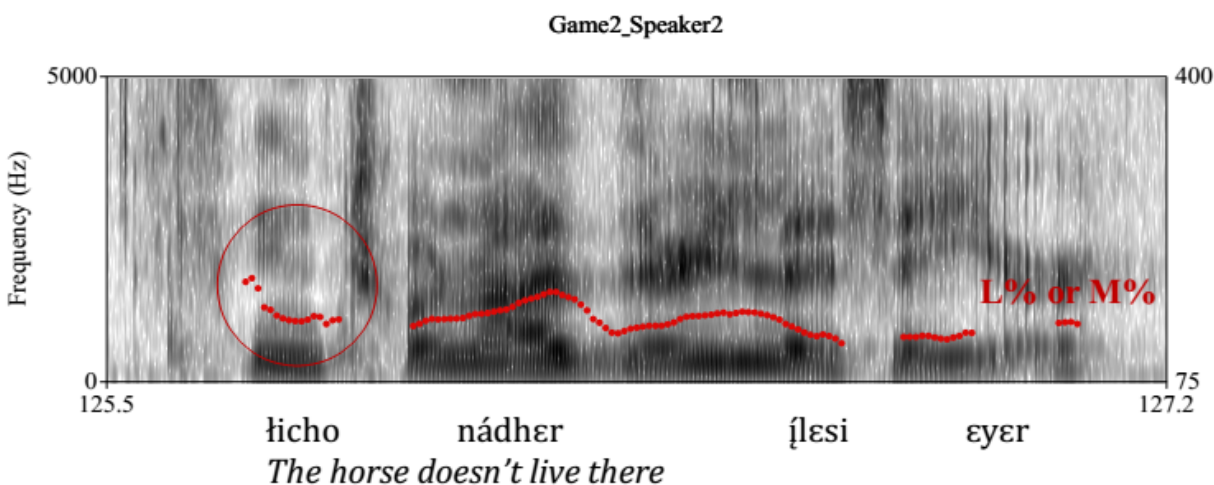


Figure 4. A statement or neutral signal with a possible L% or M% edge tone. Utterance from the Toy Game in Dene S̥l̥ine, Speaker 2 in (7). The word *l̥icho* ‘horse’ is circled.

In Figure 5a is the question, *l̥i?* ‘Dog?’, with a clear rising contour at the end of the utterance. Then in 5b, the speaker corrects herself with a clear statement, *l̥icho*. ‘Horse.’ with a flat contour (arrow). The flatness of the final contour is characteristic in the conversation. These two utterances in Figure 5 are by the same speaker and follow each other in the conversation, approximately 1s apart. Note also the pitch range differences. The rise on the syllable *l̥i?* in figure 5a, versus its pitch contour in 5b, is a good example of respectable evidence for boundary tones in this conversation game: clear pitch excursions are associated to the left edges of the utterances. These contour patterns appear throughout the conversation.

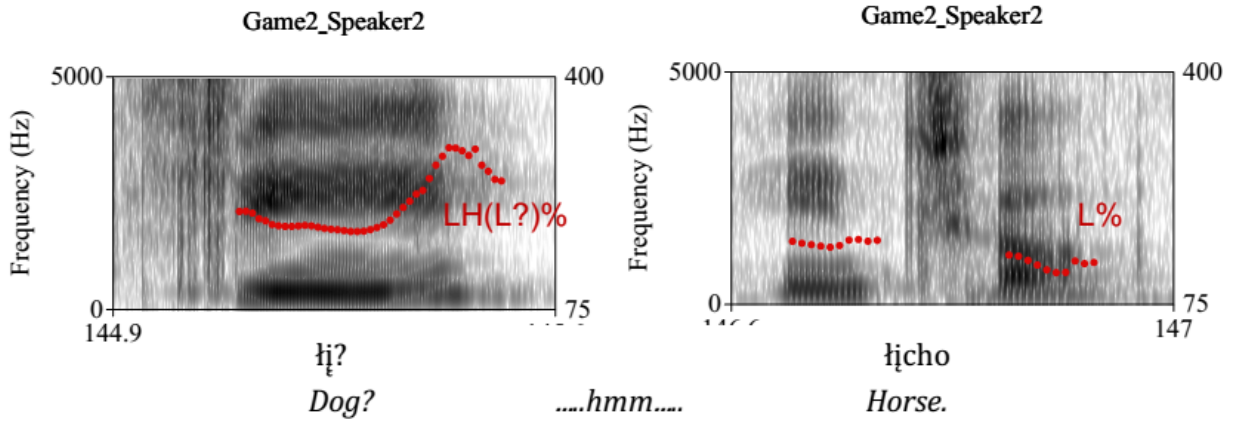


Figure 5. Same speaker, Speaker 2, from Toy Game in Dene Suline, two utterances

In (8) below are two utterances spoken by the same speaker using similar words. The speaker says simply ‘dog.’, then pauses and changes her mind, ‘maybe a/the small dog?’, adapting to what she may now know or guess about her cohort’s toys.

