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## THE TONES OF NUMERALS AND NUMERAL-PLUS-CLASSIFIER PHRASES: ON STRUCTURAL SIMILARITIES BETWEEN NAXI, NA AND LAZE\*

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**Abstract:** Numeral-plus-classifier phrases have relatively complex tone patterns in Naxi, Na (a.k.a. Mosuo) and Laze (a.k.a. Shuitian). These tone patterns have structural similarities across the three languages. Among the numerals from ‘1’ to ‘10’, three pairs emerge: ‘1’ and ‘2’ always have the same tonal behaviour; likewise, ‘4’ and ‘5’ share the same tone patterns, as do ‘6’ and ‘8’. Even those tone patterns that are irregular in view of the synchronic phonology of the languages at issue are no exception to the structural identity within these three pairs of numerals. These pairs also behave identically in numerals from ‘11’ to ‘99’ and above, e.g. ‘16’ and ‘18’ share the same tone pattern. In view of the paucity of irregular morphology—and indeed of morphological alternations in general—in these languages, these structural properties appear interesting for phylogenetic research. The identical behaviour of these pairs of numerals originates in morpho-phonological properties that they shared at least as early as the stage preceding the separation of Naxi, Na and Laze, referred to as the Proto-Naish stage. Although no reconstruction can be proposed as yet for these shared properties, it is argued that they provide a hint concerning the phylogenetic closeness of the three languages.

**Keywords:** tone; numerals; classifiers; morpho-tonology; Naxi; Na; Mosuo; Laze; Muli Shuitian; Naish languages; phylogeny.

### 1. INTRODUCTION

#### *1.1. The search for shared innovations between Na, Laze and Naxi*

The position of Naxi within Sino-Tibetan is a topical issue in Sino-Tibetan historical linguistics. Naxi was classified as a member of the Loloish group by Shafer (1955); however, Bradley (1975) showed that it does not share the innovations that characterise this group and concluded that Naxi is “certainly not a Loloish language, and probably not a Burmish language either” (p. 6). Some

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scholars (especially in mainland China) nonetheless maintain the classification of Naxi as a member of the Loloish group (in Chinese: Yí yǔzhī 彝语支); Gai Xingzhi & Jiang Zhuyi 1990 base this renewed claim on the high percentage of phonetically similar words between Naxi and Loloish, but without verifying the regularity of sound correspondences. Naxi has resemblances with neighbouring languages currently classified as Qiangic, such as Shixing (about which see Chirkova 2009 and references therein) and Namuyi (Lama Ziwo 1994; see also Sun Hongkai 2001 and Yang Fuquan 2006).

This issue is related to that of the dialectal boundaries of Naxi. On the basis of a survey conducted in the 1950s, two areas were distinguished: (i) Western Naxi, a relatively homogeneous dialect area subdivided into three “patois” (tǔyǔ 土语): Dayanzhen 大研镇 (Lijiang old town), Lijiang plain 丽江坝, and Baoshan 宝山; and (ii) Eastern Naxi, divided into three “patois”: Yongning 永宁, Beiquba 北渠坝 and Guabie 瓜别 (He Jiren & Jiang Zhuyi 1985: 104-116). The ‘Eastern Naxi’ domain is actually more diverse than the distinction among three sub-varieties would suggest. The Naxi historians Guo Dalie and He Zhiwu provide a detailed list of subfamilies (zhīxì 支系) of the Naxi, and a dialect map (1999 [1994]: 5-9). The approach chosen here consists in examining language varieties that appear in Guo and He’s list, and examining their similarities and differences. Some of these languages may turn out to not be closely related: for instance, the Shixing are mentioned as one of the variegated avatars of the Naxi (Guo Dalie & He Zhiwu 1999 [1994]: 9), but available linguistic data suggest a relatively large distance between the Shixing language and the Naxi language. Conversely, a possibility to keep in mind is that some language varieties closely related to Naxi may not have been mentioned by these authors.

First-hand data on four language varieties are used here: two “dialects of Western Naxi” (A-she and Nda-le), and two “dialects of Eastern Naxi”: Yongning Na (a.k.a. Mosuo 摩梭) and Laze (a.k.a. Muli Shuitian 木里水田话). I use the language name ‘Naxi’ for the former, but not for the latter two, choosing to go by their autonyms instead, hence ‘Na’ and ‘Laze’. Concerning Yongning Na, several publications insist on a close relationship with Naxi (see, e.g., a study of syntactic similarities between Yongning Na and Naxi: Jiang Zhuyi 1993). Concerning Laze, Huang Bufan (2009) cautiously concludes that its relationship with neighbouring languages—including Naxi and Loloish—is by no means self-evident and calls for in-depth research.

Naxi, Na and Laze are no exception to the notorious complexity of language names, ethnonyms and toponyms in East and Southeast Asia. Table 1 sets out the various names by which these languages are referred to, as well as the locations where they are spoken. The principle followed in this article is to use romanised autonyms for languages and place names (e.g. ‘Laze’ for /laːze/); however, exceptions are made in the case of well-established names, hence the use of ‘Naxi’, and of ‘Yongning Na’ (following Lidz 2007, 2010).

	<i>Place spoken</i>	<i>Language</i>	<i>Autonym</i>	<i>Chinese</i>	<i>Alternative</i>
<i>Name in local language</i>	<i>Present-day Chinese name</i>	<i>name used here</i>		<i>name</i>	<i>names</i>
h̄w̄a˧˥ dzy˧˥	Mùlǐ xiàn Xiàngjiǎo xiāng 木里县项脚乡	Laze	/la˧˥ze˧˥/	Lārè 拉热	Mùlǐ Shuǐtián 木里水田话
a˧˥sə˧˥	Lǐjiāng gǔchéngqū Wénhuà cūn 丽江古城区文化村	A-sher Naxi			AS Naxi, A Ser Naxi
nda˧˥le˧˥	Lǐjiāng gǔchéngqū Guǐfēng Dàlái cūn 丽江古城区贵峰大来村	Nda-le Naxi	/na˧˥lhi˧˥/	Nàxī 纳西	NL Naxi, Nda Le Naxi
ɦi˧˥di˧˥	Lǐjiāng Nínglàng xiàn Yǒngníng xiāng 丽江市永宁乡	Yongning Na	/na˧˥/	Nà 纳	Mósuō 摩梭话

Table 1. Some information about the four language varieties under study.

A systematic study of sound correspondences between Naxi, Na and Laze has been conducted (Jacques & Michaud 2011). The high number of regular correspondences provides strong support for the hypothesis that these three languages are closely related. Still, evidence in favour of a phylogenetic subgroup should ideally comprise shared innovations. Inflectional morphology can provide important evidence for the study of phylogeny—as exemplified, in the Sino-Tibetan domain, by Jackson Sun’s comparison of Lavrung and Rgyalrongish languages (Sun 2000a, b; for an overview about morphology in Sino-Tibetan, see Jacques 2006). However, there is very little inflectional morphology in Na, Laze and Naxi. Few cases of suppletion have been detected so far; Table 2 shows data on the verbs ‘to go’ and ‘to come’, the number ‘10’, and the word for ‘year’.

<i>Cases of suppletion</i>	<i>Na</i>	<i>Laze</i>	<i>Naxi</i>
‘year’ except in time ordinals	k <sup>h</sup> v̄˧˥	k <sup>h</sup> v̄˧˥	k <sup>h</sup> v̄˧˥
‘year’ in time ordinals: ‘this year, next year, two years ago’, etc.	i˧˥	viə˧˥	be˧˥
‘to go’, non-past	bi˧˥	bi˧˥	buw˧˥
‘to go’, past	huw˧˥	huw˧˥	huw˧˥
‘to come’, non-past	ju˧˥	i˧˥	ɭu˧˥
‘to come’, past	ts <sup>h</sup> ɣ˧˥	i˧˥	ts <sup>h</sup> ɣ˧˥
‘10’ in the range [10..19]	ts <sup>h</sup> e˧˥	ts <sup>h</sup> i˧˥	ts <sup>h</sup> e˧˥
‘10’ in the range [20..29]	tsi˧˥	tsi˧˥	tsæ˧˥
‘10’ in the range [30..39]	ts <sup>h</sup> i˧˥	ts <sup>h</sup> i˧˥	ts <sup>h</sup> æ˧˥

Table 2. Cases of suppletion in Naxi, Na and Laze.

