

Phrasing, prominence, and morphotonology: How utterances are divided into tone groups in Yongning Na
Alexis Michaud

► **To cite this version:**

Alexis Michaud. Phrasing, prominence, and morphotonology: How utterances are divided into tone groups in Yongning Na. *Bulletin of Chinese linguistics*, 2015, 8, pp.112-152. 10.1163/2405478X-00801006 . halshs-01162331

HAL Id: halshs-01162331

<https://halshs.archives-ouvertes.fr/halshs-01162331>

Submitted on 10 Jun 2015

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Phrasing, Prominence, and Morphotonology: How Utterances are Divided into Tone Groups in Yongning Na*

短语切分、重点突出与形态声调学：永宁摩梭话的语句如何形成声调组

Alexis Michaud

米可

Yongning Na is a Sino-Tibetan language spoken in an area straddling the border between Yunnan and Sichuan. The Yongning Na tone system is based on three levels: L, M, and H. It comprises a host of rules that are specific to certain morphosyntactic contexts. These rules represent the bulk of what language learners must acquire to master the tone system. Different rules apply in the association of a verb with a subject or an object, the association of two nouns into a compound, that of a numeral and classifier, and that of a word and its affixes, for instance. The domain of tonal computation is referred to here as the *tone group*; tonal processes never apply across tone-group junctures. The present study investigates how utterances are divided into tone groups in Yongning Na, building on examples from narratives and elicited combinations. There is no hard-and-fast correspondence between syntactic structure and tone group divisions: several options are generally open for the division of an utterance into tone groups. The choice among these options depends on considerations of information structure. This study is intended as a stepping-stone towards the long-term goal of modelling the Na tonal system (its morpho-phonology and its phonetics), and placing the findings in a typological perspective.

永宁摩梭话（纳语）是汉藏语族纳语组的一种语言，位于云南跟四川交界地带的永宁坝与泸沽湖地区。永宁纳语的声调系统有高、中、低三个调域。本文介绍和分析纳语中的语句如何被划分为“声调组”。选择何种声调组往往反映了语句不同的信息结构。由于句法结构跟声调组的切分没有硬性直接的对应，说话人可以选择将一个大的组块整合为一个声调组，从而形成强整合，或者也可以把语句分成一些声调组，加强不同成分的风格效应。论文用详细的例子展示了在语句分为声调组的过程中说话人的选择某种变调类型的动机。结构越紧密的语句，其可能划分的声调组就越少。而当出现富于表现力的或较生动的某个词时，句子便会用声调来切分。

Key words: intonation, phrasing, prominence, morphotonology, tone groups

关键词：语调，短语切分、重点突出，形态声调学，声调组

* Many thanks to Duan Bingchang 段炳昌, Wang Weidong 王卫东, Yang Liquan 杨立权 (Yunnan University) and Latami Dashi 拉他咪·达石 (Ninglang Research Centre in Ethnology) for making my fieldwork possible, and to the Na language consultants and friends, in particular Latami Dashilame 拉他咪·达石拉么. Many thanks to Roselle Dobbs for insightful suggestions about data analysis and thorough editing of the entire article. Many thanks to the participants at the Li Fang-Kuei Young Scholars Symposium in 2013, and to two anonymous reviewers, for useful comments and suggestions. I alone am responsible for remaining shortcomings.

This research was financially supported by *Agence Nationale de la Recherche* as part of the projects HimalCo, ANR-12-CORP-0006, and LabEx EFL, ANR-10-LABX-0083 – *Investissements d’Avenir*.

1. Introduction: challenges in the description of the tone system of Yongning Na

Yongning Na (endonym: /naɿ-zwɿt/) is a member of the Naish subgroup of the Sino-Tibetan family, which also includes the Naxi and Laze languages (Guo Dalie and He Zhiwu 1994: 5–9; Jacques et al. 2011: Appendix 1). It is spoken in and around the plain of Yongning, in Lijiang, China (Lìjiāng shì Nínglàng xiàn Yǒngníng xiāng 丽江市宁蒗县永宁乡). A salient characteristic of this language is its rich tonal morphology, which is apparent from the first contact with the language, witness sentences (1) and (2) (from field notes):

- (1) njɿt bi-t-zo-t-hoɿ
 njɿɿ bi-t zo-t hoɿ
 1SG to_go OBLIGATIVE FUT(/DESIDERATIVE)
 ‘I have to go. / I’m afraid I have to leave.’

(Note: In all examples, the first line contains a representation of the entire utterance, indicating surface-phonological tones; and the second line shows the morphemes with their lexical tone.)

- (2) njɿt ʒiɿ-bi-t-zo-t-hoɿ
 njɿɿ ʒiɿ bi-t zo-t ho
 1SG to_take to_go OBLIGATIVE FUT(/DESIDERATIVE)
 ‘I have to go and take [my luggage] now.’

The difference in the lexical tone on the main verb—in (1): /bi-t/ ‘to go’, Mid tone; in (2): /ʒiɿ/ ‘to take’, Low tone—is reflected in the tones of the following syllables, all the way to the end of the sentence. The tonal morphology of Yongning Na is comparable in its extent to the segmental morphology found in the (very distantly related) Kiranti languages (see Jacques et al. 2012; Jacques 2012). For instance, the determinative compound /zwæt-zo-t-gv-tɿvɿ/ ‘colt’s back’ has a final H tone, whereas the coordinative compound ‘father and mother,’ which has the same input tones, is /ə-tɿt-t-ə-tmi#ɿ/, with a floating H tone (more about this tone below; but in a nutshell, it is a tone which can only associate to a following syllable; it is represented as #ɿ). The floating H tone on ‘father and mother’ is not by itself a marker of the morphological status of the compound as being coordinative rather than determinative: not all determinative compounds share the same tone pattern—not any more than coordinative compounds do. The tonal output depends on the input (lexical) tones, but different rules apply in determinative compounds and in coordinative compounds. The tone rules that apply when combining an object with a verb are likewise different from those that apply when combining a subject with a verb. To date, the best-documented part of the system consists in numeral-plus-classifier determiners: a systematic study brought out no less than nine categories with different tone patterns (Michaud 2013). The Yongning Na tone system comprises a host of rules that are specific to certain morphosyntactic contexts. This large set of rules constitutes the core of the tonal morphology of Yongning Na and represents the bulk of what language learners must acquire to master this tone system.

Tonal computation takes place within a domain referred to here as a *tone group*. This computation is conducted independently for successive tone groups. The aim of the present study is to bring out the ways in which utterances can be divided into tone groups in Yongning Na. There is no hard-and-fast correspondence between syntactic structure and tone group divisions. Several options are generally open for the division of the utterance into tone groups, and the choice among them relates to the utterance’s information structure. A tone group may be considered as constituting one prosodic phrase; prosodic phrasing depends on considerations of information structure, as well as on syntax. Speakers may choose to

integrate large chunks of speech into a single tone group, resulting in strong integration; or they may divide the utterance into a number of tone groups, with the stylistic effect of emphasizing these individual components one after the other. The present study builds on examples from narratives and elicited combinations to bring out rules and tendencies.

This study is intended as a stepping-stone towards the long-term goal of modelling the Yongning Na tone system (its morpho-phonology and its phonetics), and integrating the findings in a typological perspective. Emphasis is laid here on synchronic description and analysis; perspectives for typology and modelling are briefly touched upon in the Conclusion.

As a background to the discussion, section 2 presents the lexical tone system.¹

2. Background: The tone system of Yongning Na

This presentation is organized in analytical order. It starts out from a static inventory of tone patterns over domains of different lengths, and gradually progresses towards an analysis of the lexical tone categories. This mode of exposition replicates the progression of analysis during fieldwork, working up from the surface facts; this is intended to allow the reader to evaluate the analysis, and in particular the choice to adopt level-tone notations. Level tones has proved to be useful for linguistic description beyond the Sub-Saharan domain, for which they were initially developed. On the other hand, level-tone notations, which have been taken up as the standard for tonal description in generative phonology, have sometimes been generalized to all tone systems, including those of Mandarin Chinese and Thai (e.g. Bao 1999; Yip 2002; Morén and Zsiga 2007), even in the absence of language-internal evidence (as pointed out e.g. by Barrie 2007:345; Sun 1997:516). It therefore appears useful to set out in detail the evidence for a level-tone analysis for Yongning Na.

For reasons of space, the presentation below focuses exclusively on nouns.

2.1. A static inventory of tone patterns for nouns

Words spoken in isolation are what one starts out from in the earliest stages of fieldwork on a tonal system. Table 1 presents an overview of the tone patterns over monosyllabic nouns spoken in isolation. It was not possible to find a minimal set (words distinguished solely by tone) due to the relatively low number of monosyllabic nouns in the language.

There are no segmental constraints on tones (such as a restriction of low rising tones to syllables with voiced onsets) or categorical effects of tones on segments (such as tone changes influencing the voicing feature of a syllable's initial consonant).

Table 1. Tone patterns attested over monosyllabic nouns spoken in isolation

phonetic realization	preliminary label	example
non-rising, non-low	M	/zɰæ˥/ 'horse'
low-rising	LM	/bo˨˥/ 'pig'
mid-rising	MH	/tʂʰæ˨˥/ 'deer'

The second column of Table 1 proposes a preliminary analysis of the three patterns into level tones: L(ow), M(id), H(igh), and their different combinations. Justification for the use of a level-tone analysis comes from the morpho-phonological alternations in which the tones

¹ Section 2 is taken up from Michaud (2013), with added clarifications.

partake; evidence will be provided over the course of the analysis. The question-mark in the column ‘preliminary label’ is intended to emphasize that these labels were given on a first pass; some—including the categorization for ‘pig’—were modified in the course of the analysis, as will be explained below. At this initial stage, the essential information is provided in the leftmost column in Table 1, describing the three patterns as follows: a non-rising, non-low pattern; a low-rising pattern; and a mid-rising pattern.

The restrictions on the tones of monosyllabic utterances are as follows: (i) There are no examples of falling contours. (ii) There is no opposition between a high tone and a mid tone: only one type of non-low, non-rising tone is observed. Its realizations occupy the entire upper part of the tonal space, varying from mid to high, with a flat or falling contour. The choice of the label M (rather than H) for this pattern will be explained further below, at the stage of phonological analysis. (iii) There is only one contour that starts on a low pitch. Using level-tone labels, this observation can be stated as follows: there is no opposition between LM and LH. (iv) There are no examples of low, non-rising tones.

These three surface patterns are the same for monosyllables in other word classes, such as verbs and adjectives. Over disyllabic nouns, seven patterns are observed, as shown in Table 2.

Table 2. Tone patterns attested over disyllabic nouns spoken in isolation

1 st syllable	2 nd syllable	preliminary label	example
non-low	low	M.L	/daːtʃiː/ ‘mule’
non-low	low-rising	*M.LM	*
non-low	mid-rising	M.MH	/hwɔːtʃiː/ ‘cat’
non-low	mid	M.M	/pɒtʃloː/ ‘ram’
non-low	high	M.H	/hwæːtʃæː/ ‘squirrel’
low	low	*L.L	*
low	low-rising	L.LM	/k ^h ɪːdʒmiː/ ‘dog’
low	mid-rising	L.MH	/ɔːldɪː/ ‘wolf’
low	mid (or high)	L.M (~ L.H)	/boːdʒmiː/ ‘sow’

Table 2 includes two unattested combinations, marked with an asterisk, (*), in the *example* and *preliminary label* columns. If the tone of the first syllable is non-low, there are four observed tonal patterns on the second syllable: low; mid; high; or mid-rising. If the tone of the first syllable is low, there are three attested patterns on the second syllable: low-rising; mid; or mid-rising.

The restrictions on the distribution of tones on disyllables can be described as follows: (i) Only two tones contrast on the first syllable: low and non-low. There can be no contour on the first syllable. (ii) A Mid tone cannot be followed by a low-rising tone. (iii) A disyllable cannot be low throughout, any more than a monosyllable can. (iv) There is no contrast between the low+mid pattern and a low+high pattern; the notation adopted is L.M.

There are also strong limitations on tone patterns over three syllables: only twelve patterns are attested. The data in Table 3 are from trisyllabic nouns whose degree of lexical integration ranges from transparent compounds, such as ‘Year of the Dragon,’ to fully undecomposable words, such as ‘lips.’ A hyphen is placed between the two parts of decomposable compounds.