- (8) łı. łı.az úto.
 Dog. *small.dog* *maybe.*

Figure 6 are spectrograms of these two utterances, a statement followed by an utterance signaling uncertainty, and conveying doubting about her first statement. The statement utterance has a clear falling contour, the following utterance has a rising contour which can be associated to uncertainty intonation. Note the similar falling contour in the *łı* ‘dog’ syllable in both and the distinct edge contours. Also note pitch reset at the beginning of the second utterance matches the initial pitch on the first utterances.

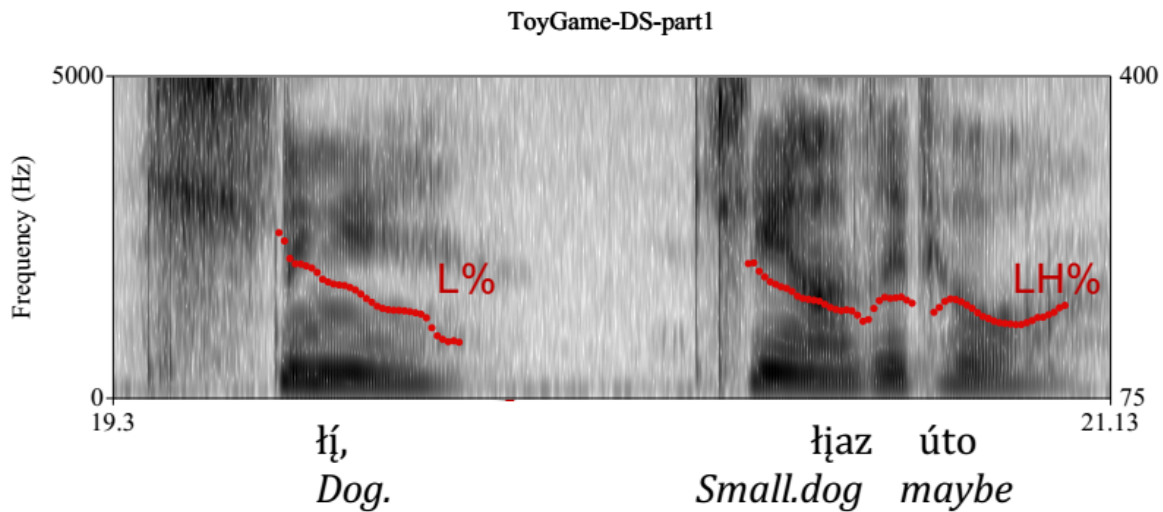


Figure 6. A spectrogram of the two utterances in (8), same speaker, a declarative followed by an uncertainty contour.

Thus a comparison of the difference tokens of the dog/horse words in different positions in an utterance and in different pragmatic contexts is found in the data, following Jun and Fletcher (2014), as a valuable resource for providing a baseline description of prosody for this language community, at least as spoken by these two native speakers.

The following spectrogram in figure x is from an utterance from Speaker 1, consisting of two tokens of the word náht'ádhi 'diamond' in the same utterance, in initial and final position. The speakers are describing to each other the geometric shapes drawn on the paper, in this case the triangle, and agreeing on their names. The tokens are circled in the figure.