Within the broader Sino-Tibetan context, the three subsets in Table 2 have different implications.

(i) The same suppletion for ‘year’ is also found in Shixing: /k<sup>h</sup>u<sup>55</sup>/ vs. /bə<sup>55</sup>/ (data from Huang Bufan & Renzeng Wangmu 1991), and in Qiangic languages

such as Tangut, Pumi (a.k.a. Prinmi), and Muya (Jacques, manuscript), so that it does not provide evidence of a special closeness between Na, Laze and Naxi.

(ii) Suppletion for ‘to go’, with a PAST and a NON-PAST, is common in languages of the area. (There also exist imperative forms of ‘to go’ and ‘to come’, which will not be discussed here.) Examples include languages where the forms are clearly different from those in Na, Laze and Naxi, such as Lizu (Chirkova 2008), but also languages with comparable forms: Namuyi (a.k.a. Namuzi, Namzi) and Shixing. In the variety of Namuyi spoken in the county of Muli 木里 (Liangshan, Sichuan), the forms are /bie<sup>13</sup>/ for NON-PAST and /hũ<sup>53</sup>/ for PAST (Katia Chirkova, p.c.). In Shixing, the forms are /bi<sup>55</sup>/ and /hu<sup>53</sup>/, respectively (Huang Bufan et al. 1991). If it could be verified that they are cognate, this would provide a (small) piece of evidence for a phylogenetic group including Shixing and Namuyi along with Na, Laze and Naxi (a group referred to as **Naic** in Jacques et al. 2011), not for a language group containing the latter three languages to the exclusion of others.

(iii) Suppletion for ‘to come’, which is not found in Laze, will not be discussed further here.

(iv) Suppletion for ‘10’ is attested (in various forms) in several Sino-Tibetan languages, including Tibetan, and borrowings or calques are not unattested (Mazaudon 1985: 127). “The unaspirated initial in ‘twenty’ is found in nearly all Northern Ngwi languages, and in Central Ngwi languages such as Lisu, Lipo, Lolopo, Sani and so on, but the regular aspirated form is found in other Central Ngwi languages such as Lahu and Jino, and in Southern Ngwi languages” (Bradley 2005: 233). For instance, Nuosu (Liangshan Yi) has /ts<sup>h</sup>i-/ for ‘ten’ in numerals below 20 and above 29, as against unaspirated /tsi-/ in the range from 20 to 29 (Li Min & Ma Ming 1983: 108-111). A difference with Naxi, Laze and Na is that, in Loloish (a.k.a. Ngwi), there is a two-way suppletion, not a three-way suppletion: ‘ten’ has the same form below 20 and above 29. A three-way suppletion is found in Shixing; note, however, that the phonetic forms in Shixing are widely different from those in Na, Laze and Naxi (/qa<sup>55</sup>/, /ka<sup>55</sup>/ and /qa<sup>33</sup>/, respectively, in the notation of Huang Bufan et al. 1991), so they may result from an independent development.

To sum up, among the three data sets in Table 2, only the three-way suppletion for ‘10’ could be adduced as potential evidence of a special phylogenetic closeness between Na, Laze and Naxi. The evidence is thin, however: the possibility of borrowing cannot be excluded. “The Thai numbers, for instance, once thought to be derived from the same ancestral forms as the Chinese numbers, and so used to argue for the genetic relationship of these two large language groups, have been shown to have been borrowed from Chinese into Thai at an early date” (Mazaudon 2007, citing Benedict 1942).

Interesting evidence may come—somewhat paradoxically—from the tonal morphology of Naxi, Na and Laze. Some preliminary definitions are useful at this point. The concept of tone sandhi is here restricted to synchronic, productive phonological ‘rules’ of tone change triggered by adjacent tones; this is a narrower

definition than that often given to this concept in the literature (see, e.g., Chen 2000: 25). The phenomena referred to by Bradley 2005 as “irregular tone sandhi” are here labelled as ‘irregular tonal alternations’. ‘Tonal morphology’, a term used interchangeably with ‘morphotonology’, consists of all the rules that determine the tone patterns of specific syntactic structures, such as determinative compounds, complex predicates, nominal determiners, etc. Guillaume Jacques (p.c.) notes that irregular morphology in Naxi, Na and Laze, as also in Yi and Pumi, largely consists in irregular morphotonology: tone patterns which can be accounted for neither by sandhi rules nor by regular morphotonological rules. However, the differences between the prosodic systems of Naxi, Na and Laze do not allow for a term-to-term comparison of their morphotonology. For instance, the complex tone patterns of compound nouns in Yongning Na, which differ for determinative compounds and copulative compounds (Michaud & Latami 2010), have no equivalent in Laze and Naxi. Likewise, the peculiar tone patterns of reduplication in Naxi appear to reflect an evolution that is specific to this language (Michaud & Vaissière 2007a, b).

There is nonetheless at least one set of tonal data that lends itself to comparison across the three languages: the tone patterns of numeral-plus-classifier phrases. These patterns, though different in the three languages, share structural similarities. Three pairs of numerals emerge: ‘1’ and ‘2’ always have the same tonal behaviour; likewise, ‘4’ and ‘5’ share the same tone patterns, as do ‘6’ and ‘8’. Sections 2 to 4 set out the facts in Naxi, Laze and Na, going from the simplest system (Naxi) to the most complex (Na). Section 5 provides a general discussion, arguing that the identical behaviour of these pairs of numerals originates in morpho-phonological properties that they shared at least as early as the stage preceding the separation of Naxi, Na and Laze, referred to as the Proto-Naish stage. Although no reconstruction can be proposed as yet for these properties, they appear to support the hypothesis that Na, Laze and Naxi belong in the same subgroup of Sino-Tibetan.

### ***1.2. Reflections on the potential time depth of tone sandhi and irregular tonal patterns***

The notion that tonal irregularities can go back a long way may require some clarification. It is well established that the diachronic evolution of tone systems can proceed at a rapid rate; close dialects can have widely different tone systems; witness the great diversity of prosodic systems across dialects of Japanese or Chinese. Contact between dialects is apt to add extra complexity to tonal correspondences (a detailed example in the Japanese domain is provided by Kubozono 2007); this greatly lessens the chances of recovering hints about the distant past by the comparative method. Naxi, Na and Laze are no exception: their prosodic systems have important structural differences. Naxi is close to the ‘omnisyllabic’ type (one tone per syllable), with only a few phenomena of tonal change (Michaud 2006b, Michaud & He Xueguang 2007a); at the other extreme, Yongning Na has a complex tonal system involving a paradigm of four tone

patterns for monosyllabic verbs and five for monosyllabic nouns, as well as ubiquitous morphotonological phenomena (Michaud 2008). The diachronic evolution of the prosodic systems of Naxi, Na and Laze has remained little explored since Bradley's hypotheses on the development of the High tone of Naxi (1975) and Matisoff's study of the evolution of stopped syllables in "Burmo-Naxi-Lolo" (1991). Jacques et al. (2011) deliberately focus on vowels and consonants, provisionally leaving tone aside. In this situation, adducing tone patterns as phylogenetic evidence may appear as a misguided venture.