Table 3. Tone patterns attested over trisyllabic nouns spoken in isolation

1 st σ	2 nd σ	3 rd σ	preliminary label	Example
non-low	mid	mid	M.M.M	/dʒɤ-tq ^h wɤ-tʃse-t/ ‘awl’
non-low	mid	low	M.M.L	/mɤ-tgɤ-t-k ^h ɤ-t/ ‘year of the Dragon’
non-low	mid	high	M.M.H	/njo-tbi-tli-t/ ‘lips’
non-low	mid	mid-rising	M.M.MH	/bɤ-tzɤ-t-k ^h ɤ-t/ ‘year of the Snake’
non-low	low	low	M.L.L	/mo-tjo-tmi-t/ ‘owl’
non-low	high	low	M.H.L	/æ-tse-t ^h p ^h æ-t/ ‘kneebone’
low	low	mid	L.L.M	/t ^h o-tk ^h ɤ-tmi-t/ ‘male dog’
low	low	low-rising	L.L.LM	/dzu-t ^h na-tmi-t/ ‘wilderness’
low	mid	mid	L.M.M	/t ^h ɑ-tzɤ-tmi-t/ ‘donkey’
low	mid	high	L.M.H	/æ-tli-t ^h p ^h æ-t/ ‘mirror’
low	mid	mid-rising	L.M.MH	/bi-t ^h p ^h ɤ-t-dzu-t/ ‘flood’
low	mid	low	L.M.L	/bæ-tbɤ-t-bɤ-t/ ‘ladybird’

Since there is a three-way opposition on the second syllable, these are labelled as ‘low,’ ‘mid,’ and ‘high,’ whereas for the first syllable, where there is no opposition between mid and high, they are simply labelled ‘low’ and ‘non-low.’

Some generalizations can be proposed in view of data from the three tables. The first generalization is that non-final syllables never carry a contour. (In light of later analyses, this will be rephrased as: *non-tone group-final syllables* never carry a contour.) The second is that an entire word cannot carry a low tone on all of its syllables. The third is that there can never be a trough: a tone surrounded by higher tones (non-low followed by low followed by mid, for instance).

Data from Table 3 confirms the observation made in Table 2, that a mid (non-low) tone can be followed by one of four tones: low, mid, high, or mid-rising, whereas a low tone can only be followed by low-rising, mid or mid-rising. Additionally, the data from Table 3 suggests that a high tone can only be followed by a mid tone.

After this static inventory, a dynamic approach to the tones of nouns can be proposed. While reading through the following section, the reader may want to make an occasional leap forward to Table 5, which presents a synthetic overview of the full picture of the tone system for nouns as it finally emerges from the analysis.

2.2. A dynamic view, bringing out six underlying tonal categories for monosyllabic nouns, and eleven categories for disyllabic nouns

2.2.1. Monosyllabic nouns

It was mentioned above that there are three patterns for monosyllabic utterances: low-rising, non-low, and mid-rising. However, the set of nouns realized as non-low in isolation is not homogeneous, as witnessed in the behaviour of /jo-t/ ‘sheep,’ /zɤwæ-t/ ‘horse,’ and /la-t/ ‘tiger,’ all of which are realized with a non-low tone in isolation. In association with the copula, these yield: /jo-t ni-t/ ‘is [a/the] ram,’ with a low tone on the noun; /zɤwæ-t ni-t/ ‘is [a/the] horse,’ with mid tone on the noun, and high tone on the copula; and /la-t ni-t/ ‘is [a/the] tiger,’ with mid tone on the noun and low tone on the copula. Since the morphosyntactic context is the same, these three words must be considered as representatives of three different lexical tones. These three tones all neutralize to mid (non-low) when the noun is spoken in isolation.

The set of nouns realized as low-rising tones in isolation is not homogeneous either: in some contexts, such as object+verb combinations, /zæ-t/ ‘leopard’ and /bo-t/ ‘pig’ have different behaviours. For example, ‘...has bought leopards’ is /zæ-t hwæ-t-ze-t/, with L tone on

the accomplished suffix /-ze/, whereas ‘...has bought pigs’ is /boɭ hwæɫ-zeɫ/, with M tone on the suffix.

As an aside regarding the research method: these combinations were elicited with the greatest care, and verified over several field trips from 2006 to the time of the present publication. An appropriate context was devised with the help of the main consultant, e.g. for ‘...has bought leopards,’ imagining that a king sends out someone to purchase leopards from hunters. Examples found in recorded narratives confirm the patterns that were obtained through systematic elicitation. The data are gradually being archived and made available online through the Pangloss Collection (Michailovsky et al. 2014).

To sum up, out of the three surface patterns on monosyllabic utterances, one (MH) corresponds to a single phonological set: all the words realized with MH tone in isolation have the same tone pattern in a given morphosyntactic context. The two others constitute the neutralization of underlying patterns: the low-rising contour provisionally transcribed above as LM corresponds to two underlying categories, and M to three categories. A dynamic view thus brings out six tonal categories of monosyllables.

2.2.2. Disyllabic nouns

The same procedure as above was also applied to disyllabic nouns, i.e. looking at the behaviour of nouns in different morphosyntactic contexts, in order to find out how many tone classes need to be distinguished. As already mentioned, the reader may want to make an occasional leap forward to Table 5, which presents a synthetic overview of the full picture of the tone system for nouns as it finally emerges from the analysis.

It was discovered that the nouns realized with a M.M pattern in isolation belong to two distinct types: one after which the copula carries L tone, and one after which the copula carries H tone. One type is illustrated by /poɫloɫ/ ‘ram,’ /poɫloɫ niɫ/ ‘is [a/the] ram,’ and the other by /zɥwæɫzoɫ/ ‘colt,’ /zɥwæɫzoɫ niɫ/ ‘is [a/the] colt’.

Likewise, the nouns realized with a M.H pattern in isolation make up two distinct sets, the one illustrated by /kɥɫʂeɫ/ ‘flea,’ /kɥɫʂeɫ niɫ/ ‘is [a/the] flea,’ the other by /hwæɫʂæɫ/ ‘squirrel,’ /hwæɫʂæɫ niɫ/ ‘is [a/the] squirrel.’

Finally, the nouns realized with a L.M pattern in isolation fall into no less than three categories. These three categories are brought out by intersecting evidence from two contexts: with a following copula and with a following possessive, as shown in Table 4.

Table 4. Examples illustrating the existence of three tone categories neutralized to L.M in isolation

in isolation	Gloss	with copula	with possessive
boɫmiɫ	Sow	boɫmiɫ niɫ	boɫmiɫ-byɫ
boɫɬaɫ	Boar	boɫɬaɫ niɫ	boɫɬaɫ-byɫ
naɫhĩɫ	Naxi	naɫhĩɫ niɫ	naɫhĩɫ-byɫ

Addition of the copula sets apart a class exemplified by ‘Naxi,’ after which the copula receives H tone. Addition of the possessive sets apart a class exemplified by ‘boar,’ which depresses the tone of the possessive to L, as opposed to its realization as M for the other words. While the evidence used to bring out the tone classes is morphotonological—looking at the behaviour of nouns in context—the tone classes must be described as lexical, since the difference in the surface-phonological tone strings shown in Table 4 must be ascribed to a difference between the lexical items at issue, and hence, to a difference in lexical tone categories.

In total, this yields eleven tonal classes of disyllables.

2.3. *A phonological analysis of the tone categories of nouns*

As reported in the preceding paragraphs, a number of tonal categories were brought out on the basis of their different behaviour in various morphosyntactic contexts. The phonological analysis of these categories is up against an issue of circularity, since the tone categories of the simplest units—monosyllabic nouns—can only be brought out by examining their combinations with various other morphemes whose tones, at this stage, have not been analyzed either. In practice, however, bootstrapping is often required when analyzing a new language variety, groping for a correct analysis by trial and error.

A step forward in the analysis of the tones of nouns was made possible by progress in the analysis of the tones of other morphemes: it was realized that the copula belonged in the tonal category L (one of the underlying lexical categories of verbs), and that the possessive carried M tone. (The full argument concerning the tones of verbs will be set out in a book-length description of the Yongning Na tone system, currently in preparation.) On this basis, it became possible to propose a phonological analysis for each of the tones of nouns.

The two tonal categories of nouns illustrated by /la˥ ɲi˨/ ‘is [a/the] tiger’ and /z̥wæ˥ ɲi˨/ ‘is [a/the] horse’ were reanalyzed as follows. In the first case, the copula surfaces with its own lexical tone. ‘Tiger’ represents the simplest case, analyzed as having M tone: a phonological tone identical with the surface tone in this context. (The same analysis can be proposed for the category of disyllables illustrated by /po˥lo˥/ ‘ram.’) In the second case, ‘horse,’ the copula surfaces with a H tone, which must be supposed to be projected onto it by the noun. ‘Horse,’ therefore, exemplifies a tone category characterized by a H tone which can only surface on a following syllable: a floating H tone. Discussion of this phenomenon warrants a separate subsection.

2.3.1. *A floating H tone*

A High tone is described as “floating” if it is never realized on the word itself, and can only be realized after the word. The H tone that appears in /z̥wæ˥zo˥ ɲi˨/ ‘is [a/the] colt’ is interpreted as reflecting a floating H tone lexically attached to the noun ‘colt’.

Since this is the only type of H tone that may be lexically attached to a monosyllabic utterance, it is convenient to transcribe it simply as a H tone on monosyllabic nouns: e.g. ‘horse’ is transcribed as //z̥wæ˥//. Henceforth, lexical tones will be enclosed within double slashes, to distinguish them from surface-phonological tones: thus, the lexical form of ‘horse’ is //z̥wæ˥//, with H tone; its surface-phonological representation when it appears in isolation is /z̥wæ˥/, with M tone.

For disyllables, however, there is an opposition between the floating H tone and a word-final H tone (as in //hwæ˥tsu˥// ‘rat’). This complexity of syllabic anchoring makes it necessary to use a nonstandard symbol: a symbol not used in the International Phonetic Alphabet. The pound symbol # was (arbitrarily) chosen to stand for the end of a lexical word, adopting the notation of the word as /z̥wæ˥zo˥#˥/, and of the tonal category as #H.

To labour this important point: the #H-tone word ‘colt’ and the M-tone word ‘little sister’ have the same tonal pattern in isolation (M on both syllables: /z̥wæ˥zo˥/ ‘colt,’ /go˥mi˥/ ‘little sister’), but the former yields /z̥wæ˥zo˥ ɲi˨/ ‘...is [a/the] colt’ (tone sequence: M.M+H), the latter /go˥mi˥ ɲi˨/ (tone sequence: M.M+L). This demonstrates that ‘colt’ has a final H tone—a H tone that is floating at the end of the word—which remains unassociated unless it can associate to a following syllable. These two words will be represented as //z̥wæ˥zo˥#˥// and //go˥mi˥//, respectively.

It should be noted that the association of this floating H tone requires specific morphosyntactic conditions. For instance, the possessive, as a clitic, is not a suitable host for a floating tone; it receives a M tone (by default), leaving the H tone unassociated (and thus

not surfacing in the resulting pattern), hence /zɥwæɫzoɫ-byɫ/ ‘...of [a/the] colt,’ tonally identical to /goɫmiɫ-byɫ/ ‘...of [a/the] little sister.’

2.3.2. Yet another type of H tone: association to the edge of the tonal phrase

It was mentioned above that the words ‘squirrel’ and ‘flea,’ realized with a M.H pattern in isolation (as /hwæɫʃsæɫ/ and /kɥɫʃeɫ/, respectively), have different underlying tones.

The former has a simple tonal behaviour: its H tone attaches to the last syllable of the lexical word. This is where it appears in all contexts. Under the present analysis, the first syllable of the word receives a M tone by default, yielding a surface-phonological M.H pattern. Accordingly, the representation of ‘squirrel’ is //hwæɫʃsæɫ//.

The word ‘flea,’ however, has a H tone that attaches to the last syllable of a higher-level unit, referred to below as the *broad tonal phrase*, including affixes. (More about prosodic levels in section 3.) Like the floating H tone, this H tone only appears when a certain condition is met. Its appearance is conditioned by whether the last syllable in the broad tonal phrase is an appropriate host. When a word carrying this tone is pronounced in isolation, the end of the lexical word is also the end of the broad tonal phrase, and the H tone lands there, hence the surface tone sequence of M.H: /kɥɫʃeɫ/ ‘flea.’ When the noun is followed by the copula, the H tone surfaces on it, hence /kɥɫʃeɫ ɲiɫ/ ‘is [a/the] flea.’ When the noun is followed by the possessive, on the other hand, the H tone does not surface, because this clitic is not an appropriate host. The result is /kɥɫʃeɫ-byɫ/ ‘...of [a/the] flea,’ with a M tone on both syllables of the noun, and also, by default, on the possessive.

Another non-standard symbol was devised to transcribe the boundary that is relevant to the attachment of this type of tone: the end of the broad tonal phrase. Again in an arbitrary way, the dollar sign \$ was chosen to stand for this boundary. Accordingly, the representation of ‘flea’ is //kɥɫʃeɫ\$//.

