

Universal Multiple-Octet Coded Character Set
International Organization for Standardization
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Международная организация по стандартизации

L2/07-357**Doc Type: Working Group Document****Title: Proposal for encoding the Old Lisu script in the BMP of the UCS****Author: China****Status: Member Contribution****Action: For consideration by JTC1/SC2/WG2 and UTC****Date: 2007-10-10**

1. Introduction. There are 630,000 Lisu people in China, mainly distributed in the regions of Nujiang, Diqing, Lijiang, Dehong, Baoshan, Kunming and Chuxiong in the Yunnan Province. Another 350,000 Lisu live in Myanmar, Thailand and India. The population is increasing rapidly. In addition, at least 20,000 non-Lisu people in Yunnan, China, speak Lisu as their mother tongue. Many more in Yunnan and northern Myanmar speak Lisu as a second language. In Yunnan, speakers of other languages use Lisu for administration, religion, and bilingual education in schools. Lisu is considered a very vigorous language.

Somewhere between 1908 and 1914 a Karen evangelist from Myanmar by the name of Ba Thaw modified the shapes of Latin characters and created the Old Lisu script. Afterwards, British missionary James Outram Fraser and some Lisu pastors revised and improved the script. At present, about 200,000 Lisu in China use the Old Lisu script and about 160,000 in other countries are literate in it. Other user communities are mostly Christians from the Dulong, the Nu and the Bai nationalities in China.

The Old Lisu script is widely used in China in domains like education, publishing, the media and religion. Various schools and universities at the national, provincial and prefectural levels have been offering Lisu courses for many years (1952: Central National University; 1978: Yunnan Nationality University; 1985: Nujiang Medium Normal School). These schools have trained large groups of professionals in the Lisu language. In the publishing aspect, plenty of literature in the Old Lisu script has been published since 1952 by provincial and prefectural publishers (1952: Yunnan People's Publishing Agency; 1957: Yunnan Nationality Publishing House; 1981: Dehong Nationality Publishing House). These publications include dictionaries, song books, primers, readers, and textbooks. Among them, 145,000 copies of the 1994 Lisu primer edited by Yunnan Minority Language Commission and Nujiang Minority Language Commission have been distributed. As for the media, Yunnan People's Broadcasting Station launched a Lisu language broadcast in 1957. Two newspapers have been publishing sections in the Old Lisu script since their establishments (1954: *Tuanjiebao* of Dehong; 1983: *Nujiangbao* of Nujiang). On the religious side, books published in the Old Lisu script includes the Bible and hymn books.

Globally, the Old Lisu script is also widely used in a variety of Lisu literature, including a bi-monthly published in Myanmar, some literature published in Australia, a primer published in 1922 with various revised forms still in print today, and plenty of Christian publishing such as Bibles, hymn books, and commentaries since 1921. There are also over 100 Lisu booklets in electronic form.

The Old Lisu script has recorded and summarised the Lisu people's rich experiences and achievements accumulated from their long-term production life. It is an extremely precious cultural heritage.

2. Script Name. The Old Lisu script is commonly known in the West as the *Fraser* script, named after James Outram Fraser. However, such a naming scheme is not preferred for the following reasons:

- (1) The name *Lao Lisu Wen*, which means 'Old Lisu script', has been used for a long time in teaching, research, broadcasting, and relevant policies and regulations in China. Within the Lisu nationality, whenever *Lao Lisu Wen* is mentioned, it is unmistakably understood to mean the script being encoded in this proposal.
- (2) The practice of naming a script after a particular originator should be avoided, as the development of a script is often a co-operative effort. The Old Lisu script was originally created by Ba Thaw, a Karen evangelist from Myanmar, and then British missionary James Outram Fraser and Lisu Christian clergymen amended and improved Ba Thaw's script. Therefore, it is not correct to name a script after a particular person.
- (3) Many of the world's scripts are not named after a person. E.g., neither Latin nor Chinese is named after its creator despite his invention of the script.

Some have proposed to simply call it the *Lisu* script. This is ambiguous because besides Ba Thaw's script, the Lisu have used several other scripts to write their language over the years. In the early 1920s, Wa Renbo, a Lisu traditional priest in China, developed a syllabic Lisu script which has now gone out of use. In the 1950s, the Chinese government devised a romanised *New Lisu* script which is still in use today. In more recent years, an *Advanced Lisu* script using Latin characters has been proposed and used on internet in Thailand (Morse & Tehan, 2000). Given the plethora of Lisu scripts, a qualifier is needed to distinguish one from the other. In particular, the name *Old Lisu* is used to contrast specifically with *New Lisu*. Simply calling it the *Lisu* script would imply there is only one script for the Lisu people, which is not true.

Some are concerned that the word *old* has the connotation of being worn out or deteriorated through age. However, as mentioned above, the reason why it is called *Old Lisu* is to contrast with the *New Lisu* script. If there is any connotation at all, it would simply be the meaning of being long established or in use **without** any meaning of deterioration or wear and tear.