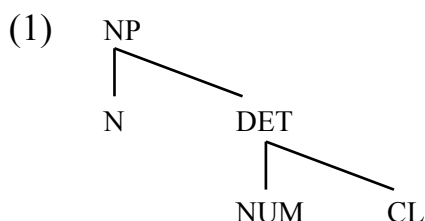
However, there is convincing evidence from other languages showing that tonal alternations and irregularities may have great historical depth, sometimes going back to segmental phenomena that predate the development of tones. Evidence to this effect is found in Vietnamese (Austroasiatic) and in Hmông-Miên, as well as in Sino-Tibetan. In Vietnamese, the word for 'ten' has two tonal realisations: *mười* (IPA: /mɯɤj/, tone A2) in the numbers from 10 to 19; and *mười* (same segmental phonemes: /mɯɤj/, with a different tone: A1) in the numbers from 20 to 99. There exist a few other pairs:

- 'many' is *nhieu*, with tone A2; 'how much' is *bao nhieu*, where the syllable *nhieu* has tone A1
- *ngồi* 'to sit' (A2); *ngôi* 'to enthrone' (A1)
- *vòi* '(elephant's) trunk' (A2); *voi* 'elephant' (A1)

An important fact about Vietnamese is that it does not have any tone sandhi phenomena. What tonal alternations it has are due to the historical influence of a preceding syllable which came to function as a prefix and finally coalesced with the main syllable. Michel Ferlus (p.c.) hypothesises that the phrase which evolved into the present-day structure for numerals from 20 to 90 (*hai mươi* '20', *ba mươi* '30', etc.) contained a prefixed syllable before the root for '10', with the meaning 'a set of 10': '20' was 'two sets of 10', etc. The only trace which remains of this prefix is the changed tone of the syllable *mười*: the prefix must have had an unvoiced initial, leading to the treatment of the word for '... set of 10' as an unvoiced-initial word at the stage where the voiced and unvoiced series of initials merged (Haudricourt 1954, 1961). The word therefore developed a high-series tone (A1), whereas the unprefixed word for 'ten' went into the low series (hence its tone A2 and not A1) due to its voiced initial. (The reconstruction and its time frame remain to be worked out in detail.) Likewise, 'elephant' can be analysed as deriving from 'trunk' ('trunk-bearer'). The tonal alternations found in Hmông-Miên languages also go back a long way (Ratliff 1992, *passim*). Within Sino-Tibetan, the history of Tibetan provides clear examples of the effects of historical prefixes and final consonants in tonogenesis (Sun 2003). Although further discussion of this topic falls outside the scope of this paper, it appeared useful to recall these illustrations of the fact that tonal morphology can "furnish invaluable clues to earlier stages of the language" (Matisoff 1973: 28).

### 1.3. The syntax of the noun phrase: some observations that hold for Naxi, Laze and Na

As a final introductory note, here are some remarks about the syntax of noun phrases which include a numeral+classifier phrase in Naxi, Laze and Na. The basic structure is *noun+numeral+classifier*. The structure of the noun phrase is as in (1), where NP=Noun Phrase, N=Noun, DET=Determiner, NUM=Numeral, and CL=Classifier.



Bradley’s generalisations about Loloish languages are also valid for Naxi, Laze and Na: “The numeral plus classifier construction follows the head of the NP. It is closely-bound and cannot have anything inserted between the final numeral and the following classifier” (Bradley 2005: 224). That the determiner makes up a unit within the noun phrase is evidenced by the tonal interaction between the numeral and the classifier, studied at length in the present article. There is no tonal interaction between the noun and the determiner: the tone pattern of the determiner is fully independent from that of the noun.

Lastly, concerning the inventory of classifiers and their semantic extension, the reader is referred to Thomas Pinson’s Naxi-Chinese-English glossary (Pinson 1998: 245-251), which contains some 90 classifiers, and to Lidz (2006: 8-14) for a description of about 50 classifiers in use in Yongning Na. The following sections focus exclusively on the tone patterns of numeral-plus-classifier phrases.

## 2. NUMERAL-PLUS-CLASSIFIER PHRASES IN NAXI

The Naxi facts are presented first because they are simpler than those in Laze (Section 3) and Na (Section 4). There are three basic lexical tones in Naxi: H(igh), M(id) and L(ow); the three tonal categories of classifiers correspond transparently to these three categories.

### 2.1. A-sher Naxi

A-sher (/aʃsəʃ/) is the Naxi name of a village located to the northeast of the city of Lijiang (see Michaud 2006a for a map and detailed coordinates). The tonal patterns of numeral-plus-classifier phrases are shown in Table 3.<sup>1</sup> The phrases

<sup>1</sup> The phonetic transcription used here is narrower than a strictly phonemic analysis. In particular, in Naxi, Na and Laze, [ɲ] is an allophone of /ŋ/ before high front vowels, and [ɲ] and [ɲ] are allophones of /u/ after fricatives and affricates ([ɲ] after dentals and [ɲ] after retroflexes). A narrow notation appeared more adequate to convey a feel for the pronunciation of the items at issue. For phonemic analyses of Naxi, the reader is referred to He Jiren & Jiang Zhuyi 1985



numeral in isolation	Tone of classifier				H	M	L
	H	M	L	L			
1	q̥uɹ	q̥uɹp <sup>h</sup> eɿ	q̥uɹɿyɹ	q̥uɹɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
2	jiɹ	jiɹp <sup>h</sup> eɿ	jiɹɿyɹ	jiɹɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
3	sɿɿ	sɿɿp <sup>h</sup> eɿ	sɿɿɿyɹ	sɿɿɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
4	luɹ	luɿp <sup>h</sup> eɿ	luɿɿyɹ	luɿɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
5	wɑɹ	wɑɿp <sup>h</sup> eɿ	wɑɿɿyɹ	wɑɿɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
6	ts <sup>h</sup> wɑɿ	ts <sup>h</sup> wɑɿp <sup>h</sup> eɿ	ts <sup>h</sup> wɑɿɿyɹ	ts <sup>h</sup> wɑɿɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
7	səɹ	səɹp <sup>h</sup> eɿ	səɹɿyɹ	səɹɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
8	hoɿ	hoɿp <sup>h</sup> eɿ	hoɿɿyɹ	hoɿɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
9	ŋgvɹ	ŋgvɹp <sup>h</sup> eɿ	ŋgvɹɿyɹ	ŋgvɹɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ
10	ts <sup>h</sup> eɿ	ts <sup>h</sup> eɿp <sup>h</sup> eɿ	ts <sup>h</sup> eɿɿyɹ	ts <sup>h</sup> eɿɿk <sup>h</sup> wɿ	ɿ	ɿ	ɿ

Table 3. The tonal patterns of numeral-plus-classifier phrases in A-sheer Naxi, using [p<sup>h</sup>eɿ] (CL for flat objects), [ɿyɹ] (CL for round objects) and [k<sup>h</sup>wɿ] (CL for elongated objects) as examples. Consultant: M4.

and Michailovsky & Michaud 2006. Concerning the phonemic analysis of Yongning Na, one correction is to be made to Michaud 2008: [e] and [i] were considered as allophones; I have now realised that they contrast after coronal fricatives and affricates. The suppletive forms of ‘10’ in Table 2 are a case in point: the /e/ and /i/ are contrastive in /ts<sup>h</sup>e/ and /ts<sup>h</sup>i/; in turn, these contrast with /wɿ/, as in /ts<sup>h</sup>wɿ/ ‘goat’. A phonemic analysis of Laze is set out in Michaud and Jacques (to appear).

with irregular tone patterns are set in bold type. In order to facilitate reading, the tone patterns are recapitulated on the right-hand side of the table, with identical cell shadings for combinations with identical tone patterns. The data collection method is the same for all the language varieties described in this article: it consists of direct elicitation via Mandarin Chinese and verification in a set of transcribed narratives. For ease of reference across publications, the identity of the language consultants is indicated by means of a unified code: M for male, F for female, followed by a number.

Above 99, the higher-level units are: 100; 1,000; 10,000 (the equivalent of Chinese *wàn* 万); and 10,000 times 10,000 (one hundred million, the equivalent of Chinese *yì* 亿). The last two digits are expressed the same way as in the range between 1 and 99.