To sum up, disyllabic (and polysyllabic) nouns with H tone must be divided into three categories, labelled H\$, H#, and #H, depending on how the H tone manifests itself. A H tone on the last syllable of a disyllabic or polysyllabic noun may have different origins. It may be the realization of a High tone that is anchored to the end of the broad tonal phrase (a tone transcribed as H\$). Or it may be a High tone anchored to the last syllable of the lexical word: H#. It is impossible to distinguish these in isolation, as both positions coincide. The third of these categories—#H—denotes a noun that carries a floating H tone. In order to find out the underlying tones of words, they have to be heard in various contexts. For nouns, these are: tone-group-final position (as when they are spoken in isolation); tone-group-internal position; and when followed by a toneless clitic such as the possessive. The lexical tone can be arrived at with certainty by matching up the behaviour of the word in these various contexts.

2.3.3. L tones: existence of a repair phenomenon for all-L tone groups

A further piece of required background knowledge when studying Yongning Na tones is that there exists a repair phenomenon whereby all-L tone groups receive a (postlexical) final H tone, resulting in a low-rising contour on their last syllable. A simple example is the noun ‘sheep,’ which carries a lexical L tone: in association with the copula, which likewise carries a L tone, it is realized as /joɫ ɲiɫ/, with a final contour, instead of a simple /*joɫ ɲiɫ/. The sequences L+L (monosyllabic noun+copula) and L.L+L (disyllabic noun+copula) cannot surface as such, due to a general prohibition against all-L tone groups in Na. The contour observed at the end of a sequence of L tones is interpreted as resulting from the post-lexical addition of an extra tone: a High tone, creating a rising contour. The same applies to the tonal class of disyllables exemplified by //k^hɥɫmiɫ// ‘dog.’

Dots indicate boundaries between syllables within the lexical word, and the ‘+’ sign indicates the boundary between the noun and a following morpheme. For instance, the information provided in Table 5 for disyllabic L-tone nouns is: L.LH in isolation, and L.L+H with a copula and with a possessive clitic. As an example, the word ‘dog’ is /k^hɿ̯ɿ̯mi/ in isolation, yielding /k^hɿ̯ɿ̯mi ɿ̯ni/ ‘...is [a/the] dog’ and /k^hɿ̯ɿ̯mi-by/ ‘...of [a/the] dog.’

The leftmost column in Table 5 (“analysis”) presents the phonological categories. The tones of example words are also transcribed according to these phonological categories, not according to their realization in isolation, hence some discrepancies with the preliminary notations provided in the previous tables (for instance, the realization of /jo/ ‘sheep’ in isolation is /jo/, and that of /k^hɿ̯ɿ̯mi/ ‘dog’ is /k^hɿ̯ɿ̯mi/). Tones are indicated at the end of each syllable using International Phonetic Alphabet tone-letters (Chao Yuen-ren 1930), e.g. /bo/ ‘pig.’ This is strictly equivalent to /bō/ in Africanist notation, or to other notations such as /bo^{LM}/ or /^{LM}bo/.

Table 5. The phonological tones of monosyllabic and disyllabic nouns.

	analysis	/realization in isolation/	+COP	+POSS	//lexical form//	meaning
Monosyllables	LM	LH	L+H	L+H	boɿ	pig
	LH	LH	L+H	L+H	zæɿ	leopard
	M	M	M+L	M+M	laɿ	tiger
	L	M	L+LH	L+M	joɿ	sheep
	#H	M	M+H	M+M	zɰwæɿ	horse
	MH#	MH	M+H	M+H	tʂ ^h æɿ	deer
Disyllables	M	M.M	M.M+L	M.M+M	poɿloɿ	ram
	#H	M.M	M.M+H	M.M+M	zɰwæɿzo#ɿ	colt
	MH#	M.MH	M.M+H	M.M+H	hwɿɿliɿ	cat
	H\$	M.H	M.M+H	M.M+M	kɿɿʂeɿ\$	flea
	H#	M.H	M.H+L	M.H+L	hwæɿtʂæɿ	squirrel
	L	L.LH	L.L+H	L.L+H	k ^h ɿ̯ɿ̯miɿ	dog
	L#	M.L	M.L+L	M.L+L	daɿjiɿ	mule
	LM+MH#	L.MH	L.M+H	L.M+H	õɿdyɿ	wolf
	LM+#H	L.M	L.M+H	L.M+M	naɿhĩ#ɿ	Naxi
	LM	L.M	L.M+L	L.M+M	boɿmiɿ	sow
LH	L.H	L.H+L	L.H+L	boɿtaɿ	boar	

In light of this synthetic view, the distributional observations made above can be flipped around. For instance, instead of stating that “a monosyllabic noun that carries a M tone in isolation may belong in one of three distinct underlying categories,” it can now be said that the three non-contour lexical tones, //M//, //L// and //H//, all neutralize to /M/ when a monosyllable is said in isolation. Among disyllables, //M// and //H// neutralize to /M.M/; //H\$// and //H#// neutralize to /M.H/; and //LM// and //LM+#H// neutralize to /L.M/.

When the possessive clitic /by/ is added after a monosyllabic noun, yielding, for example, /boɿ-by/ ‘of the pig,’ contours unfold over the two syllables of the resulting combination: //LH// yields /L+H/ (as does //LM//, following neutralizing with //LH//), and //MH// yields /M+H/. The non-contour tones, //M//, //L// and //H//, do not affect the possessive, which surfaces with the default /M/.

This last point offers crucial evidence for the distinction between contours (//LM//, //LH//, and //MH#//) on the one hand, and the floating H tone (//H//), on the other. The second part

of the contour is realized on the possessive; the floating H tone is not. The interpretation proposed is that the possessive clitic cannot provide anchorage for a tone, whereas it can host a tone level that is part of a tone anchored to a preceding syllable. The //MH#// contour tone in Table 5 has a stable phonological anchorage: it is anchored to the syllable preceding the clitic. From there, the second part of the contour can be projected onto the possessive clitic—a process of contour unfolding, which is distinct from that of tonal anchoring.

On the other hand, the floating H tone initially lacks anchorage, and the possessive clitic is unable to provide such anchorage. Since this H tone receives syllabic anchoring neither onto the word to which it is lexically attached, nor on the possessive clitic that follows it, it remains unassociated, and does not surface at all.

From a typological point of view, the facts set out above definitely warrant the conclusion that the tone system of Yongning Na can be analyzed as based on tonal levels. This stands in contrast to tonal systems where phonation-type characteristics are part and parcel of the definition of tones, e.g. the Wu branch of Sinitic (Rose 1982, 1989a, 1990), Yi and Bai (Edmondson et al. 2001), Tamang (Mazaudon and Michaud 2008), and Hmong (Andruski and Ratliff 2000, Andruski and Costello 2004, Kuang 2012).

In light of this detailed introduction to the tone system of Yongning Na, it is now possible to address the issue of tone groups.

3. General characterization of the tone group

Section 2 presented information about the tones of nouns, using evidence from some prosodic words consisting of nouns in isolation or combinations of nouns with affixes or verbs. It also introduced some of the prosodic levels for which there is evidence in Yongning Na; the full list, from the level of the syllable to that of the tone group, is:

- the syllable, which is the tone-bearing unit at the surface-phonological level;
- the lexical word, to which tone categories are lexically associated;
- the narrow tonal phrase, including combinations of lexical words (e.g. noun plus verb in S+V or O+V combinations, and noun plus noun in compounds) and any added clitics
- the broad tonal phrase: a narrow tonal phrase with the addition of affixes
- the tone group, containing at least one tonal phrase.

In a model of prosodic hierarchy, such as the model proposed as universal by Selkirk (1986) and Nespor and Vogel (1986), made up of Utterance Phrase→ Intonational Phrase→ Phonological Phrase→ Phonological Word→ Foot→ Syllable→ Mora, tone groups could be considered as constituting one *phonological phrase* each, or possibly one *intonational phrase* each. The term ‘tone group’ is nonetheless used here in preference to ‘prosodic phrase’ for several reasons. One is that straightforward identification of Na tone groups with a given level of the prosodic hierarchy proposed as a universal (generative) model raises the issue of the real degree of cross-linguistic similarity (a point taken up again in the Conclusion of this article). Another reason is that the defining characteristic of this phonological unit in Yongning Na is that it serves as the domain of tonal processes, hence the choice of a label containing the word “tonal;” likewise for the units described here as *narrow tone phrase* and *broad tone phrase*, which (in the current state of the analysis) do not appear to lend themselves straightforwardly to identification with levels in the “Utterance Phrase→ Intonational Phrase→ Phonological Phrase→ Phonological Word” hierarchy. Likewise, the levels that have been proposed as relevant for the analysis of tone sandhi in Wu dialects of

the Sinitic languages by Zhu (2006:43)—*prosodic word* and *phrase*—do not coincide neatly with the levels that need to be posited for Na on the basis of tonal processes.²

The only morphophonological processes observed in Na are tonal. Na does not have segmental rules such as the lenition of word-medial consonants observed in other languages of the area, e.g. Qiang (LaPolla and Huang 2003:31–32) and Shixing (Chirkova 2009:12–13), which provide evidence for the phonological word as a metrical domain.

In Na, tonal computation is conducted independently for successive tone groups. The following are the key phonological facts governing tonal assignment within a tone group.

- Within a tone group, contours are only realized as such in tone-group-final position; in non-group-final position, the second level (the H portion in MH, for instance) associates to the following syllable.
- L tone spreads progressively (left-to-right).
- All tones following H are lowered to L.
- H and M are neutralized to M in tone-group-initial position.

On the basis of this overview, it is now possible to turn to the central topic of this article: the division of utterances into *tone groups*, the largest domain within which tonal computation takes place.

Although there exist some general tendencies in the division of utterances into tone groups, and a few hard-and-fast rules, there are often several possibilities open to the speaker; different divisions into tone groups have different implications in terms of prominence of the various components. Prominence (conveying information structure) and phrasing (reflecting syntactic structure) interact in the division of an utterance into tone groups. There is therefore no systematic one-to-one correspondence between syntactic structure and division into tone groups.

The present description starts with the simplest case: that of elements which always constitute a tone group on their own.

3.1. *Some elements always constitute a tone group on their own*

Some words always constitute a tone group on their own; they are referred to below as “tonal standalones.” These include the gap-filler /t^{hi}l/ ‘(and) so, (and) then’; /wɔl/ ‘again’,

² Detailed discussion of prosodic domains in Na in typological perspective must be deferred to a later study; with apologies for the self-citation, the reader is referred to Michaud and Vaissière (2015) for a presentation of this author’s views on the typology of tone and intonation. Let us simply note a difference between tonal grammar in Yongning Na and tone sandhi in Sinitic: phenomena described as “tone sandhi” in Sinitic include cases that look like ingrained coarticulation patterns, rather than sandhi proper (i.e. the categorical substitution of one tone by another within the closed set of lexical tones). This is one of the most intensively researched areas of Chinese (Sinitic) phonology (in particular: Shih 1986; Zee and Maddieson 1980; Chen 1987; Chen 2000; Rose 1989; Chang 1992; Hashimoto-Yue 1987): tone-3 sandhi in Standard Mandarin, whereby the first of two 3-tone syllables changes to tone 2, is probably the most intensely studied phonological issue of the entire Sinitic domain (see in particular the review by Shih 1997; and Chen and Yuan 2007). Continuing disputes about the degree of closeness of the tones in 2+3 and 3+3 sequences (Cheng, Chen, and Xu 2014 and references therein), i.e. between tone 2 and the sandhi form of tone 3, are by themselves highly revealing about the fuzzy boundary between tonal coarticulation and categorical tone change. The difficulty to obtain decisive experimental evidence comes from the considerable range of factors – many of them gradient – that contribute to shaping the phonetic realization of tones in Mandarin.

which in quite a few cases does not have its full lexical meaning and is close to a simple gap-filler; the intensifier /dʷæɪ/ ‘very’; and the contrastive topic marker /-noɪ/. Three of these happen to appear in succession in Housebuilding.144, resulting in a sequence of three monosyllabic tone groups: / | t^{hi}ɪ | -noɪ | wɤɪ |/. (The symbol | is used to mark tone-group boundaries; for the sake of visual clarity, it is preceded and followed by two spaces.)

One could speculate that /t^{hi}ɪ/ ‘(and) so, (and) then’ and /wɤɪ/ ‘again’ are favoured as gap-fillers because of their properties with respect to tone-group divisions. The gap-filler /t^{hi}ɪ/ appears in most sentences in the narratives told by the main consultant: more than 1,500 occurrences among 20 narratives. The gap-filler /wɤɪ/ appears more than 120 times among the same narratives. These two items may owe part of their conspicuous success as gap-fillers to the phonological fact that they demarcate tone groups clearly. Since they always constitute a tone group on their own, they create a pause in the computation of tone sequences.