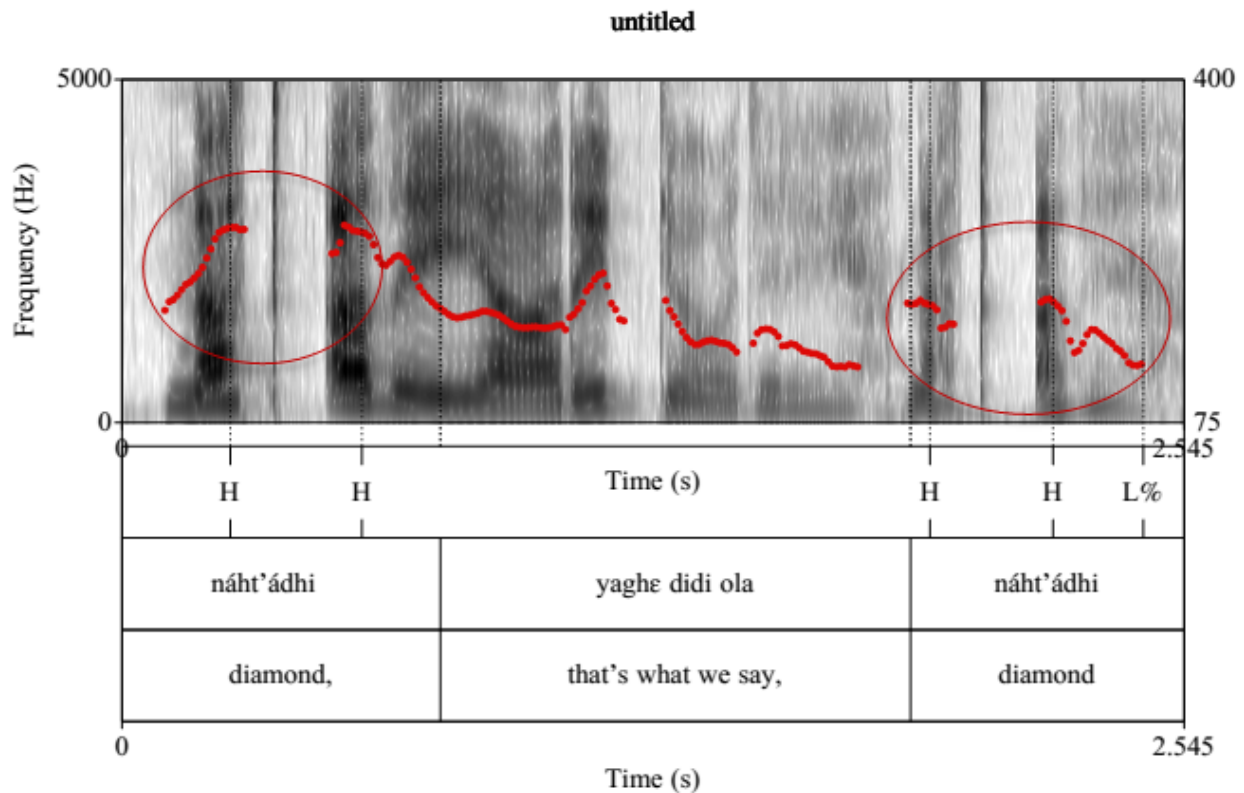


Figure 7. Two tokens of the word náht'ádhi 'diamond' in initial and final position, Sp 1.

This is an excellent example taken from natural speech of the declination of the pitch range throughout the utterance and the contrast between the two tokens of the word náht'ádhi 'diamond' as they appear in these two positions. The lexical H tones in the words are marked (H), an intonational IP boundary tone (L%) is marked at the end of the utterance, though it may be realized is a flat contour at the edge of the domain (see oval in Figure 7), open to further work.

Thus the conversation game, the Toy Game, is an excellent source of basic information about a language's intonational prosody in conversation. The participants, if interested, quickly become involved in the odd objects and descriptive tasks of the game, and seem to forget that they are being recorded. Introducing odd objects such as big and little dogs, horses smaller than a dog, houses standing on their side, or differences in the size of object between speakers, all add

opportunities for conversational exchanges between the speakers. The video of this game and its annotations are online on the Dene Speech Atlas.

3.3 Tsuut'ina (Sarcee): Storytelling

The Tsuut'ina language materials are from 'The Tsúutína Medicine Pipe' by Bruce Starlight & Christopher Cox (ms) and the accompanying sound files and annotations by Starlight and Cox. They are part of a larger ongoing collaborative documentation project on Tsuut'ina language by the University of Alberta, Edmonton, working with the Tsuut'ina people. The speaker is Elder Bruce Starlight, retelling a traditional story called 'The Medicine Pipe'.

3.3.1 Storytelling

Storytelling differs from the other speaking styles in its performative aspects, a making of an event of storytelling before an audience. There are, of course, many different types, traditions and styles of storytelling, from highly skilled oral performers with a tradition who have at hand a toolbox of sophisticated performance techniques, to prompted storytelling, where a native speaking language consultant is given an illustrated book (like the frog story) and recorded telling a story based on the illustrations and without concern for, or interest in, their particular skills as a performer. What is common to all types of story-telling is the relationship of the storyteller to the audience. In storytelling the speaker is performing for an audience and this act may result in differences in style and register, special vocabulary. Thus the spoken text contains long sections of a speaker's performance or recitation, without the attention to turn-taking common to conversation.

The storytelling example we use is in the Tsuut'ina (Sarcee) language. A speaker (BS) is retelling a traditional story, for the explicit purpose of recording the spoken story for documentation. This storyteller is actively involved in the community language revitalization efforts.