The facts in Table 3 are identical with those reported in linguistic descriptions of Naxi (such as the data on the Qinglong 青龙 dialect—present-day Changshui 长水—reported by He Jiren et al. 1985: 12-14) and with the examples found in the editions of traditional Naxi tales and rituals, such as He Kaixiang et al. 1987. The only tonal difference that I noticed concerns ‘1’ and ‘2’. In the book co-authored by He Jiren and Jiang Zhuyi (1985), they are transcribed with Mid tone on page 59 (/ɬu˧˥/, /ni˧˥/), but with Low tone on page 170 (/ɬu˨˩/, /ni˨˩/). This is a dialectal difference: ‘1’ and ‘2’ are pronounced in the Mid tone in some dialects, including A-sher, but with Low tone in other dialects, including Qinglong 青龙 (present-day Changshui 长水; see, e.g., He Zhiwu 1981: 145) and Yangxi 漾西, He Jiren’s native dialect (we made recordings in 2002). Both of these dialects are spoken in neighbouring areas in the Lijiang plain, i.e. at the heart of the Naxi area. This observation will be taken up again in the general discussion (Section 5).

Most of the tone sequences observed in numeral-plus-classifier phrases correspond to a simple sequence of the tone of the numeral and that of the classifier. Those that do not (set in bold type in the table) concern the numerals ‘3’, ‘4’, ‘5’, ‘6’, ‘8’ and ‘10’. If these cases resulted from a synchronic rule of tone sandhi, the same output would be expected from each of the M-tone numerals ‘1’, ‘2’, ‘4’, ‘5’, ‘7’ and ‘9’. This prediction is not borne out (e.g., with M-tone classifier: /ɬu˧˥ly˧˥/ ‘one...’, with MM tone pattern, but /lu˧˥ly˧˥/ ‘four...’, with HM). Similarly, the outputs of the two L-tone numerals ‘3’ and ‘10’ differ from each other.

Two options are open in the analysis of these facts: either the patterns are irregular, and learnt as such by the speakers; or the inventory of lexical tones must be extended: if ‘4’ and ‘5’ pattern differently from ‘1’ and ‘2’, it could indicate that they have different lexical tones, and that the contrast between the two tonal categories at issue is neutralised in isolation. Such neutralisations are indeed observed in Yongning Na, a closely related language discussed in Section 4. In the case of Naxi, however, postulating additional lexical tones is hardly a satisfactory solution: one would then need to postulate five tones, two of them neutralising to L in isolation (those of the words for ‘3’ and ‘10’), and two others neutralising to M in isolation (those of {4, 5} on the one hand, and those of {1, 2, 7, 9} on the other).

	numeral in isolation	Tone of classifier				H	M	L
		H	M	L				
1	ŋd̪uɾɿ	ŋd̪uɾɿp <sup>h</sup> eɽ	ŋd̪uɾɿlyɿɿ	ɖuɾɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
2	ŋiɿ	ŋiɿp <sup>h</sup> eɽ	ŋiɿlyɿɿ	ŋiɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
3	sɿɿ	sɿɿp <sup>h</sup> eɽ	sɿɿlyɿɿ	sɿɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
4	ŋd̪uɾɿ	ŋd̪uɾɿp <sup>h</sup> eɽ	ŋd̪uɾɿlyɿɿ	ŋd̪uɾɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
5	wɑɿ	wɑɿp <sup>h</sup> eɽ	wɑɿlyɿɿ	wɑɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
6	ts <sup>h</sup> wɑɿ	ts <sup>h</sup> wɑɿp <sup>h</sup> eɽ	ts <sup>h</sup> wɑɿlyɿɿ	ts <sup>h</sup> wɑɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
7	səɿ	səɿp <sup>h</sup> eɽ	səɿlyɿɿ	səɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
8	høɽ	høɽp <sup>h</sup> eɽ	høɽlyɿɿ	høɽk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
9	ŋgɿɿ	ŋgɿɿp <sup>h</sup> eɽ	ŋgɿɿlyɿɿ	ŋgɿɿk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	
10	ts <sup>h</sup> eɽ	ts <sup>h</sup> eɽp <sup>h</sup> eɽ	ts <sup>h</sup> eɽlyɿɿ	ts <sup>h</sup> eɽk <sup>h</sup> wɿɽ	ɿ	ɿ	ɿ	

Table 4. The tonal patterns of numeral-plus-classifier phrases in Nda-le Naxi, using the same classifiers as in Table 3. Consultant: M10.

There is no evidence anywhere else in the language for these categories, however, whereas there do exist a few other irregular tonal patterns in the lexicon.<sup>2</sup> The

<sup>2</sup> For instance, /nɿɿhøɽ/ ‘mung bean’ can be transparently analysed as composed of /nɿɿ/ ‘bean’ and /høɽ/ ‘green’; its tone pattern is synchronically opaque: in the present state of the language, compounding is not accompanied by any tonal change (Michaud & Vaissière 2007a: 34).

interpretation chosen here is that some numeral-plus-classifier phrases have irregular tone patterns. The patterns in Table 3 that do not coincide with the simple sequence of the lexical tones of their constituting elements are taken to be irregular patterns, inherited from earlier historical stages. This situation is areally common; detailed examples in Loloish are analysed by Bradley 2005.

The irregular patterns of Naxi are complex, in that both the numeral and the classifier can undergo tone change: in /ho<sup>h</sup>l<sup>h</sup>e-/ ('8' plus H-tone classifier), the tone of the classifier is different from its realisation in isolation; in /sɿ<sup>h</sup>lly-/ ('3' plus M-tone classifier), the tone of the classifier is as expected, whereas that of the numeral is modified; finally, in /wa<sup>h</sup>l<sup>h</sup>e-/ ('5' plus H-tone classifier), both differ from their realisation in isolation.

From Table 3, it appears that there are five sets of numerals: '3' and '10' are singletons, each with its own tonal behaviour, whereas '4' and '5' pattern together, as do two other sets: {6, 8} and {1, 2, 7, 9}. Interestingly, these sets also behave identically in numerals from '11' to '99' and above: thus, '16' and '18' share the same tone pattern, as do '60' and '80', '106' and '108'; '14' and '15', etc. These observations will be central to the general discussion.

## 2.2. *Nda-le Naxi*

Nda-le (/nda<sup>h</sup>le/) is the Naxi name of a village located southeast of the city of Lijiang (see, again, Michaud 2006a for a map and detailed coordinates). The Naxi dialect of Nda-le is close to that of A-sher; the comparison of these dialects allows for a fine-grained investigation into dialectal diversity. There are only three tonal categories of classifiers in Nda-le, which coincide exactly with those of A-sher. On the other hand, the tonal patterns of numeral-plus-classifier phrases are not identical: see Table 4. As in Tables 3 and 5, the irregular cases are indicated in bold: in these cases, the tone pattern of the determiner is not simply the concatenation of the tones of the numeral and the classifier.

Again, the question arises whether these cases result from a sandhi rule taking as its input the tones of the numeral and of the classifier. Nda-le Naxi does have one sandhi rule which comes into play for some of the forms in Table 4; since this relatively complex phenomenon is not central to the present issue, it is set out in the Appendix. From the vantage point of the present research, an important observation is that tone sandhi does not account for all the data: to take an example, '3' and '10' have the same tone (L) but do not pattern together in every case. In association with a H-tone classifier, 'ten' yields LH (/ts<sup>h</sup>e<sup>h</sup>l<sup>h</sup>e/) whereas 'three' yields /sɿ<sup>h</sup>l<sup>h</sup>e/. There is therefore more to the data in Table 4 than the application of sandhi rules.