But one may just as well hypothesize the inverse causal link: that these words tend to be set off from the rest of the utterance due to their function as gap-fillers, eventually resulting in the present situation where they systematically constitute tone groups of their own. An argument in favour of this hypothesis is provided by items that are in the process of entering the set of “tonal standalones.” The adverb ‘continuously, ceaselessly’ is a case in point. It was elicited in association with verbs exemplifying the six tonal categories of verbs, yielding the results shown in Table 6.

Table 6. The tone patterns of phrases made up of the adverb ‘continuously, ceaselessly’ followed by a verb.

tone	example	gloss	Result	tone pattern
H	dzuɪ	to eat	ɖuɪ-njɤɪ dzuɪ	M.M.M
M _a	hwæɪ _a	to buy	ɖuɪ-njɤɪ hwæɪ	M.M.L
M _b	tɕ ^{hi} ɪ _b	to sell	ɖuɪ-njɤɪ tɕ ^{hi} ɪ	M.M.M
L _a	dzeɪ _a	to cut	ɖuɪ-njɤɪ dzeɪ	M.M.MH
L _b	zɤɤɪ _b	to speak	ɖuɪ-njɤɪ zɤɤɪ	M.M.MH
MH	laɪ	to strike	ɖuɪ-njɤɪ laɪ	M.M.MH

But in narratives, the adverb is always followed by a tone-group boundary, as in (4), where //ɖuɪ-njɤɪ// ‘continuously, ceaselessly’ and //zɤɤɪ_b// ‘to say’ are not integrated in the same tone group. (Total number of examples as of 2015: 31.)

(4) hɪɪmoɪ = ɤæɪ-nɤɪ | ɖuɪ-njɤɪ | zɤɤɪ-kvɪ | mæɪ
 hɪɪmoɪ = ɤæɪ-nɤɪ ɖuɪ-njɤɪ zɤɤɪ_a kvɪ mæɪ
 elders=pl-a constantly to_say abilitive affirm
 ‘The elders would always say...’ (Dog2.32)

Using the context of this narrative, it was attempted to combine the adverb with the verb, but the consultant judged this wrong, even when truncating the sentence after the main verb: /*ɖuɪ-njɤɪ zɤɤɪ/. This judgment highlights the fact that the data in Table 6 were elicited at a push: in the present state of the language, they verge on the incorrect, and the adverb is well advanced on its way towards the status of “tonal standalone.” This example illustrates how easily different data collection methods can lead to different conclusions; the combination of different types of data, collected with suitable precautions, appears indispensable for cumulative progress in this research.³

³ See the methodological papers on *How to Study a Tone Language* are grouped into a set of articles edited by Steven Bird and Larry Hyman, in volume 8 of the journal *Language Documentation and Conservation* (2014).

A discourse factor that arguably plays a leading role in the evolution of the adverb //dɯ-t-njɤ-t// ‘continuously, ceaselessly’ is the emphasis that is associated with ‘ceaselessly/constantly’ (from a semantic-pragmatic point of view). The word sometimes carries emphatic stress in narratives. The scenario would thus be one of generalization (lexicalization) of intonational emphasis. This constitutes a distant echo to the phenomenon of lexicalization of a Rising tone of emphatic origin in Naxi (Michaud 2006).

3.2. *A tone group boundary is always found after topicalized phrases*

A tone group boundary is always found after topicalized and focused elements—a cross-linguistically unsurprising pattern (see e.g. Downing’s (2006) analysis of data from the Bantu language Chitumbuka). In detail, the situation is as follows:

- The topic-marker //noʔ// always constitutes a tone group on its own, as mentioned above and illustrated by (5).

(5) hwɤ-liʔ | -noʔ, | zy-kʰvʔ-ŋwɤ-kʰvʔ. |
 hwɤ-liʔ -noʔ zy-kʰvʔ ŋwɤ-kʰvʔ
 cat TOP four-years five-years

‘As for the cat, [it has a lifespan of] four, five years.’ (Dog2.84; context: the previous discussion hinges on the dog’s lifespan, and the speaker now moves on to the topic of cats.)

- The topic-marker //dzoʔ// always terminates a tone group. No exception has been found among some 2,000 examples from narratives.
- The focus-marker //tʂʰuʔ// likewise terminates a tone group, except in the many cases where it is followed by the topic-marker //dzoʔ//.

3.3. *Options left to the speaker in the division into tone groups*

Apart from the cases presented above, where the speaker has no choice as to the division into tone groups, the speaker generally has several options. They may choose to integrate large chunks of speech into a single tone group; or they may divide the utterance into a number of tone groups, with the stylistic effect of emphasizing these individual components one after the other. This parallels observations made in the past century, going back at least to Karcevskij’s observation that, in Russian and German, “within certain limits, it is possible to change the position of the rhythmic breaks that separate a sentence into parts” [original quote: “Dans certaines limites, nous pouvons déplacer les anti-cadences séparant les membres de la phrase”] (1931:204). An interesting characteristic of Yongning Na is that this division exerts a direct effect on tonal morphology, since tonal processes never apply across tone-group junctures.⁴

For instance, //dzu-t-diʔ// ‘things to eat; food’, from //dzuʔ// ‘to eat’ and the nominalizer //diʔ//, can combine with /mɤ-t-dzoʔ/ ‘there isn’t’ to mean ‘there isn’t any food, there is nothing to eat’; the noun and the negated verb can either be integrated into a single tone

A case of diverging notations in a level-tone language is analyzed by Roux (2003), leading to similar recommendations for precautions in the investigation method. This author’s views are set out in Niebuhr and Michaud (2015).

⁴ In tonal languages, modifications of metrical structure as a function of speech tempo are reported e.g. in Jianghuai Mandarin (Nantong) by Ao (1993:136–138).

group, as /dzuɹ-dɪɹ mɻɹ-dzoɹ/, or separated, as /dzuɹ-dɪɹ | mɻɹ-dzoɹ/. The latter option is illustrated by (6):

- (6) dzuɹ-dɪɹ | mɻɹ-dzoɹ, | tʰuɹ-dɪɹ | mɻɹ-dzoɹ
 dzuɹ -di mɻɹ dzoɹ tʰuɹ -di mɻɹ dzoɹ
 to_eat NMLZ NEG EXIST to_drink NMLZ NEG EXIST
 ‘[Before mankind had learned to grow crops], there was nothing to eat and nothing to drink!’ (Seeds2.67)

In (6), the noun phrase /dzuɹ-dɪɹ/ ‘food’ and the negated existential verb /mɻɹ-dzoɹ/ are separated into two tone groups. This has the effect of emphasizing the two noun phrases, /dzuɹ-dɪɹ/ ‘food; things to eat’ and /tʰuɹ-dɪɹ/ ‘drink; beverage.’ This could be analyzed as a case of focalization, and transcribed as /dzuɹ-dɪɹ F | mɻɹ-dzoɹ, | tʰuɹ-dɪɹ F | mɻɹ-dzoɹ/, where the symbol ‘F’ indicates intonational focalization. The presence of a tone-group boundary before the negation could then be interpreted as a consequence of focalization.

The following sentence in the story repeats the statement ‘There was no food,’ continuing the same strategy of bringing out the noun phrase ‘food,’ this time with the topic marker /-dzoɹ/: /dzuɹ-dɪɹ | -dzoɹ, | mɻɹ-dzoɹ-nɪɹ-tsuɹ | -mɻɹ/ ‘As for food, it’s said that there was none!’ (Seeds2.68). Then the narrator recapitulates, and moves on:

- (7) dzuɹ-dɪɹ mɻɹ-dzoɹ | -dzoɹ | tʰiɹ...
 dzuɹ -di mɻɹ dzoɹ -dzoɹ tʰiɹ
 to_eat NMLZ NEG EXIST TOP so/then
 ‘As there was nothing to eat, ...’ (the narrative moves on to: ‘there were some exceptional, smart people, who stood up and did something about it’) (Seeds2.69)

At this juncture, ‘there was no food’ is integrated into a single tone group, and followed by the topic marker // -dzoɹ//. This provides an exemplary illustration of the integration of larger chunks of information into a single tone group as this information changes its status from new to old.

Long tone groups within which morphosyntactic tone rules are allowed full play, undisturbed by local intrusions of pragmatic phenomena of emphasis, yield a stylistic effect of carefully constructed, poised, stately speech. The more tightly constructed an utterance, the fewer tone groups it contains. Conversely, in lively speech, tone-group boundaries are inserted, highlighting the word (or phrase) that precedes. Even function words can be emphasized in this way. Consider (8):

- (8) ʰoɹ-pɻɹ-tɪɹ-kɻɹ | -tsuɹ | -mɻɹ!
 ʰoɹ-pɻɹ tɪɹ kɻɹ -tsuɹ -mɻɹ
 kow-tow to_hit abilitive rep affirm
 ‘It is said that [on that occasion, the whole family] will kow-tow!’
 (Sister3.138)

A simpler formulation would be /ʰoɹ-pɻɹ-tɪɹ-kɻɹ-tsuɹ | -mɻɹ/. The formulation in (8) emphasizes the reported-speech particle. This evidential particle is used over and over again by the consultant when telling narratives: it is used whenever the speaker only has indirect knowledge of the situation at issue (Lidz 2007). But in the context of (8), it takes on its full meaning, because the narrator never witnessed the ritual that she describes. The emphasis laid on this particle in the context of this sentence is one of the manifestations of the speaker’s efforts to adhere to truthfulness and precision.

The stylistic choices made by a speaker can be appraised against a background of general tendencies, as outlined below.

3.4. *The role of the morphological complexity of constituents*

The degree of internal complexity of the successive constituents of an utterance is an important parameter in determining its division into tone groups. A verb without prefixes or suffixes is usually just one syllable long, and easily associates with a preceding element—an adverb or a noun. For instance, /k^hu+ts^hɣ+ t^he+// ‘to stretch out [one’s] leg,’ from //k^hu+ts^hɣ+// ‘leg’ and //t^he+// ‘to stretch out,’ constitutes a single narrow tonal phrase, whose output tone is determined by the tone rules that apply in subject+verb phrases. When an adverb is inserted, it can be integrated into the tone group, e.g. yielding /k^hu+ts^hɣ+ mɿtɕo t^he+// ‘to stretch (one’s) leg down’ through addition of //mɿtɕo+// ‘downward.’ Often times, though, the adverb marks the beginning of a new tone group: /k^hu+ts^hɣ+ | mɿtɕo+ t^he+// ‘to stretch [one’s] leg downward’ (two tone groups; the word ‘leg’ therefore surfaces with its lexical tone, MH).

Like directional adverbs, numeral-plus-classifier phrases often mark the beginning of a new group, e.g. /sɿ+~sɿ+ | dɿ+~p^hæ+// ‘a sheet of paper’ (from //sɿ+~sɿ+// ‘paper’). The only case of integration observed is ‘the mother and her daughter,’ phrased as /ə+mi+~mɿ+ | ni+~kɿ+//, literally ‘mother and daughter, the two’ (Tiger.11, 51, and Lake.93, 96-98, 125), from /ə+mi+~mɿ+// ‘mother and daughter’ and /ni+~kɿ+//, ‘2’ plus the classifier for persons. This is a special case, obviously not an instance of counting mother-and-daughter pairs. The numeral-plus-classifier phrase does not serve the usual purpose of counting the referent of the preceding noun: in this context, it serves an anaphoric function (paraphrase: ‘these two: the mother and the daughter’).

On the other hand, demonstrative-plus-classifier phrases are commonly integrated with a preceding noun: for instance, in the first version of the Lake story, the same two characters, a mother and her daughter, are referred to as /ə+mi+ t^hu+~ɿ+~la+ | mɿ+ t^hu+~ɿ+//, ‘that mother and that daughter.’

- (9) ə+mi+ t^hu+~ɿ+~la+ | mɿ+ t^hu+~ɿ+ (...)
 ə+mi+ t^hu+~ɿ+ -la mɿ+ t^hu+~ɿ+
 mother DEM-CLF.individual and daughter DEM-CLF ‘that mother and that daughter’ (Lake.52).

3.5. *The role of information structure: considerations of prominence*

Information structure also influences the division into tone groups, in a way which is often difficult to disentangle from the influence of morphological complexity. Consider (10):

- (10) k^hv+mi+~sɛ+ | dzu+~mɿ+~dɔ+~pi+~zo+!
 k^hv+mi+~sɛ+ dzu+ mɿ+ dɔ+ pi+ zo
 dog-meat to_eat NEG ought_to to_say ADVB
 ‘It’s said that dog meat is something one must not eat! / It’s said that one mustn’t eat dog meat!’ (Dog2.37)

In (10), the noun phrase ‘dog meat’ is set into relief by constituting a tone group on its own. Despite the absence of a morphemic indication that it is topicalized/focalized—such as use of the focus-marker //~t^hu+// or the topic-marker //~dzo+//—it clearly has the status of topic. In this context, tonal integration with a following verb would not be stylistically appropriate.