Tsuut'ina is alone among the Dene tone languages in having three tones H, M, L (Cook 1971). Baseline phonetic work needs to be done on Tsuut'ina, but preliminary work indicates that the M tone tends to occur at edges of domains and words, and thus may be part of word prosody edge marking (Fletcher and Evans 2002). In (10) are transcriptions, morpheme glosses and translations taken from the text by edited by Starlight and Cox (ms.). The storytelling contains long sections of recitation and lots of stylistic variation. The recording, though valuable, is not a good source of information about prosody except at the general level. The analysis is confounded by a lack of baseline phonetic work on the language, including an analysis of the unusual (for the Dene tone languages) tonal system of three tones. There is also the fact of the distribution of consonants and vowels in the Dene languages: these languages have a rich obstruent inventory with glottalic consonants and few voicing contrasts (Ladefoged and Maddieson 1997; McDonough 2003, 2012 (online)). Because of this consonant inventory, the pitch traces are highly likely to be inconsistent and disturbed.

However, in light of this and the fact that prosodic marking of intonational units was consistent and discernable in the data, though hard to quantify, three intonational aspects are noted in (9), illustrated in three spectrograms which demonstrate the utterances glossed in (10).

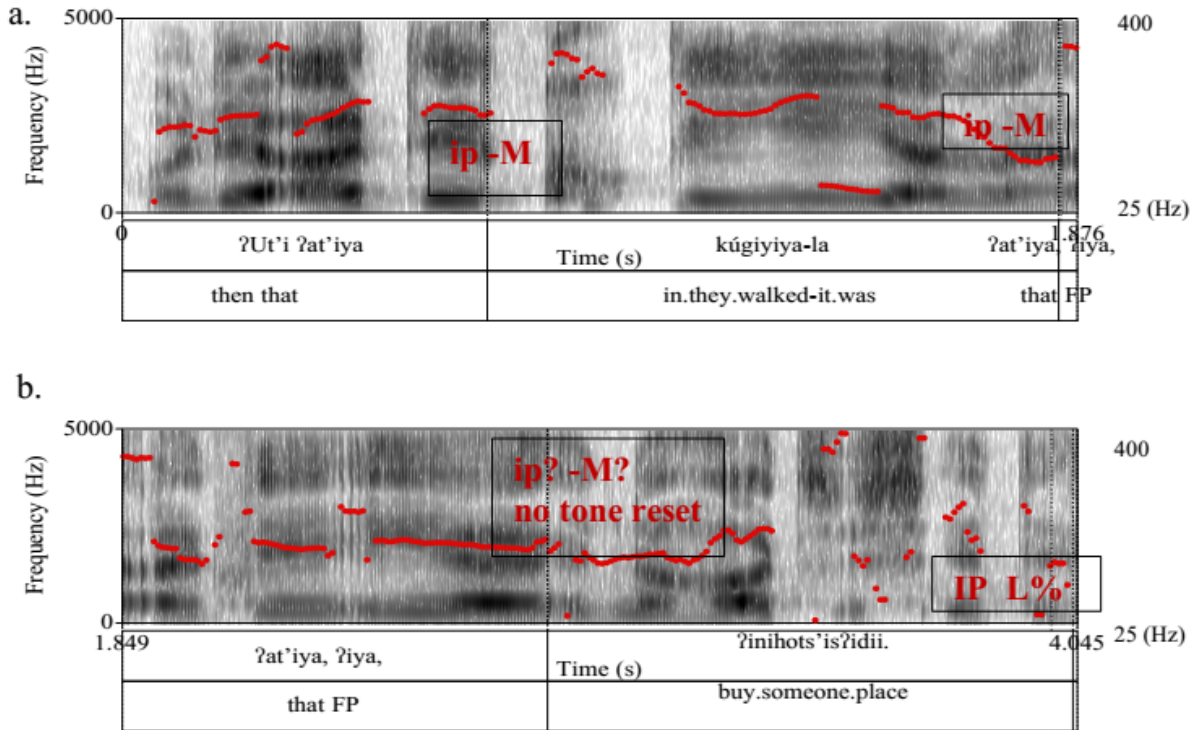


Figure 8a and 8b. Spectrograms of utterance in (10-2) with proposed intonational units marked.

The utterance in Figure 9 is interesting for its clear intonational units: there is a pause after the first word, marked by Starlight and Cox, and a discernable focus on the word *tuh* ‘water’. There is also a clear break after the verb complex *goghanischud-la*, which is marked in Figure 9 with an ip boundary as a M tone. This is followed by either a rest or a focus on the postposed word *ʔik’oholi tuwa* ‘whiskey’. Finally the utterance ends with a discernable fall to a low pitch, marked with as IP boundary with L%. Note that no claim is made about focus intonation, the rise on the word ‘water’ could be associated only to the performance. It’s only noted in that it exists as a feature in this storytelling event, no claim is made about its status as a phonological or pragmatic unit.