The irregular patterns concern the numerals '3', '4', '5', '6', '8' and '10', as in A-sher Naxi (Section 2.1). Again as in A-sher Naxi, the numerals of Nda-le Naxi can be classified into five sets on the basis of their tonal behaviour: '3' and '10' are singletons, each with its own tonal behaviour, whereas '4' and '5' pattern together, as do two other sets: {6, 8} and {1, 2, 7, 9}. Another similarity with A-

sher is that these sets also behave identically in numerals from ‘11’ to ‘99’ and above: thus, ‘16’ and ‘18’ share the same tone pattern, as do ‘60’ and ‘80’, etc.

As a final note about Naxi dialects, the language variety spoken in Fv-kho (Naxi: /fɿk<sup>h</sup>o-/-; Chinese: 峰科 Fèngkē; see Michaud 2006a for detailed coordinates) also partakes in the structural pattern studied here; the pairs that pattern together are {1, 2}, {4, 5}, and {6, 8}.

### 3. NUMERAL-PLUS-CLASSIFIER PHRASES IN LAZE

Laze is an as yet unclassified language spoken in the county of Muli 木里 (Liangshan 凉山, Sichuan); the reader is referred back to Table 1 for information about the various names that have been given to this language. It was first studied by Huang Bufan in the 1980s (Huang Bufan 2009). Its tonal system, while somewhat richer than that of Naxi, remains relatively straightforward (see Michaud 2009). There are four categories of monosyllabic nouns: H(igh), M(id), L(ow), and M-to-H, and all classifiers likewise have one of these four tones. However, a further distinction must be made among H-tone classifiers on the basis of their tonal behaviour in numeral+CL phrases: the classifiers ‘year’ /k<sup>h</sup>ɿ/ and ‘basket’ /k<sup>h</sup>ɿ/ have different behaviours when associating with a numeral, as shown in Table 5a, where a ‘year’ type and a ‘basket’ type are distinguished among H-tone classifiers. Note that no citation forms are provided for Laze numerals, because they cannot be said in isolation.

Unlike in Naxi, the numerals in the range from ‘11’ to ‘19’ do not behave simply as in the range from ‘1’ to ‘9’. For reasons of space, numbers above ‘10’ are not presented here for all types of classifiers. However, it appeared useful to present data from ‘11’ to ‘20’ for the ‘year’ and ‘basket’ types of H-tone classifiers, because these data constitute additional evidence that these two types are indeed distinct: see Table 5b. Numerals could not be elicited in isolation, the consultants insisting on providing a complete determiner, with a classifier—as is done when counting items. For want of more direct evidence, one may reason as follows. Tone patterns in which the determiner receives a tone that differs from its lexical tone will be considered as irregular; they are therefore set in bold in Table 5a. The lexical tone of numerals can then be extracted from the remaining forms, considered as regular. This yields: L tone for ‘6’ and ‘8’; M tone for ‘1’, ‘2’, ‘4’, ‘5’, ‘7’ and ‘9’; and H tone for ‘3’ and ‘10’ (unless ‘3’, which is thoroughly irregular, is analysed as having a MH tone). In turn, this allows for a distinction between two sets of irregular patterns:

(i) those that result from two processes that are also observed elsewhere in the language: M+L>H+H, and L+M>L+L. In the process of lexicalisation, compounds with an M+L pattern are observed to change to H+H, and compounds with an L+M pattern to L+L, e.g. /wɿ/ ‘pig’ and /dze/ ‘food’ (with M tone) yielding /wɿdze/ ‘pig feed, swill’ (Michaud 2009).

(ii) those that involve the numerals ‘3’ and ‘10’, for which no parallel has been found elsewhere in the language.

The former can be interpreted as relatively recent tonal changes, the latter as relatively ancient irregularities.

Tone of classifier		MH		L		M		H		MH		L		M		H		H	
								‘year’ type		‘basket’ type						‘year’ type		‘basket’ type	
1	ɬu˥˥tsæ˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥	ɬu˥˥
2	ɲi˥˥tsæ˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥	ɲi˥˥
3	su˥˥tsæ˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥	su˥˥
4	zy˥˥tsæ˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥	zy˥˥
5	ŋwɤ˥˥tsæ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥	ŋwɤ˥˥
6	qʰɔ˥˥tsæ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥	qʰɔ˥˥
7	sɿ˥˥tsæ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥	sɿ˥˥
8	ɕi˥˥tsæ˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥	ɕi˥˥
9	gy˥˥tsæ˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥	gy˥˥
10	tsʰi˥˥tsæ˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥	tsʰi˥˥

Table 5a. Tonal patterns in Laze for [tsæ˥˥] ‘section’, [ɬv] (generic CL), [ɲi] ‘day’, [kʰv] ‘year’ and [kʰɤ] ‘basket’. Consultant: F7.

	Tone of classifier			
	H 'year' type	H 'basket' type	H 'year' type	H 'basket' type
11	ts <sup>h</sup> iː]dɯ]k <sup>h</sup> vː]	ts <sup>h</sup> iː]dɯ]k <sup>h</sup> vː]		
12	ts <sup>h</sup> iː]ni]k <sup>h</sup> vː]	ts <sup>h</sup> iː]ni]k <sup>h</sup> vː]		
13	ts <sup>h</sup> iː]su]k <sup>h</sup> vː]	ts <sup>h</sup> iː]su]k <sup>h</sup> vː]		
14	ts <sup>h</sup> iː]zɯ]k <sup>h</sup> vː]	ts <sup>h</sup> iː]zɯ]k <sup>h</sup> vː]		
15	ts <sup>h</sup> iː]ŋwɤ]k <sup>h</sup> vː]	ts <sup>h</sup> iː]ŋwɤ]k <sup>h</sup> vː]		
16	ts <sup>h</sup> iː]q <sup>h</sup> ɔ]k <sup>h</sup> vː]	ts <sup>h</sup> iː]q <sup>h</sup> ɔ]k <sup>h</sup> vː]		
17	ts <sup>h</sup> iː]ŋ]k <sup>h</sup> vː]	ts <sup>h</sup> iː]ŋ]k <sup>h</sup> vː]		
18	ts <sup>h</sup> iː]ci]k <sup>h</sup> vː]	ts <sup>h</sup> iː]ci]k <sup>h</sup> vː]		
19	ts <sup>h</sup> iː]ŋvː]k <sup>h</sup> vː]	ts <sup>h</sup> iː]ŋvː]k <sup>h</sup> vː]		
20	ni]tsiː]k <sup>h</sup> vː]	ni]tsiː]k <sup>h</sup> vː]		

Table 5b. Behaviour of the 'year' and 'basket' types of H-tone classifiers of Laze in numeral-plus-classifier phrases from eleven to twenty.

To sum up the observations made about Laze, (i) unaccountable irregularities concern the numerals '3' and '10', and (ii) numerals can be classified into five sets on the basis of their tonal behaviour: '3' and '10' are singletons, each with its own tonal behaviour, whereas '7' and '9' pattern together, as do two other sets: {6, 8} and {1, 2, 4, 5}. As in Naxi, these sets also behave identically in numerals from '11' to '99' and above: thus, '17' and '19' share the same tone pattern, as do '70' and '90', etc. These facts will be taken up in the general discussion.

#### 4. NUMERAL-PLUS-CLASSIFIER PHRASES IN YONGNING NA

In the lexical data provided by He Jiren et al. (1985: 135-172), as also in the language synopsis by Yang Zhenhong 2006, 2009, four tones are reported for Yongning Na: High, Mid, Low, and Rising. The prosodic system of Yongning Na is actually of greater complexity, but several of the tonal contrasts are neutralised when words are spoken in isolation. A similar situation is found in Pumi (see Ding 2006 and Jacques 2011). In the variety analysed here, on the surface, each syllable has one of three level tones (High, Mid or Low) or one of two contours (Low-to-Mid or Mid-to-High); there are strong arguments in favour of the analysis of contours as sequences of two levels. Five tonal classes of monosyllabic nouns have been brought out, eleven classes of disyllabic nouns,

and four classes of monosyllabic verbs (Michaud 2008). If a classifier is “a type of limited noun that occurs only after numerals (...), and whose selection is determined by a preceding (overt or implicit) noun” (Matisoff 1973: 88), one may expect a degree of tonal complexity for classifiers that is comparable to that of nouns—and hence a considerably more complex picture than in Naxi (Section 2), which only has three basic tones. The tonal complexity of numeral-plus-classifier phrases clearly bears out this prediction, witness the six categories brought out in Table 6. The form for ‘1’ followed by the classifier for humans is provided in brackets because a different classifier is used with this numeral; no tone pattern is indicated in the right hand-side of the table for this combination.