Likewise, in (11), the adverbial ‘outside,’ //əp^ho/], constitutes a tone group on its own; another option would be to integrate it tonally with the following verb. In this context, integration into a single tone group would be stylistically acceptable; it would reflect a higher degree of linguistic elaboration. Separation into two tone groups has the effect of providing information gradually, giving the impression that the speaker is constructing the utterance as she is saying it, rather than delivering long, carefully preplanned chunks of speech.

(11) əʃji+ʃuŋji]-dzo], | k^hv+ts^hu+dzo], | dzɤ/ | əp^ho/ | k^hu+mx̣-kv!
 əʃji+ʃuŋji]-dzo] k^hv -ts^hu -dzo] dzɤ/ əp^ho/
 in_the_past TOP dog FOC TOP INTENSIFIER outside
 k^hu mx̣ kv
 to_let NEG ABILITIVE

‘In the old times, one wouldn’t usually let dogs go outside! *Literally*: In the old times, dogs, one wouldn’t usually let them go outside!’ (Dog2.75)

It is uncommon for a verb preceded by the accomplished /le-/- to interact tonally with a preceding noun phrase. In Caravans.191, for instance, ‘the uncle comes back’ is realized as /əʃv | le+ts^hu/], not as /əʃv le-+ts^hu/], although the latter form is also acceptable. Cases where tonal interaction does take place are characterized by a strong degree of semantic givenness, as in (12):

(12) ɬu+ɣ+le+ts^hu], | ni+ky+le+ts^hu], | so]-ky] le]-ts^hu/
 ɬu+ɣ le+ ts^hu] ni+ky] so]-ky] le]-ts^hu/
 1-CLF.individual ACCOMP to_arrive 2-CLF 3-CLF

‘There arrived one person, then two, then three’ (field notes: explanation proposed during a discussion of Lake4.126)

It would not be incorrect to say /ɬu+ɣ | le+ts^hu], | ni+ky | le+ts^hu], | so]-ky | le+ts^hu/], but this would be inappropriate in a context where the emphasis is on the incrementation of the figure: one person, then two, then three. There would be no point in setting the subject apart from the verb, hence the division into three tone groups, rather than six.

When an explanation is added as an afterthought, a relatively long sequence of syllables can be integrated into a single tone group, as in (13), where the last tone group contains ten syllables.

(13) ɣɤ+ŋɤ+dzo], | əʃji+ʃuŋji], | hã]-baŋla]! | hã]-baŋla]-baŋla] le]-po]-jo]-ky]-mæ]!
 ɣɤ+ŋɤ dzo] əʃji+ʃuŋji] hã]-baŋla] hã]-baŋla]-baŋla]
 Chengdu top in_the_past silk silk_clothes
 le]- po] jo] ky] mæ]
 accomp to_bring to_come abilitive affirm

‘From Chengdu, in the past... Silk!! [The people who went on caravans] would bring back silk [from their journeys to Chengdu]!’ (Caravans104-105)

In this context, the narrator is explaining which goods used to be transported by caravan; the essential information is already given in the word ‘silk.’ The sequence /...le]-po]-jo]-ky]-mæ]/ ‘[they] would bring back’ is added as an explanation; its integration with the preceding noun, ‘silk,’ into a single tone group, results tonally in a levelling down of all of its tones to L.

In Elders3.11, as many as twelve syllables are bunched together: /əʃzi], | ɬu]mɔ+ɬa]ts^ho] pi]-hĩ] ɬu]-ɣ] dzo]-ni]-tsu]-mɣ]/ ‘[Among] women elders, it is said that

there was one by the name of $\text{dʷu}|\text{ma}|\text{-}|\text{ta}|\text{ts}^{\text{h}}|\text{o}|\text{J}$.’ The speaker lays considerable emphasis on the person’s name, $/\text{dʷu}|\text{ma}|\text{-}|\text{ta}|\text{ts}^{\text{h}}|\text{o}|\text{J}/$; all the rest of the sentence follows as a background accompaniment to this name. Phonologically, the name and all that follows are integrated into a single tone group, with the result that all the syllables from the third to the twelfth and last are lowered to L.

As a last example, in Renaming.17, the same syntactic structure, ‘you came along,’ is realized as two tone groups: $/\text{no}|\text{-}|\text{le}|\text{-}|\text{ts}^{\text{h}}|\text{u}|\text{-}|\text{ni}|\text{-}|\text{ze}|\text{-}|\text{mæ}|\text{J}/$, then repeated as a single tone group: $/\text{no}|\text{le}|\text{-}|\text{ts}^{\text{h}}|\text{u}|\text{-}|\text{ni}|\text{-}|\text{ze}|\text{-}|\text{mæ}|\text{J}/$, providing a striking illustration of how sentences tend to be integrated into broader chunk when the speaker assumes that the semantic content is already familiar to the listener.

This serves a function close to what has been labelled “parenthetical intonation” (a useful label, despite misgivings one may have about the carry-over of terms from writing systems). In the sample of (non-tonal) languages examined by Bolinger, the typical parenthesis has three prosodic characteristics: it is lower in pitch, it is set off by pause(s), and it has a rising terminal (Bolinger 1989:186; on French, see Rossi 1999:53, 97, 102). Yongning Na represents an interesting example of a phonetically similar surface realization (lowered fundamental frequency) in a tonal language, obtained through different means: in Yongning Na, lowered pitch is the result of a categorical process—the deletion of tone-group boundaries, which modifies the surface-phonological tone string for the utterance. The fact that parenthetical intonation has a broader set of phonetic correlates in non-tonal languages (such as a final rise, not found in Yongning Na) exemplifies the constraints that tones place on intonation in tonal languages: in Yongning Na, a final rise would conflict headlong with the rule of L-tone spreading. While tonal languages undoubtedly have intonation, lexical tone and tone rules place certain limitations on the range of intonational variation.

3.6. Derivation samples

This section recapitulates the mechanisms presented above by giving examples.

3.6.1. Noun+clitic+suffix+copula+particles

The family name of the main consultant, spoken in isolation, is $/\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{J}/$. Its phonological form is $//\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{J}|\text{S}//$, i.e. it has a morphological-nucleus-final H tone (tone category H\$).

When the COLLECTIVE clitic $/=\text{ɿ}|\text{J}/$ is added to it, it yields $/\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{-}|\text{=}\text{ɿ}|\text{J}/$ ‘the Latami family; the Latamis.’ As mentioned above, clitics belong to the narrow tonal phrase, along with the noun to which they are attached.

Addition of the AGT/TOP suffix $/\eta\text{u}|\text{J}/$ yields $/\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{-}|\text{=}\text{ɿ}|\text{-}\eta\text{u}|\text{J}/$ ‘by the Latami family’. The suffix is not part of the narrow tonal phrase, but it belongs in the broad tonal phrase, and the H tone therefore moves all the way to this syllable.

As for the copula, $//\text{ni}|\text{J}//$, it belongs in the same narrow tonal phrase as a preceding noun, hence $/\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{-}|\text{=}\text{ɿ}|\text{ni}|\text{J}/$ ‘it is the Latami family’.

Finally, sentence particles belong neither in the narrow tonal phrase nor in the broad tonal phrase, hence $/\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{-}|\text{=}\text{ɿ}|\text{ni}|\text{-}|\text{tsu}|\text{-}|\text{m}^{\text{y}}|\text{J}/$ ‘it is said that this is the Latami family’ ($/\text{-}|\text{tsu}|\text{J}/$: particle of reported speech; $/\text{-}|\text{m}^{\text{y}}|\text{J}/$: affirmative particle) and $/\text{la}|\text{-}|\text{t}^{\text{h}}|\text{a}|\text{-}|\text{mi}|\text{-}|\text{=}\text{ɿ}|\text{-}|\text{dzo}|\text{J}/$ ‘as for the Latami family...’ ($/\text{dzo}|\text{J}/$: topic marker). Importantly, even though the surface tones on $/\text{tsu}|\text{-}|\text{m}^{\text{y}}|\text{J}/$ and $/\text{-}|\text{dzo}|\text{J}/$ do not carry H, this is still only one tone group.

3.6.2. Movement and unfolding of the MH tone

(14) $\text{æ}|\text{ɰ}|\text{v}|\text{J}|\text{ | } \text{g}|\text{x}|\text{-}|\text{p}^{\text{h}}|\text{i}|\text{ | } \text{le}|\text{-}|\text{ts}^{\text{h}}|\text{u}|\text{-}|\text{tsu}|\text{J}$

æɭɛɣɿ | gɣɿ- p^{hi}ɿ | leɿ- ts^huɿ | tsuɿ |
 egg upward to_spit ACCOMP to_come REP
 ‘It is said that [she] spat out the egg!’ (BuriedAlive2.143)

The derivation of the tone group /gɣɿ-p^{hi}ɿ leɿ-ts^huɿ-tsuɿ/ can be presented as follows:

- (i) Lexical tones: /gɣɿ- p^{hi}ɿ leɿ- ts^huɿ -tsuɿ/
- (ii) First level of grouping: /{gɣɿ-p^{hi}ɿ} {leɿ-ts^huɿ} -tsuɿ/
- (iii) Left-to-right computation: the MH pattern of /p^{hi}ɿ/ spreads rightwards, up to the syllable /ts^huɿ/: /{gɣɿ-p^{hi}ɿ leɿ-ts^huɿ} -tsuɿ/
- (iv) Unfolding of the MH contour, overriding (replacing) the lexical tone of the final particle: /gɣɿ-p^{hi}ɿ leɿ-ts^huɿ-tsuɿ/

3.6.3. Analysis of the division into tone groups for an entire sentence: Sister.49

(15) əɿmɿ | leɿ-ts^huɿ | t^{hi}ɿ | goɿmiɿ-ŋuɿ | əɿmɿ | mɿɿ-suɿ-tsuɿ-mɿ |
 əɿmɿ leɿ- ts^huɿ t^{hi}ɿ goɿmiɿ
 elder_sibling ACCOMP arrive gap_filler:well younger_sibling
 ŋuɿ əɿmɿ mɿɿ suɿ tsuɿ mɿ
 A/TOP elder_sibling NEG to_know REP affirm

‘[When] the big brother came back, the younger sister didn’t recognize him!’ (Sister.49)

In example (15), the group | əɿmɿ | ‘elder sibling’ consists of a single noun; the levels of the narrow tonal phrase, broad tonal phrase, and tone group coincide. In the absence of suffixes or final particles, its lexical tone, MH, is realized on the last syllable of the narrow tonal phrase, which is also the last syllable of the tone group.

In the group | əɿmɿ-ŋuɿ | ‘by the elder sibling,’ the narrow tonal phrase coincides with the noun, as in example (15), | əɿmɿ |. In this case, the broad tonal phrase is distinct from the narrow tonal phrase, since there is a suffix, /ŋuɿ/ (AGT/TOP). Indicating the boundary between the narrow tonal phrase and its suffix, this group would be transcribed as | əɿmɿ#-ŋuɿ |. The rising contour (MH) of /əɿmɿ/ ‘elder sibling’ projects its H part onto the suffix, as illustrated in example (14).

The word /t^{hi}ɿ/ ‘(and) then, (and) so’ constitutes a tone group on its own, as mentioned in section 3.1.

The group | mɿɿ-suɿ-tsuɿ-mɿ | ‘...didn’t know/recognize’ contains the verb ‘to know,’ /suɿ/, which constitutes the narrow tonal phrase. It is flanked by the negative prefix /mɿɿ-/ and the sentence particles /-tsuɿ/ (reported speech) and /-mɿ/ (affirmative). Indicating boundaries explicitly, this group would be transcribed as | mɿɿ-suɿ\$-tsuɿ-mɿ | (or, adding the symbol marking the end of the narrow tonal phrase: | mɿɿ-suɿ#-\$-tsuɿ-mɿ |). In keeping with the rules of tone assignment that hold throughout the system, the negative prefix /mɿɿ-/ receives M tone by default, and the sentence particles receive L due to the fact that they are preceded by a H tone (rules 3 and 4).