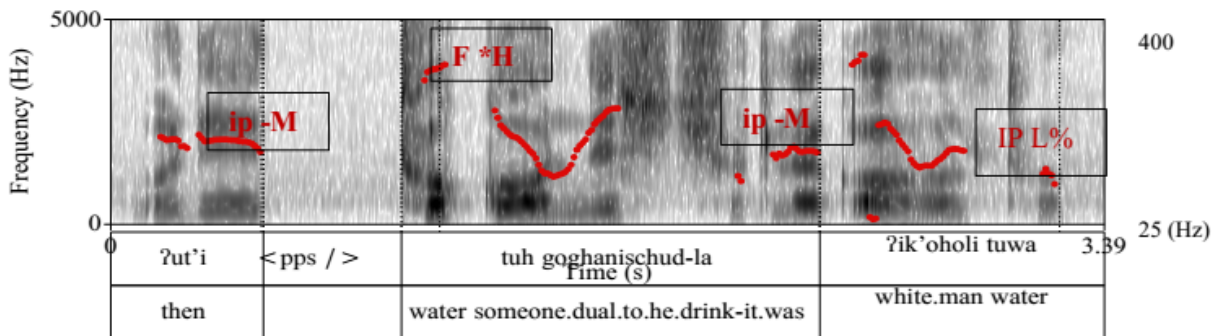


Figure 9. Spectrogram of utterance (10-3) with proposed intonational boundaries marked.

Many questions surround these intonational annotations, at the least pointing to the need for good baseline descriptions of the phonetic behavior of the sound phonemes, including tone, and their alternation patterns, as well as a good workable description of the morphological units and domains in the verb. However, clear intonational strategies appear in the data, and patterns can be observed. It is clear, for instance, that though it remains to be seen if the lack of pitch-related intonational unit marking is found in Navajo conversation, there are strong differences in the prosody of Navajo and the two other related languages, Tsuut'ina and Dene Sųline.

4 Discussion

Of the three types of data elicitations examined in this study, wordlist, storytelling and the Toy Game task, analysis of the conversational Toy Game is the most helpful in providing good evidence for baseline information about intonational prosody. The observation is that this is likely related to the task itself, with relaxed conversational speech in a controlled environment. The participants have a small number of items that can be manipulated at will, and moved about on a surface that is not shared and not visible to the other participant. There are items that need to be identified, via description, and the participants have to figure this out. Compass directions need to be established.

This task also serves as a base for understanding, by comparison, other types of discourse, such as the intonation of wordlists. For instance, does the falling contour apparent in the Toy Game appear in word list recitation? (Word list recitations in Dene Sųline and other northern Dene languages are available online for comparison on the Dene Speech Atlas.) Is there a contrast between Navajo and Dene Sųline wordlist recitations in the existence of edge tones? Does the lack of any edge tones in Navajo in the word list recitations extend to conversation? Is pragmatic or discourse information expressed in Navajo by particles alone, with no edge tones to mark this information? The storytelling data is interesting for its performative aspects, the use of stylized language or particular morphemes or structures, which generally do not fall within common descriptions of a language's syntax. But storytelling, likely including oral histories, is a particular form of communication and likely to be stylized and conventionalized, perhaps heavily so in the best of storytellers. The question arises as to the relationship of the expression used in the performance to the phonological units in the grammar. Finally, of course, as with any oral performance, the performance itself is dependent on the skills and experience of the story teller and to the presence and quality of the audience and the occasion.

Many confounds will appear in any analysis performed on these types of data that relate to the experience of collecting that data, including interference from the speaker's dialect and exposure to English, the robustness of the spoken language in the community, the speaker's interest in language revitalization, the number of speakers, and lack of control in elicitation and the ensuing resistance to traditional academic means of testing empirical claims about prosody.

5 Conclusion: Leveraging Progress

This small and inconclusive sketch closes with a quote from Cruz and Woodbury (2014) on working with speakers. Cruz and Woodbury view the role of the linguist as providing arguments for:

“[the] importance of an interplay among speaker and non-speaker perspectives over the long course of work; a mix of introspection, hypothesis-testing, natural speech recording, transcription, translation, grammatical analysis, and dictionary-making as research methods and activities; an emphasis on community training as an active research context; the simultaneous study of many varieties within a close-knit language family to leverage progress; and the use of historical comparative methods to get to know tonal systems and the roles they play at a deeper level.”

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