The data presented here are from a female speaker (F4) born in 1950; in the speech of younger speakers, some of these contrasts are becoming lost, bringing the tone system closer to an ‘omnisyllabic’ type (one tone per syllable) as in Chinese, the dominant language. Observations on this topic are proposed by Michaud and Latami (2010).

Taking into account the range of numerals from 1 to 30, I have found no less than eleven different categories of classifiers. For instance, /k<sup>h</sup>wɿ/ ‘piece of...’, which has the same behaviour as /ni/ ‘day’ up to ‘13’, has different tone patterns for ‘14’, ‘15’, ‘16’, ‘18’, ‘19’, ‘22’, ‘25’, ‘29’ and ‘30’, requiring the recognition of these two classifiers as members of distinct categories. This system may appear staggeringly complex; however, numeral-plus-classifier phrases are extremely frequent in discourse, a factor which is known to favour the preservation of irregular morphology. The system of Yongning Na would warrant a detailed study of the occasional hesitations or ‘mistakes’ of speakers in the tone patterns of such phrases, in the spirit of Henri Frei’s *Grammar of Mistakes* (Frei 1929). It is not clear at this stage which of the forms can be considered as irregular: in Naxi and Laze, the ‘regular’, ‘default’ mode of association of a numeral and a determiner is that each surfaces with its lexical tone, whereas the Na data in Table 6 cannot be accounted for by a set of simple rules. For the sake of the present argument, let us simply note that three pairs of numerals stand out: ‘1’ and ‘2’ always have the same tonal behaviour; likewise, ‘4’ and ‘5’ share the same tone patterns, as do ‘6’ and ‘8’. As in Naxi and Laze, these sets also behave identically in numerals from ‘11’ to ‘99’ and above: thus, ‘14’ and ‘15’ share the same tone pattern, etc.

## 5. GENERAL DISCUSSION AND CONCLUSION

The mathematical structure of the system found in Laze, Na and Naxi, a decimal system with higher-level units of 10,000 and 100,000,000 as in Chinese, is widespread in the area, unlike the more unusual counting systems analysed by Mazaudon 2002, 2007. It is therefore useless for phylogenetic classification. As for the facts presented in Sections 2-4, they can be interpreted as separate innovations, in light of the lack of surface similarity between Naxi, Laze and Na;<sup>3</sup>

<sup>3</sup> In A-sheer Naxi the numerals ‘1’, ‘2’, ‘6’, ‘7’, ‘8’ and ‘9’ have stable tones: there is no sandhi in numeral-plus-classifier determiners. In Nda-le Naxi the stable numerals are ‘1’, ‘2’, ‘4’, ‘5’, ‘7’, ‘9’ and ‘10’, and the stable classifiers are the high and low tone ones; in Laze ‘3’, ‘6’, ‘8’



	numeral in isolation												
	Tone of classifier												
	H	MH	M	M	L	M	H	MH	M	M	L	M	
1	qur <sup>1</sup>	qur <sup>1</sup> ni <sup>1</sup>	qur <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	qur <sup>1</sup> na <sup>1</sup>	(qur <sup>1</sup> v <sup>1</sup> )	qur <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	qur <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
2	ŋi <sup>1</sup>	ŋi <sup>1</sup> ni <sup>1</sup>	ŋi <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	ŋi <sup>1</sup> na <sup>1</sup>	ŋi <sup>1</sup> kv <sup>1</sup>	ŋi <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	ŋi <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
3	so <sup>1</sup>	so <sup>1</sup> ni <sup>1</sup>	so <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	so <sup>1</sup> na <sup>1</sup>	so <sup>1</sup> kv <sup>1</sup>	so <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	so <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
4	zy <sup>1</sup>	zy <sup>1</sup> ni <sup>1</sup>	zy <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	zy <sup>1</sup> na <sup>1</sup>	zy <sup>1</sup> kv <sup>1</sup>	zy <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	zy <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
5	ŋwɤ <sup>1</sup>	ŋwɤ <sup>1</sup> ni <sup>1</sup>	ŋwɤ <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	ŋwɤ <sup>1</sup> na <sup>1</sup>	ŋwɤ <sup>1</sup> kv <sup>1</sup>	ŋwɤ <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	ŋwɤ <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
6	q <sup>h</sup> v <sup>1</sup>	q <sup>h</sup> v <sup>1</sup> ni <sup>1</sup>	q <sup>h</sup> v <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	q <sup>h</sup> v <sup>1</sup> na <sup>1</sup>	q <sup>h</sup> v <sup>1</sup> kv <sup>1</sup>	q <sup>h</sup> v <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	q <sup>h</sup> v <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
7	ʂ <sup>1</sup>	ʂ <sup>1</sup> ni <sup>1</sup>	ʂ <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	ʂ <sup>1</sup> na <sup>1</sup>	ʂ <sup>1</sup> kv <sup>1</sup>	ʂ <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	ʂ <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
8	hū <sup>1</sup>	hū <sup>1</sup> ni <sup>1</sup>	hū <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	hū <sup>1</sup> na <sup>1</sup>	hū <sup>1</sup> kv <sup>1</sup>	hū <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	hū <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
9	gy <sup>1</sup>	gy <sup>1</sup> ni <sup>1</sup>	gy <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	gy <sup>1</sup> na <sup>1</sup>	gy <sup>1</sup> kv <sup>1</sup>	gy <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	gy <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+
10	ts <sup>h</sup> e <sup>1</sup>	ts <sup>h</sup> e <sup>1</sup> ni <sup>1</sup>	ts <sup>h</sup> e <sup>1</sup> lk <sup>h</sup> v <sup>1</sup>	ts <sup>h</sup> e <sup>1</sup> na <sup>1</sup>	ts <sup>h</sup> e <sup>1</sup> kv <sup>1</sup>	ts <sup>h</sup> e <sup>1</sup> lk <sup>h</sup> w <sup>1</sup>	ts <sup>h</sup> e <sup>1</sup> mae <sup>1</sup>	+	+	+	+	+	+

Table 6. Tonal patterns in Yongning Na for [ni] ‘day’, [k<sup>h</sup>v<sup>1</sup>] ‘year’, [na] (CL for knives), [kv<sup>1</sup>] (CL for humans), [k<sup>h</sup>w<sup>1</sup>] (CL for elongated objects) and [mae<sup>1</sup>] ‘monetary unit’. Consultant: F4.

and ‘10’ are stable (though not in collocations for ‘20’), but no classifiers are; and in the Na data, no numerals or classifiers are stable.

they potentially encapsulate phylogenetic evidence nonetheless, since they bring out similar parallels between pairs of numerals. Table 7 recapitulates groupings among numerals in Na, Laze and Naxi; anticipating the argument about the relatedness of these three languages, the table also proposes hypotheses about their common ancestor, **Proto-Naish**. Proto-Naish is defined as the (hypothetical) common ancestor of the present-day languages described in Chinese scholarship as “dialects of Naxi”, and which will be referred to as **Naish languages**. **Naish** is proposed as a name for the entire group because, as pointed out by Yang Fuquan (2006), the syllable ‘Na’ appears in the autonyms of several of the communities at issue, including ‘Na’ and ‘Naxi’. The second syllable of ‘Naxi’ means ‘human being’; as for the name ‘Laze’, it apparently originates in a place name (Guo Dalie & He Zhiwu 1999 [1994]: 6-7); the /la/ in ‘Laze’ cannot be cognate with ‘Na’, since Laze has a contrast between /n/ and /l/ and the latter regularly corresponds to /l/ in Na and Naxi.