4. Extreme cases of tonal integration; and cases of compounds that resist the tendency towards integration

4.1. Tonal integration in set phrases

Set phrases constitute an extreme case of integration. For instance, there exist formulae that recapitulate which of the animals symbolizing the twelve Terrestrial Branches have

special affinities with one another. This is one of the bases for fortune-telling: the year of birth is used as a basis from which to predict whether or not an individual will be able to relate harmoniously with another, in marriage or various other important circumstances. Among the animals that succeed one another in the twelve-year cycle, there are four sets of three, indicated below in surface-phonological notation:

- /bɤtʰzɤt | ʝi | æ/ are grouped as /bɤtʰzɤt, ʝi, | æ- soŋ-kʰɤ/ ‘the three years of the Serpent, the Ox, and the Rooster’;
- /mɤtʰgɤt | zɪ | hwɤ/ are grouped as /mɤtʰgɤt zɪ | hwɤ soŋ-kʰɤ/ ‘the three years of the Dragon, the Ape, and the Rat’;
- /tʰoŋli | bo | jo/ are grouped as /tʰoŋli-bo | jo- soŋkʰɤ/ ‘the three years of the Rabbit, the Pig, and the Sheep’;
- /la | zɤwæ | kʰɤ/ are grouped as /la, | zɤwæ, | kʰɤ | soŋ-kʰɤ/ ‘the three years of the Tiger, the Horse, and the Dog.’

The tone grouping is not exactly the same in all these phrases. In the first three cases, the first two animal names are integrated into one tone group, and the third is integrated together with the phrase ‘three years.’ Each of these three set phrases only comprises two tone groups, half the number if each animal name were said separately. In the fourth phrase, however, the three animal names do remain separate, each constituting a distinct tone group, hence yielding four tone groups in total.

4.2. *Tonal integration in proverbs*

Proverbs are also typical instances of tightly-knit tonal integration. An example is shown in (16):

(16) hĩtʰdza | dʒɛtʰa-ʝiŋ, | ʃtʰkoŋ mi | tʰaŋ-tʰvŋ
 hĩŋ dzaŋ dʒɛtʰ tʰaŋ- ʝiŋ ʃtʰkoŋ miŋ tʰaŋ- tʰvŋ
 Person poor money PROHIB to_borrow shinbone wound PROHIB to_get
 ‘The poor must not borrow money; the shinbone must not receive wounds.’

The proverb’s argument is that one must beware of hitting fragile spots. The listener is presumed to know that a blow to the shin is especially painful, and to imagine, by analogy, how hard it is for a poor person to reimburse a loan plus added interest. The sequence /ʃtʰkoŋ mi | tʰaŋ-tʰvŋ/, ‘the shinbone must not receive wounds,’ is integrated into a single tone group, with the stylistic effect of presenting it as a self-evident fact (an established truth), not a statement coined on the fly by the speaker, in which case the tone pattern would have been /ʃtʰkoŋ | miŋ | tʰaŋ-tʰvŋ/.

It is highly revealing that, even in the case of proverbs and set phrases, the speaker retains a latitude of choice in the division of the utterance into tone groups. The comparison of different versions of the same story by the same speaker yields a wealth of examples. For instance, the saying /laŋ doŋ əŋdaŋ ʃuŋ, | zɤŋ doŋ əŋmiŋ ʃuŋ/ ‘If you see the tiger, it means your father is going to die; if you see the panther, it means your mother is going to die,’ which is at the heart of the narrative “Tiger”, is divided into two tone groups. However, a realization as four tone groups is found in four of the eight occurrences: /zɤŋ doŋ, | əŋmiŋ ʃuŋ; | laŋ doŋ, | əŋdaŋ ʃuŋ/. As in the examples described above, the stylistic nuance is that, the greater the number of tone groups, the more attention is drawn to the individual components of the sentence; the phrasing in which the panther is mentioned before the tiger looks like a departure from the canonical pattern, which may account for the speaker’s intuitive breaking up of the saying into smaller tone groups. An intermediate case, with a division into three tone groups, is also attested: /zɤŋ doŋ | əŋmiŋ ʃuŋ, | laŋ doŋ əŋdaŋ ʃuŋ/ (Tiger.50).

As a final example, let us examine the saying ‘What remains unseen by humans is nonetheless seen by the heavens!’, used as a reminder that other people’s gaze is not the touchstone of good conduct, and that one’s actions should be guided by the same rules whether seen or unseen. The most common realization of this saying is: /hĩt-ŋuŋ | mɤŋ-doŋ, | mv-t-ŋuŋ | doŋ/, where the first part (‘What people do not see’) is integrated into a single tone group, while the second is divided into two. This emphatically brings out the verb /doŋ/ ‘to see, to observe,’ which being on its own in the tone group receives a final H tone and is realized with a rising pitch, LH, following Rule 7: “If a tone group only contains L tones, a post-lexical H tone is added to its last syllable.” (Variants are found in the narrative Reward.28, 36, 62, 114.)

4.3. *Compounds that resist the tendency towards integration*

There exist a few compound words which, unlike the majority, resist the tendency towards integration into a single tone group. The most frequently occurring example is ‘Lugu Lake,’ //lo-tɕvŋ | -hiŋna-tmi#//, literally ‘the lake of lo-tɕvŋ,’ from //hiŋna-tmi#// ‘lake,’ and //lo-tɕvŋ// ‘Luòshuǐ 落水’, the name of a village on the shore of Lugu Lake. The noun phrase //lo-tɕvŋ | -hiŋna-tmi#// must be analyzed as consisting of two tone groups; if it constituted as a single tone group, its tone pattern would be /*lo-tɕvŋ-hiŋnaŋmiŋ/, by application of the rule “All syllables following a HL or ML sequence receive L tone”—this is one of the rules that apply throughout the Na tone system.

The word //sa-t | zoŋbɣŋŋuŋ//, meaning ‘the universe, the whole world’ (Mountains.69), is another case in point. Like ‘Lugu Lake,’ it is perceived as composed of two parts, //sa-t// and //zoŋbɣŋŋuŋ//, even though the first syllable, //sa-t//, is no longer intelligible by itself and cannot be used on its own. The trisyllable /zoŋbɣŋŋuŋ/, though, can be employed on its own to mean ‘the universe,’ like the four-syllable word. The existence of this trisyllabic form may partially explain why the four-syllable word //sa-t | zoŋbɣŋŋuŋ// ‘the universe’ does not get integrated into a single tone group. If such integration took place, this would yield a M.L.L.L tone pattern, /*sa-t-zoŋbɣŋŋuŋ/, by application of the same rule as above (“All syllables following a HL or ML sequence receive L tone”).

A third example is ‘field penny-cress,’ a foetid plant with round flat pods (*Thlaspi arvense*). It is called //kɣ-t-bɣŋ | vŋts^hɤŋ// in Na, literally ‘the crane’s vegetable’. The fact that the name can still be transparently analyzed as a possessive construction probably contributes to slowing down its phonological integration into a single tone group.

5. Cases of breach of tonal grouping, and consequences for the system

This section describes how non-final syllables can come to carry a contour, in which case the following syllables tend to become extrametrical.

5.1. *The stylistic option of realizing a contour on a word in non-final position*

Syllables that are not in final position within the tone group do not carry a contour (MH, LM or LH, the latter two being neutralized to LH at the surface-phonological level). This is an important part of the definition of the phonological unit of tone group. But this rule is at odds with a stylistic device whereby a word is emphasized by cutting short the tone group immediately after it. This device suspends tonal calculation, and allows the realization of a contour on the emphasized word, as in (17).

(17) le-t-tsaŋ, | le-t-tsaŋ, | le-t-tsaŋ | -kwɤŋ-tɕuŋ, | le-t-lyŋ!
 le-t- tsaŋ -kwɤŋ-tɕuŋ le-t- lyŋ!

ACCOMP to_row when/because ACCOMP to_escape
 ‘By rowing, rowing, rowing, they escaped/they managed to escape!’ (Lake3.59)

The context for this example is highly emotional: a mother and her daughter are rowing for their lives, struggling against the flood that has come over the plain where they lived, now suddenly becoming a lake. The verb ‘to row’ is repeated, and the sentence is chopped into short tone groups. The verb is strongly articulated, each time with its lexical rising tone; the conjunction //kwɿ-tɕu// is tacked on as if it were an afterthought. (The hyphen after the tone group boundary (/...l -kwɿ]-tɕu/]) serves as an indication that the syllables at issue are extrametrical, and do not constitute a full-fledged tone group on their own.) It would be possible to say /le-tɕa-t-kwɿ]-tɕu/ for ‘...because [they] rowed...’ with the expected unfolding of the MH contour over the verb and the first syllable of the conjunction, but this deliberate, neatly structured variant would be stylistically inappropriate in this context.

An example using the same conjunction as above, but where the expected division into tone groups is respected, and where the expected process of unfolding of a contour tone takes place, is found in (18):

(18) loɰdzoŋ | tɕ^hu-tneɪ | mɿɰtɕoɪ p^hɿ-t-kwɿ]-tɕu]-ŋuɰ, | "q^{hhhh}... ə!" pi-t-tsuɰ]-mɿɰ.
 loɰdzoŋ tɕ^hu-tneɪmɿɰtɕoɪ p^hɿ -kwɿ-tɕu -ŋuɰ
 bracelet thus downward take_off when top
 q^{hhhh}...ə! piŋ tsuɪ mɿ
 onomatopoeia:burp! to_say rep affirm

‘When [the man] took off [the buried woman’s bracelets], like this, [the corpse made a gurgling sound]: Buuurp!’ (BuriedAlive2.48)

This is the only example found so far where the H part of a verb’s MH contour reassociates to the conjunction //kwɿ-tɕu//, as against 14 examples where this contour surfaces as such on the verb prior to this conjunction (Dog.49, Tiger.46, BuriedAlive3.65, Caravans.80, Sister.50, Sister3.133, Seeds2.34, Renaming.18, 41, Funeral.51...). Example (18) is just enough evidence to show that a realization with contour unfolding is possible. Contour unfolding might once have been the norm, and the realization with a contour on the verb might have originally been a conspicuous stylistic effect; but the latter is now much more common than the former, to the point that the realization with contour unfolding is now a stylistically marked option.

Realizations of a contour in non-final position are common; examples include Tiger.51 and Housebuilding.71, 98, 100.

Another construction for which the set of narratives contains examples without the unfolding of a rising contour is the combination of /tɕ^hu-tneɪ/ ‘thus, in this way’ and /gɿ-/ ‘to take place, to occur (event)’.

(19) ə-tsoɪ mɿ-t-ŋiɰ | zɰɿ]-kvɪ! | ə-tmi-t! | ə-ji-t-ɕu]-jiɰ]-dzoɰ, | “tɕ^hu-t-zɪɪ | -dzoɰ, | tɕ^hu-tneɪ gvɪ | -ŋiɰ! | t^hv-t-zɪɪ | -dzoɰ, | tɕ^hu-tneɪ gvɪ | -ŋiɰ! | hɪ-t-dzoɰ, | dzɿ]-hɪ-t soɰ]-zoɰ]-kvɪ! | dzɪ-t-hɪ-t, | ji-t-mɿ-t-dɔ-t! |”

‘[My grandmother] knew about everything (literally: ‘could speak about everything’)! Good lord! In the old times, [she would also tell us stories about people in the village, and what we must learn from them:] “This household, **this is what happened** to them! That household, **this is what happened** to them! (literally: ‘this is how it happened’) One must develop habits of doing good! One mustn’t do wrong! (literally: ‘bad things mustn’t be done’)” ’ (Elders3.44-45)

There are two instances in this example where ending the tone group after the phrase /tʂ^hu˧ne˧ gv˧/ sets the phrase apart as making up a block. The following morpheme, /-ni˧/ (the copula, in a bleached use in which it serves to emphasize assertion), also stands out by not being incorporated within the same tone group. Use of the bleached copula here is clearly that of “an epistemic strategy that marks a high degree of certitude” (Lidz 2010:497). In context, it reflects the assertiveness of the character (the grandmother) to whom this passage in reported speech is assigned. Realization as /tʂ^hu˧ne˧ gv˧ | -ni˧/ rather than /tʂ^hu˧ne˧ gv˧ni˧/ reflects the deliberate, authoritative way in which the character spoke.

On the other hand, when the phrase ‘This is how it happened’ is told more casually, such as in an introduction to a narrative, it constitutes one single tone group, as /tʂ^hu˧ne˧ gv˧ni˧-tsu˧-mv˧/ (with following REPORTED-SPEECH particle /tsu˧/ and AFFIRMATIVE /mɤ˧/). A related phrasing is /tʂ^hu˧ne˧ gv˧-kɤ˧/, ‘This is how it would happen’ (as in Sister3.149), which is similarly a set phrase and hence integrated into a single tone group (also with following particles such as /-tsu˧-mɤ˧/, as in Tiger.2).