	Na	Laze	Naxi	Proto-Naish	Proto-Naish sets
1	[Solid Grey]				{1, 2}
2					
3	[Solid Black]				
4	[Dotted]	[Solid Grey]	[Dotted]		{4, 5}
5	[Dotted]	[Solid Grey]	[Dotted]		
6	[Diagonal Lines]				{6, 8}
7	[Diagonal Lines]		[Solid Grey]	[Diagonal Lines]	
8	[Diagonal Lines]				{6, 8}
9	[White]	[Diagonal Lines]	[Solid Grey]	[White]	
10	[Solid Black]	[White]	[Diagonal Lines]	[Dotted]	

Table 7. Groupings among numerals from ‘1’ to ‘10’ on the basis of their tonal patterns in association with classifiers in Na, Laze and Naxi, and hypotheses about Proto-Naish.

Table 7 abstracts away from the tone patterns themselves to bring out the cases of identical tonal behaviour of two or more numerals (in the numeral system itself and in numeral-plus-classifier phrases). These cases are indicated by the use of the same shading in the cells at issue. The cells corresponding to numerals which are not members of larger subsets are left in white. The table brings out the identical behaviour of the pairs of numerals {1, 2}, {4, 5} and {6, 8} in Naxi, Laze and Na (though the patterns for {1, 2} and {4, 5} merge in Laze). Given the considerable differences in the surface forms between the three languages, it can safely be asserted that this similarity is not due to borrowing.

Before interpreting these data as a confirmation of the initial hypothesis of a close relationship between Naxi, Laze and Na, the status of the data in Table 7 needs to be examined carefully. This is clearly a case of retention of a common structure. The facts in Table 7 are synchronically opaque: the identical behaviour of these pairs of numerals dates back to morpho-phonological properties that they shared at least as early as the Proto-Naish stage, and for which no reconstruction can be proposed as yet. The similar behaviour of numerals could be put down to ‘affix-runs’ of the type brought out by Michailovsky 2003 in Kiranti; but not all the numerals that pattern together in the Naish languages are contiguous, witness the pair {6, 8}.

The shared morpho-phonological properties of these sets of numerals must have endured until the stage when the classifiers developed, since they left traces on the tone patterns of numeral-plus-classifier phrases; and the development and elaboration of classifiers is a relatively recent development in Tibeto-Burman (Bradley 2005: 224). It would be paradoxical to suggest that the entire structure in Table 7 reflects a language state of great antiquity: to my knowledge, this structure has not been reported so far in Burmic, Qiangic or other Sino-Tibetan language groups. In Sino-Tibetan, well-attested affinities are observed between ‘2’ and ‘7’ (which probably both had a final -s at early stages of the ancestor language: see Matisoff 1997), but these do not pattern together in Naxi, Na and Laze. Examples of languages of the area that do not partake in the structure set out in Table 7 include Nuosu (Loloish), Shixing, Namuyi, and Pumi (Qiangic). For want of detailed evidence on numeral-plus-classifier phrases on each language, the comparison below is based on the behaviour of numerals, comparing the forms in the interval [1: 10] with those in the numerals from ‘1’ to ‘10’ in higher numerals.

(i) In Nuosu, numerals fall into the following tonal subgroups: {1, 2, 7}, {3, 4, 5, 9, 10}, and {6, 8}; however, ‘6’ and ‘8’ differ in that the former is not subject to tonal alternations (Li Min et al. 1983: 108). The ‘Naish pattern’, if it may be so called, is not found in Lisu or Lahu either (data from Bradley 2005).

(ii) In Shixing, the numerals ‘1’ and ‘2’ do appear to pattern together, but not the numerals ‘4’ and ‘5’, nor ‘6’ and ‘8’: the tone patterns of ‘16’ and ‘18’ differ from each other, as do those of ‘60’ and ‘80’ (data from Huang Bufan et al. 1991).

(iii) In Namuyi, ‘1’ and ‘4-10’ all have L tone, whereas ‘2’ and ‘3’ have M tone. The tones of numerals do not change in higher-level combinations, from

‘11’ to ‘99’, except that there is a special form for ‘10’ in the range from 20 to 39: /hɔɪ/, as opposed to /hɔɪ/ in all the other cases. No tonal change takes place when the classifier /laɪ/ is added after numerals from 1 to 100. (Data from Libu Lakhi, recorded at Academia Sinica in 2008; see also Libu Lakhi et al. 2010.)

As a last observation on languages of the area, let us mention that Pumi also lacks the ‘Naish pattern’ among numerals (data from Lu Shaozun 2001).

Thus, the grouping of {1, 2}, {4, 5} and {6, 8} can be proposed as one of the criteria that can be used to determine whether a language belongs in the Naish language group or not. This criterion should of course be used in combination with as many others as possible, including regular sound correspondences, common lexical innovations, and cases of suppletion such as those reported in Table 2. This criterion offers additional evidence for the set of hypotheses recapitulated in Jacques et al. 2011: (i) as argued by Bradley (1975), Naish and Loloish are separate subgroups; (ii) Shixing is not part of the Naish group proper, *pace* Guo Dalie & He Zhiwu (1999 [1994]: 9); and (iii) Namuyi, despite numerous surface similarities with Na and Naxi, is not part of Naish either. This leads to further hypotheses, such as that the striking phonetic closeness of the forms of numerals from ‘1’ to ‘9’ in Na and Namuyi is due to language contact. Needless to say, systematic comparison of Shixing and Namuyi with Naxi, Na and Laze is required before any solid conclusion on issues of cognacy vs. areal convergence can be reached.

### ***5.1. Does Naxi stand apart within the Naish language group?***

Data from A-sher Naxi and Nda-le Naxi suggest the existence of a Naxi innovation whereby the pair of numerals {1, 2} came to have the same tonal behaviour as ‘7’ and ‘9’, resulting in the set of four similar numerals {1, 2, 7, 9} observed in A-sher and Nda-le. However, this phenomenon is not attested in all dialects of Naxi. In Section 2.1, it was mentioned that the linguists He Jiren and He Zhiwu, who are native speakers of the dialects of Yangxi and Changshui, respectively, describe ‘1’ and ‘2’ as having Low tone. This observation takes on special significance in view of the general picture in Table 7. The realisation of ‘1’ and ‘2’ with Low tone, which sets them apart from ‘7’ and ‘9’, is an archaic feature, reminiscent of the state of affairs in Laze and Na. The evolution whereby the pair of numerals {1, 2} came to have the same tonal behaviour as {7, 9} in several Naxi dialects must therefore be more recent than the separation of Naxi from Na and Laze. The identity of the tone patterns of {1, 2} and {4, 5} in Laze must likewise be supposed to have taken place after this language variety began its separate evolution.

### ***5.2. Perspectives for reconstruction***

The reconstruction of a Proto-Naish system in which the pairs {1, 2}, {4, 5} and {6, 8} patterned together raises new issues concerning the phonetic nature of the Proto-Naish system and the evolution leading up to the present-day Naish languages. At this stage, the phonological properties conditioning the similar

behaviour of the above pairs are not clear. Table 8 presents the segmental correspondences for numerals from 1 to 10, and a preliminary reconstruction (the method and results of this reconstruction are set out in Jacques et al. 2011).

	<i>A-sher</i> <i>Naxi</i>	<i>Nda-le</i> <i>Naxi</i>	<i>Na</i>	<i>Laze</i>	<i>Preliminary</i> <i>reconstructions</i>
1	ɖu	ŋɖu	ɖu	ɖu	*rd- (rhyme: uncertain)
2	ɲi	ɲi	ɲi	ɲi	*ɲi
3	sɿ	sɿ	so	su	*s- (+nasal rhyme *ũ?)
4	lu	ŋɖu	zɿ	zɿ	*rl- (rhyme: uncertain)
5	wa	wa	ŋwɤ	ŋwɤ	*ŋwa
6	<i>tʂ<sup>h</sup>wa</i>	<i>tʂ<sup>h</sup>wa</i>	q <sup>h</sup> ɿ	q <sup>h</sup> ɔ	*q <sup>h</sup> - (+ rhyme *U?)
7	ʂə	ʂə	ʂɿ	ʂɿ	*sr- (+nasal rhyme?)
8	ho	hø	hũ	ɕi	(uncertain)
9	ŋgɿ	ŋgɿ	gɿ	gɿ	*ŋgu
10	ts <sup>h</sup> e	ts <sup>h</sup> e	ts <sup>h</sup> e	ts <sup>h</sup> i	*ts <sup>h</sup> - (rhyme: uncertain)

Table 8. Segmental correspondences between the numerals of Naxi, Na and Laze, and preliminary reconstructions. (Italics are used for forms presumed not to be cognate.)

The history of numerals in Sino-Tibetan is notoriously complex. Quite a few of the items in Table 8 raise special difficulties: they do not fit in with the regular correspondences observed elsewhere, explaining why reconstructions are only proposed for three of the ten items ('2', '5' and '9'). This may point to morphological renovation. The forms for '6' cannot be straightforwardly reduced to a single etymon; the correspondence between Naxi /wa/, Na /ɿ/ and Laze /ɔ/ is not observed elsewhere. A prefix may have coalesced with the numeral; there may have existed two different forms at the stage of Proto-Naish, with different uses. A relationship with the widespread Sino-Tibetan etymon for '6', reflected by Tibetan *drug*, is likely; the Na and Laze forms can be reconstructed back to \*q<sup>h</sup>U, which can be related to *drug*, as final stops are lost without trace in \*-uC rhymes; the disappearance without trace of a medial \*-r- is also postulated in the historical phonology of the Naish languages. As for the Naxi form, it could come from the same root, but with a dental prefix instead of a uvular one; the rhyme remains unaccountable at present. The vowel correspondence for '10' is likewise isolated.

Looking beyond Naish, '6' and '8' are the only two numerals that have a final stop in conservative languages such as Tibetan (*drug* and *brgyad*) and Japhug Rgyalrong (/kutsɤɿ/ and /kurcat/). The similar tonal behaviour of '6' and '8' in Naish might therefore constitute an indirect trace of final stops, which otherwise left few traces in the historical phonology of Naish (Jacques et al. 2011). Further documentation on related dialects and languages will hopefully allow for a full-fledged reconstruction of the phonetic substance of the numerals and classifiers of Proto-Naish; this will shed some light on the historical origin of the observed patterns.

**APPENDIX: THE REVERSAL OF H+M TONE SEQUENCES ON  
DISYLLABLES TO M+H IN NDA-LE NAXI**

The presence of tone sandhi in Nda-le Naxi was mentioned in Section 2.2: this language variety has a tone sandhi rule which affects some of the phrases shown in Table 4. The present Appendix sets out this phenomenon. A peculiarity of Nda-le Naxi vis-à-vis neighbouring Naxi dialects (including A-sher, as well as the dialect of the old town of Lijiang) is the systematic reversal of H+M patterns to M+H on disyllables—said differently, the neutralisation of H+M and M+H patterns to M+H, as illustrated in Table 9. This phenomenon will be referred to below as “reversal of H+M to M+H”.

<i>Meaning</i>	<i>Nda-le Naxi</i>	<i>A-sher Naxi</i>	<i>Correspondence</i>
mist, fog	kiʰsæʌ	kiʌsæʌ	M+H: H+M
forehead	tøʌmuʌ	toʌmuʌ	M+H: H+M
heart	nyʌmeʌ	nyʌmeʌ	M+H: H+M
lid (of pot/pan)	kuʌpuʌ	kuʌpuʌ	M+H: H+M
sickle	sɿʌkyʌ	ʂyʌkyʌ	M+H: H+M
middle, centre	lyʌŋgyʌ	lyʌgyʌ	M+H: H+M
nettle	leʌpʰyʌ	leʌpʰyʌ	M+H: H+M
mortar, 臼	ʈsuʌmuʌ	ʈsuʌmuʌ	M+H: H+M
rubbish, refuse	ŋdøʌmæʌ	ndæʌmæʌ	M+H: M+H
brains	kyʌfyʌ	kyʌfyʌ	M+H: M+H
beard	myʌtsɿʌ	myʌtsɿʌ	M+H: M+H
spittle, mucus	ʈsøʌpʰeʌ	ʈsʷøʌpʰeʌ	M+H: M+H
beggar	haʌmeʌ	haʌmeʌ	M+H: M+H
lean meat	ʂyʌnaʌ	ʂyʌnaʌ	M+H: M+H
cloth, fabric	tʰøʌpyʌ	tʰoʌpyʌ	M+H: M+H
man’s waistband	mbuʌkuʌ	buʌkuʌ	M+H: M+H
earring	heʌkʰyʌ	heʌkʰyʌ	M+H: M+H
hoe	tsʰøʌkyʌ	tsʰoʌkyʌ	M+H: M+H
morning	myʌsɿʌ	myʌsɿʌ	M+H: M+H
hors-d’œuvre, 酒菜	zɿʌʂøʌ	zɿʌʂʷøʌ	M+H: M+H

*Table 9. Some correspondences illustrating the neutralisation of H+M and M+H patterns in Nda-le Naxi. (A Chinese gloss is added for disambiguation where necessary.)*

Only two exceptions have been observed so far. The first is /ʈsʰɿʌkyʌ/ ‘that place’ (distal deixis): the preservation of its H+M pattern may be due in part to the iconic value of the H tone on the distal deictic, and in part to the avoidance of homophony with /ʈsʰɿʌkyʌ/, which means ‘this one’ (proximal deictic plus classifier used for one human individual). The second is a set of terms of address calqued from Chinese: /əʌlʌ/ for elderly men (from Chinese ālǎo 阿老), /əʌŋjæʌ/ for women older than oneself aged about 40 to 50 (āniáng 阿娘), /əʌnæʌ/ for ‘grandmother, old woman’ (ānǎi 阿奶). These are part of a specific set of terms of address for people older than oneself.

The same reversal of H+M to M+H takes place in reduplication: H-tone adjectives reduplicate to M+H in Nda-le, and to H+M in A-sher and other

neighbouring dialects (about reduplication in Naxi, see Michaud and Vaissière 2007a; a shortened version of this research was published in English as Michaud and Vaissière 2007b).

In light of the existence of a reversal of H+M to M+H in Nda-le, the identical surface patterns of the phrases /tɕ<sup>h</sup>waɿly/ and /tɕ<sup>h</sup>waɿp<sup>h</sup>eɿ/ ('6' + M-tone CL and H-tone CL, respectively) can be analysed as resulting from different sequences of processes. The combination /tɕ<sup>h</sup>waɿly/ yields /tɕ<sup>h</sup>waɿly/; this determiner surfaces as such in A-sher Naxi, whereas it is reversed to /tɕ<sup>h</sup>waɿly/ in Nda-le Naxi, following the regularity described above. As for the combination /tɕ<sup>h</sup>waɿ/+p<sup>h</sup>eɿ/, for reasons that remain unknown it yields /tɕ<sup>h</sup>waɿp<sup>h</sup>eɿ/ (H+M) in Naxi dialects of the Lijiang area (including A-sher); for Nda-le, the same underlying H+M pattern can be hypothesised to be present: it gets modified to M+H by the systematic process (specific to Nda-le Naxi) of reversal of H+M to M+H. The same argument can be made for the phrases made of {4, 5, 8} followed by a M-tone classifier—and even for '3': their surface tone pattern, M+H, can be derived by application of the H+M reversal rule to the patterns of A-sher Naxi (Table 3), which suggests that they may be underlyingly identical.

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