5.2. Consequences for the tone system: the emergence of extrametrical syllables

The phenomenon whereby a tone group is cut short after a certain word (noun or verb) has some consequences for the general architecture of the tone system. In cases where the portion of the tone group that is cut off from the verb can stand on its own as a tone group, the tenets of the system remain unaffected, such as in example (20).

- (20) hæ˧, | k^hv˧mi˧-ʂe˧ | dzu˧-kv˧!
 hæ˧ k^hv˧mi˧-ʂe˧ dzu˧ kv˧
 Chinese dog_meat to_eat abilitive
 ‘The Chinese (Han) eat dog meat!’ (Field notes, 2012)

Example (20) lays emphasis on ‘dog meat’: in the Na world view, dogs and men are close friends—the dog agreed to exchange its 60-year lifespan with the 13-year lifespan that had initially been granted to man (see the narrative “Dog”). Eating dog meat is therefore taboo among the Na, and the fact that some other ethnic groups do eat dog meat comes to them as a shock. An unmarked phrasing of (20) would be /hæ˧ | k^hv˧mi˧-ʂe˧ dzu˧-kv˧/, in which a single tone group spans the object and verb, and tonal computation takes place.

Example (21) shows that the phenomenon of cutting a tone group short can take place as early as the first syllable of a sentence.

- (21) p^ho˧ | hu˧-kwɤ˧-tɕu˧-lə˧ | t^hi˧, | go˧mi˧ tʂ^hu˧-ɤ˧-dzo˧, | le˧-ŋɤ˧, | le˧-ŋɤ˧, | le˧-ŋɤ˧, | le˧-ŋɤ˧-zo˧!
 p^ho˧_a hu˧_c -kwɤ˧-tɕu˧-lə˧ t^hi˧
 to_flee/to_rush to_go.PST after then
 go˧mi˧ tʂ^hu˧ ɤ˧ -dzo˧ le˧- ŋɤ˧ -zo
 younger_sister DEM.PROXCLF TOP ACCOMP to_cry ADVB
 ‘After he rushed away, [his] younger daughter cried her eyes out!’ (Sister3.68)

A more strongly integrated formulation would be: /p^ho˧-hu˧-kwɤ˧-tɕu˧-lə˧/, without any special emphasis on the verb.

On the other hand, when particles or conjunctions are left stranded, as in (17), they do not constitute a tone group on their own. The rules recapitulated in section 2, such as the addition of a final H tone to all-L sequences (§2.3.3), do not apply to them – otherwise one would expect a final rising contour: /*le˧-tsa˧ | -kwɤ˧-tɕu˧/. Nor are these stranded syllables integrated into the following tone group.

Several options for modelling are open here. One option would be to consider that, at some phonological level, the division into tone groups is in fact left unchanged. This would entail that a contour can be realized in non-final position within a tone group, an option which seems to run into insuperable difficulties. A preferred option is to consider that the emphasis laid on a word, and the consequent realization of a contour on that word, modifies the utterance's division into tone groups, and that the syllables left stranded acquire extrametrical status. The notion of extrametricality supersedes the general rule which serves as one of the key criteria for the definition of the tone group as a phonological unit, i.e. that contours only appear tone-group-finally. There exists additional evidence for resorting to the concept of extrametricality in the description of the Na tone system: this concept also applies to the affirmative particle //*-mv*/. This particle cannot host a H level from a preceding reported-speech particle /*tsu*/: the sequence is realized as /*-tsu*¹*-mv*/, not /**-tsu*¹*-mv*/.

At this point, it is useful to examine a further example.

(22) *pv* | *u* | *dz*¹ | *-ki* | *-tsu* | *-mv* | . |
pv | *u* | *dz*¹ | *ki* | *tsu*¹ | *mv* |
 button to_pluck to_give REP AFFIRM

'It is said that [he] plucked a [button from his jacket] and gave it [to the child]. He plucked one, and gave it [to the child].' (Renaming.23)

Three stylistic options are open here. The most tightly-knit would involve a single tone group: /*dz*¹*-ki*¹*-tsu*¹*-mv*/. The most analytic would involve two full-fledged tone groups: /*dz*¹ | *ki*¹*-tsu*¹ | *-mv*/, with the added complexity that the second tone group contains a contour, MH, on a non-final syllable. The third one, found in the recorded narrative, is intermediate: the verb //*dz*¹// 'to pluck' is realized with its lexical MH contour, as if it were tone-group-final, and the syllables that follow are all lowered to L, as if they belonged to the preceding tone group. (As mentioned above, the hyphen after the tone group boundary (/... | *-ki* | *-tsu* | *-mv* /) serves as an indication that the syllables at issue are extrametrical, and do not constitute a full-fledged tone group on their own.)

This range of stylistic variation is a salient characteristic of Yongning Na. Among other potential consequences for the evolution of the tone system, extrametrical syllables at the end of a tone group may tend to become affiliated to the following tone group instead, in cases where the sequence of (surface) tones allows for this reinterpretation. A case in point is the highly frequent sequence of the topic-marker /*-dzo*/ and the discourse marker /*t^{hi}*/ 'so, then.' The latter makes up a tone group on its own, as was mentioned in section 3.1. However, in the narratives, it is not preceded by any perceived pause; there tends to be a pause before the topic-marker, and the two syllables /*-dzo*/ and /*t^{hi}*/ are then pronounced in quick succession. There is thus a discrepancy between two levels: that of the division into tone groups, on the one hand, and that of linguistic rhythm, on the other. From a phonological point of view the sequence of /*-dzo*/ and /*t^{hi}*/ would constitute a well-formed tone group: L.LH is the way a disyllabic tone group with underlying L tone is realized. One may speculate that the high discourse frequency of the (phonetically) tightly-knit /*dzo* | *t^{hi}*/ sequence paves the way for its reinterpretation as a single tone group. A typical example is the sequence /*gi* | *-dzo* | *t^{hi}*/ (Mountains.58), 'really-TOP-so/then.' Here, /*gi*/ is realized with a rising contour, unambiguously signalling the end of a tone group, and leaving the topic-marker stranded (i.e. with extrametrical status). While /*dzo*/ does not constitute a well-formed tone group, the sequence /*dzo* | *t^{hi}*/ would constitute one.

5.3. *Further examples of extrametrical elements*

The expression /əJ-gi/ ‘isn’t it!’ or ‘right!’ is commonly tagged at the end of an utterance. A preceding LH or MH contour does not unfold over it, as would be expected within a tone group (Caravans.257, 287; Housebuilding.113; Mountains.159; Sister3.86). It is often preceded by a short (perceived) pause. These two observations suggest that /əJ-gi/ constitutes a tone group on its own. On the other hand, the fact that the expression /əJ-gi/ contains only L tones implies that it does not constitute a tone group on its own, otherwise it would be realized as /əJ-gi/. The latter, /əJ-gi/, is well-formed and attested in the narratives, but it is a full-fledged question (‘Is it true?’), whereas /əJ-gi/ is almost a gap-filler. The expression /əJ-gi/ is here treated as extrametrical; in the transcriptions, it is preceded by a tone group boundary, to reflect the fact that it does not interact tonally with what precedes it.

To summarize the above discussion: the tonal group may be interrupted after the last syllable of a word (verb or noun), leaving some syllables stranded. These syllables are described as having extrametrical status.

6. **Concluding remarks**

The present paper was essentially descriptive, aiming to convey a feel for the construction of utterances in Yongning Na, by discussing illustrative examples selected from the online data set, and, where appropriate, comparing the tone patterns with those found in elicited data. In Na, as in any of the world’s languages (e.g. English: Maeda 1976), discourse factors can radically affect phrasing, and thus tonal domains. Speakers may choose to integrate large chunks of speech into a single tone group, resulting in stronger integration; or they may divide the utterance into a number of tone groups, with the stylistic effect of emphasizing these individual components one after the other. Let us emphasize again that the present research is only a stepping-stone; as a rule of thumb, this author’s assessment is that about one fifth of the tasks required for an in-depth study of Yongning Na have been conducted so far, and 80% of the road still lies ahead. Perspectives for gradual progress towards advanced linguistic modelling of Yongning Na are outlined below.

6.1. *Computer implementation of the morpho-phonology*

A mid- to long-term direction consists in computer-aided analysis of individual utterances on the basis of a computer model of the grammar (finite-state modelling), following the methodological suggestion of Karttunen (2006). This will require (i) implementation of the entire tonal grammar of Yongning Na by a computer script, (ii) glossing of Yongning Na texts at the morpheme level (indicating lexical tones), and (iii) encoding of the morphosyntactic structure of each utterance. These will allow for the automatic generation of surface-phonological tone patterns for an utterance, spelling out the full set of possible variants in the division of utterances into tone groups. It will then be possible (i) to verify the proposed generalizations about possible divisions into tone groups for a given utterance, and also, more ambitiously, (ii) to appraise the speaker’s stylistic choices in a narrative by setting the observed division into tone groups against the backdrop of the complete set of alternatives. The aim is to arrive at a degree of accuracy and depth that approaches the standard set by Delattre’s study of French intonation (1966; 1970): on the basis of an identification of basic patterns, Delattre explored the range of stylistic possibilities allowed by the system—e.g. through the choice of congruence vs. dissonance between message and form, and between syntax and prosodic phrasing.

6.2. *Studying the phonetic implementation of (surface-phonological) tone sequences*

A second perspective will consist in examining the phonetic implementation of surface-phonological tones. This study has not begun in earnest yet, because the approved order of business consists of understanding the system first (morpho-tonology, and intonation) before launching into experimental investigation into acoustic correlates and fine phonetic details (see the recommendations by Morey 2014; Cruz and Woodbury 2014; Rice 2014; Mazaudon 2014). From the beginning of fieldwork on Yongning Na, this objective has always been kept in view, however. It motivates constant efforts to collect data that will be exploitable for this purpose: high-fidelity audio, and, for some recordings, an electroglottographic signal (Rothenberg 1992 and references therein). Electroglottography is the ultimate reference for calculation of fundamental frequency, and offers additional phonetic indications on phonation types (on the acoustic bases of this method: Henrich et al. 2004; on applications to phonetics: Kuang and Keating 2014 and references therein).

The first steps will consist of modelling the tonal targets and studying coarticulation patterns, as has already been done for several two-tone systems, e.g. Dinka (Remijsen and Ladd 2008) and Sotho (Zerbian and Barnard 2010a; Zerbian and Barnard 2010b), three-tone systems (Teo 2014:48–65; Coupe 2003:100–106; Laniran and Clements 2003), and four-tone systems, e.g. Mambila (Connell 2003). Since tone-group boundaries are systematically indicated in the Yongning Na annotations, it should be possible to obtain quantified evidence on issues such as follows: To what extent are tone-group boundaries accompanied by pauses? Do fine phonetic details in the realization of segments cue the presence of tone-group boundaries (i.e. to what extent are tone-group boundaries signalled by “segmental intonation” in the sense of Niebuhr 2009)?

The ultimate aim consists of assessing the contribution of various factors to the final phonetic realization of each syllable, thus teasing apart and spelling out the various components of the speech signal, and their linguistic interpretation. Computer implementation could be used as a tool to bring out, by contrast, intonational phenomena, as components that are not predictable on the basis of the utterance’s contrastive units (the sequence of phonemes, and the tonal string parsed into tone groups).

This type of modelling is clearly a long term project, but it is not a technical impossibility (Kochanski and Shih 2003 and Kochanski, Shih and Jing 2003). Another inspiring example of a corpus-based intonation study is Marc Brunelle’s work on Cham (Brunelle, Oi, and Daly 2012) and Vietnamese (Brunelle 2015).

6.3. *Making a contribution to typology*

Discussions about domains in phonology are greatly complicated by uncertainty about the real degree of cross-language comparability, and by differences in experimental setups across linguistic studies. In this writer’s view, the first step consists of bringing out prosodic properties of individual languages by using various sources of evidence, including comparison between language pairs (among the wealth of insightful analyses, let us mention Wagner and McCurdy 2010 on English; Lahiri and Plank 2010 on Germanic). At a later stage, relevant parameters can be proposed for quantitative cross-linguistic studies. On this basis, typological surveys (such as that by Bickel, Hildebrandt, and Schiering 2009) can reach new levels of reliability and precision.

References

- ANDRUSKI, JEAN E.; and JAMES COSTELLO. 2004. Using polynomial equations to model pitch contour shape in lexical tones: an example from Green Mong. *Journal of the International Phonetic Association* 34.125–140.
- ANDRUSKI, JEAN E.; and MARTHA RATLIFF. 2000. Phonation types in production of phonological tone: the case of Green Mong. *Journal of the International Phonetic Association* 30.39–62.
- AO, BENJAMIN XIAOPING. 1993. Phonetics and phonology of Nantong Chinese. Columbus: Ohio State University ph.d.
- BAO, ZHIMING. 1999. *The Structure of Tone*. New York/Oxford: Oxford University Press.
- BARRIE, MICHAEL. 2007. Contour tones and contrast in Chinese languages. *Journal of East Asian Linguistics* 16.337–362.
- BICKEL, BALTHASAR; KRISTINE HILDEBRANDT; and RENE SCHIERING. 2009. The distribution of phonological word domains: a probabilistic typology. *Phonological domains: universals and deviations*, ed. by J. Grijzenhout and B. Kabak, 47–78. Berlin: Mouton de Gruyter.
- BOLINGER, DWIGHT LE MERTON. 1989. *Intonation and its uses: melody in grammar and discourse*. Stanford University Press.
- BRUNELLE, MARC. 2015. Effects of lexical frequency and lexical category on the duration of Vietnamese syllables. *Proceedings of ICPHS XVIII*. Glasgow.
- BRUNELLE, MARC; MUTSUMI OI; and TABITHA DALY. 2012. Eastern Cham prosodic phrasing and intonational phonology. Presentation at SEALS 22, Agay.
- CHANG, LAURA MEI-CHIH. 1992. A prosodic account of tone, stress, and tone sandhi in Chinese languages. Honolulu: University of Hawai'i.
- CHAO YUEN-REN. 1930. A system of tone letters. *Le Maître phonétique* 45.24–27.
- CHENG, CHIERH; JENN-YEU CHEN; and YI XU. 2014. An acoustic analysis of Mandarin Tone 3 sandhi elicited from an implicit priming experiment. *Proceedings of the Fourth International Symposium on Tonal Aspects of Languages*. Nijmegen.
- CHEN, MATTHEW Y. 1987. The syntax of Xiamen tone sandhi. *Phonology Yearbook* 4.109–149.
- CHEN, MATTHEW Y. 2000. *Tone sandhi: Patterns across Chinese dialects*. Cambridge Studies in Linguistics 92. Cambridge: Cambridge University Press.
- CHEN, YIYA; and JIAHONG YUAN. 2007. A corpus study of the 3rd tone sandhi in Standard Chinese, 2749–2752.
- CHIRKOVA, KATIA. 2009. Shixīng, a Sino-Tibetan language of South-West China: A grammatical sketch with two appended texts. *Linguistics of the Tibeto-Burman Area* 32.1–90.
- CONNELL, BRUCE. 2003. Pitch realization and the four tones of Mambila. *Proceedings of the symposium "Cross-linguistic studies of tonal phenomena: historical developments, phonetics of tone,"* ed. by Shigeki Kaji, 181–198. Tokyo: Research Institute for Languages and Cultures of Asia and Africa, Tokyo University of Foreign Studies.
- COUPE, ALEC. 2003. *A phonetic and phonological description of Ao: a Tibeto-Burman language of Nagaland, north-east India*. Pacific Linguistics 543. Canberra: The Australian National University.
- CRUZ, EMILIANA; and TONY WOODBURY. 2014. Finding a way into a family of tone languages: The story and methods of the Chatino Language Documentation Project. *Language Documentation and Conservation* 8.490–524.
- DELATTRE, PIERRE. 1966. Les dix intonations de base du français. *The French Review* 40.1–14.
- DELATTRE, PIERRE. 1970. Syntax and intonation, a study in disagreement. *The Modern Language Journal* 54.3–9.
- DOWNING, LAURA J. 2006. The prosody and syntax of focus in Chitumbuka. *ZAS Papers in Linguistics* 43.55–79.

- EDMONDSON, JEROLD A.; JOHN ESLING; JIMMY G. HARRIS; LI SHAONI; and LAMA ZIWO. 2001. The aryepiglottic folds and voice quality in the Yi and Bai languages: Laryngoscopic case studies. *Mon-Khmer Studies* 31.83–100.
- HASHIMOTO-YUE, ANNE O. 1987. Tone sandhi across Chinese dialects. *Wang Li memorial volumes: English volume*, ed. by The Chinese Language Society of Hong Kong, 445–474. Hong Kong: Joint Publishing Co.
- HENRICH, NATHALIE; CHRISTOPHE D' ALESSANDRO; MICHELE CASTELLENGO; and BORIS DOVAL. 2004. On the use of the derivative of electroglottographic signals for characterization of nonpathological phonation. *Journal of the Acoustical Society of America* 115.1321–1332.
- JACQUES, GUILLAUME. 2012. Agreement morphology: the case of Rgyalrongic and Kiranti. *Language and Linguistics* 13.83–116.
- JACQUES, GUILLAUME; AIMEE LAHAUSOIS; BOYD MICHAILOVSKY; and DHAN BAHADUR RAI. 2012. An overview of Khaling verbal morphology. *Language and Linguistics* 13.1095–1170.
- KARCEVSKIJ, SERGE. 1931. Sur la phonologie de la phrase. *Travaux du Cercle linguistique de Prague* 4.188–226.
- KARTTUNEN, LAURI. 2006. The insufficiency of paper-and-pencil linguistics: the case of Finnish prosody. *Intelligent linguistic architectures: Variations on themes by Ronald M. Kaplan*, ed. by M. Butt, M. Dalrymple, and T.H. King, 287–300. Stanford: CSLI Publications.
- KOCHANSKI, GREG P.; and CHILIN SHIH. 2003. Quantitative measurement of prosodic strength in Mandarin. *Speech Communication* 41.625–645.
- KOCHANSKI, GREG P.; CHILIN SHIH; and JING HONGYAN. 2003. Hierarchical structure and word strength prediction of Mandarin prosody. *International Journal of Speech Technology* 6.33–43.
- KUANG, JIANJING. 2013. The tonal space of contrastive five level tones. *Phonetica* 70.1–23.
- KUANG, JIANJING; and PATRICIA KEATING. 2014. Glottal articulations in tense vs. lax phonation contrasts. *Journal of the Acoustical Society of America* 136.2784–2797.
- LAHIRI, ADITI; and FRANS PLANK. 2010. Phonological phrasing in Germanic: the judgement of history, confirmed through experiment. *Transactions of the Philological Society* 108.370–398.
- LANIRAN, YETUNDE O.; and NICK CLEMENTS. 2003. Downstep and high raising: interacting factors in Yorùbá tone production. *Journal of Phonetics* 31.203–250.
- LAPOLLA, RANDY; and CHENGLONG HUANG. 2003. *A grammar of Qiang with annotated texts and glossary*. Mouton de Gruyter.
- LIDZ, LIBERTY. 2007. Evidentiality in Yongning Na (Mosuo). *Linguistics of the Tibeto-Burman Area* 30.45–87.
- LIDZ, LIBERTY. 2010. *A descriptive grammar of Yongning Na (Mosuo)*. Austin: University of Texas, Department of linguistics.
- MAEDA, SHINJI. 1976. *A Characterization of American English Intonation*. Cambridge, Massachusetts: M.I.T.
- MAZAUDON, MARTINE. 2014. Studying emergent tone-systems in Nepal: Pitch, phonation and word-tone in Tamang. *Language Documentation and Conservation* 8.587–612.
- MAZAUDON, MARTINE; and ALEXIS MICHAUD. 2008. Tonal contrasts and initial consonants: a case study of Tamang, a “missing link” in tonogenesis. *Phonetica* 65.231–256.
- MICHAILOVSKY, BOYD; MARTINE MAZAUDON; ALEXIS MICHAUD; SEVERINE GUILLAUME; ALEXANDRE FRANÇOIS; and EVANGELIA ADAMOU. 2014. Documenting and researching endangered languages: the Pangloss Collection. *Language Documentation and Conservation* 8.119–135.
- MICHAUD, ALEXIS. 2006. Tonal reassociation and rising tonal contours in Naxi. *Linguistics of the Tibeto-Burman Area* 29.61–94.
- MICHAUD, ALEXIS. 2013. The tone patterns of numeral-plus-classifier phrases in Yongning Na: a synchronic description and analysis. *Transhimalayan Linguistics. Historical and Descriptive Linguistics of the Himalayan Area*, ed. by Nathan Hill and Tom Owen-Smith, 275–311. Trends in Linguistics. Studies and Monographs [TiLSM] 266. Berlin: De Gruyter Mouton.
- MICHAUD, ALEXIS; and JACQUELINE VAISSIERE. 2015. Tone and intonation: introductory notes and practical recommendations. *KALIPHO - Kieler Arbeiten zur Linguistik und Phonetik* 3.43–80.
- MOREN, BRUCE; and ELIZABETH ZSIGA. 2007. The lexical and post-lexical phonology of Thai tones. *Natural Language and Linguistic Theory* 24.113–178.

- MOREY, STEPHEN. 2014. Studying tones in North East India: Tai, Singpho and Tangsa. *Language Documentation and Conservation* 8.637–671.
- NESPOR, MARINA; and IRENE VOGEL. 1986. *Prosodic phonology*. Dordrecht: Foris.
- NIEBUHR, OLIVER. 2009. Intonation segments and segmental intonations. *Proceedings of the 10th Interspeech conference*, 2435–2438. Brighton, UK.
- NIEBUHR, OLIVER; and ALEXIS MICHAUD. 2015. Speech data acquisition: the underestimated challenge. *KALIPHO - Kieler Arbeiten zur Linguistik und Phonetik* 3.1–42.
- REMIJSEN, BERT; and ROBERT LADD. 2008. The tone system of the Luanyang dialect of Dinka. *Journal of African Languages and Linguistics* 29.173–213.
- RICE, KEREN. 2014. On beginning the study of the tone system of a Dene (Athabaskan) language: Looking back. *Language Documentation and Conservation* 8.690–706.
- ROSE, PHILIP. 1982. Acoustic characteristics of the Shanghai-Zhenhai syllable-types. *Papers in Southeast Asian Linguistics n°8: Tonation*, ed. by David Bradley, 1–53. Canberra: Australian National University Press, Pacific Linguistics, Series A, n°62.
- ROSE, PHILIP. 1989. Phonetics and phonology of Yang tone phonation types in Zhenhai. *Cahiers de linguistique - Asie Orientale* 18.229–245.
- ROSE, PHILIP. 1990. Acoustics and phonology of complex tone sandhi: An analysis of disyllabic lexical tone sandhi in the Zhenhai variety of Wu Chinese. *Phonetica* 47.1–35.
- ROSSI, MARIO. 1999. *L'intonation, le système du français: description et modélisation*. Gap/Paris: Ophrys.
- ROTHENBERG, MARTIN. 1992. A multichannel electroglottograph. *Journal of Voice* 6.36–43.
- ROUX, JUSTUS C. 2003. On the perception and description of tone in the Sotho and Nguni languages. *Proceedings of the symposium "Cross-linguistic studies of tonal phenomena: historical developments, phonetics of tone,"* ed. by Shigeki Kaji, 155–176. Tokyo: Research Institute for Languages and Cultures of Asia and Africa, Tokyo University of Foreign Studies.
- SELKIRK, ELISABETH. 1986. On derived domains in sentence phonology. *Phonology Yearbook* 3.371–405.
- SHIH, CHILIN. 1986. The prosodic domain of tone sandhi in Chinese. San Diego: University of California ph.d.
- SHIH, CHILIN. 1997. Mandarin third tone sandhi and prosodic structure. *Linguistic Models* 20.81–124.
- SUN, JACKSON T.-S. 1997. The Typology of Tone in Tibetan. *Chinese Languages and Linguistics IV: Typological studies of languages in China*, 485–521. Taipei, Taiwan: Symposium Series of the Institute of History and Philology-Academia Sinica.
- TEO, AMOS. 2014. *A phonological and phonetic description of Sumi, a Tibeto-Burman language of Nagaland*. Asia-Pacific Linguistics Open Access Monographs. Canberra: Asia-Pacific Linguistics.
- WAGNER, MICHAEL; and KATHERINE MCCURDY. 2010. Poetic rhyme reflects cross-linguistic differences in information structure. *Cognition* 117.166–175.
- YIP, MOIRA. 2002. *Tone*. Cambridge, U.K.: Cambridge University Press.
- ZEE, ERIC; and IAN MADDIESON. 1980. Tones and tone sandhi in Shanghai: Phonetic evidence and phonological analysis. *Glossa* 14.45–88.
- ZERBIAN, SABINE; and ETIENNE BARNARD. 2010a. Realisations of a single high tone in Northern Sotho. *Southern African Linguistics and Applied Language Studies* 27.357–380.
- ZERBIAN, SABINE; and ETIENNE BARNARD. 2010b. Word-level prosody in Sotho-Tswana. *Proceedings of Speech Prosody 2010*. Chicago.
- ZHU, XIAONONG. 2006. *A Grammar of Shanghai Wu*. LINCOM studies in Asian linguistics 66. Munich: LINCOM Europa.