3. Alphabet. There are 40 letters in the Old Lisu alphabet. 30 consonants and 10 vowels were respectively written with 20 and 7 Latin capital letters in upright and turned positions:

B	P	ɸ	D	T	⊥	G	K	⋈
J	C	Ɔ	Z	F	Ǝ	M	N	L
S	R	ʀ	Λ	V	H	Ɔ	ʁ	W
X	Y	B	A	ʌ	E	E	I	O
U	U	⌊	D					

3.1. Consonant Letters

B	[b]	P	[p]	ɸ	[p ^h]	D	[d]	T	[t]	⊥	[t ^h]
G	[g]	K	[k]	⋈	[k ^h]	J	[dz]	C	[tɕ]	Ɔ	[tɕ ^h]
Z	[dz]	F	[ts]	Ǝ	[ts ^h]	M	[m]	N	[n]	L	[l]
S	[s]	R	[ʒ]	ʀ	[z]	Λ	[ŋ]	V	[h]	H	[x]
Ɔ	[ɦ]	ʁ	[f]	W	[w]	X	[ɕ]	Y	[ʑ]	⊗	[ɣɑ]

Consonant letters have an inherent [ɑ] vowel unless followed by an explicit vowel letter. ⊗ OLD LISU LETTER GHA sometimes represents a vowel and sometimes a consonant (e.g., ⊗. ɕ ʁU: A. ⊗.), and so are letters W WA and Y YA. Letters Ɔ HHA and V HA represent allophones in complementary distribution: the former

occurs only in a final imperative marker while the latter appears elsewhere, causing nasalisation to the whole syllable.

3.2. Vowel Letters

A	[ɑ]	Ǻ	[ɛ]	E	[e]	Ǝ	[ø]	I	[i]
O	[o]	U	[u]	Ŋ	[y]	ɿ	[ʉ]	Ɔ	[ə]

With the exception of ɿ_{UH} and Ɔ_{OE}, vowel letters starting a syllable have an unmarked glottal-stop onset. Letters E_E, O_O and U_U can form diphthongs with a preceding Y_{YA} (i.e., YE, YO and YU).

3.3. Encoding Model. It can be observed that a number of Old Lisu letters may look similar to certain Latin characters, yet it is best to encode the whole set separately for Old Lisu. This is primarily because the two scripts behave differently: Latin is bicameral while Old Lisu is unicameral. Section 11 addresses this in more detail.

4. Tone Letters. The Old Lisu script has six tone letters (Figures 6 and 13) that can be placed individually or in combination after the syllable to mark tones:

Orthography	Pitch	Lisu Name	English Name
.	55	MY.. TI.	MYA TI
,	35	N. PO..	NA PO
..	44	MY.. CY.	MYA CYA
.,	33	MY.. BO.,	MYA BO
;	42	MY.. N.	MYA NA
:	31	MY.. JĚ.,	MYA JEU

4.1. Simple Tones. When used individually, each of the six tone letters represents one simple tone. Except for *mya cya* and *mya bo* (aka *mya po* outside China), all tone letters should be encoded separately (at U+A4F8..U+A4FB) despite their resemblance to Latin punctuation marks. This is because they have different behaviours: The tone letters are word-forming (gc=Lm) while the Latin punctuation marks are not (gc=Po). Unless special tailoring is done in **all** applications, forcing unification would create problems in determining word boundaries in text processes like word selection and whole-word searching. It should also be noted that none of the Latin look-alikes occurs in the same context as the tone letters.

4.2. Combination Tones. The first four tone letters can be used in combination with the last two to represent tones like .; ,; :: ,: :: (of which only ,; is still in use whereas the rest are now rarely seen in China). Figure 14 lists all eight combinations.¹ These can be encoded as sequences of the six tone letters. The following lists some example sequences:

::	= . MYA TI	+ :	MYA JEU			
,:	= , NA PO	+ :	MYA JEU			
::	= .. <i>mya cya</i>	+ :	MYA JEU	= . MYA TI	+ . MYA TI	+ : MYA JEU
.,:	= ., <i>mya bo</i>	+ :	MYA JEU	= . MYA TI	+ , NA PO	+ : MYA JEU

¹ It is also possible to obtain other permutations outside the 4-by-2 framework, but so far the only attested occurrences are found in a Lisu song transcription where they are used to mark special intonations and vowel lengths as the song is sung (Figure 5).

Note that the tone sequence *..*: coincides with the ending intonation of a question and was traditionally used to signal a question at the end of a sentence, usually followed by a = PUNCTUATION FULL STOP, as in Figure 9. Since the '80s, however, this has been replaced by the European QUESTION MARK.

4.3. *Mya Cya* and *Mya Bo*. The Old Lisu letters *tone mya cya* and *tone mya bo* are encoded as the following sequences:

.. mya cya = . MYA TI + . MYA TI
., mya bo = . MYA TI + , NA PO

Instead of sequences, it is theoretically possible to encode these two letters as pre-composed forms. However, this is not preferred because:

- (1) Pre-composition would introduce encoding confusion (multiple spellings). E.g., *tone mya cya* may be encoded with the pre-composed form at one place while at another it may be represented by the sequence. This confusion is all the more likely to happen in the context of combination tones. A possible solution would be to implement rules to allow combination-tone sequences like *.. mya cya* + : MYA JEU but forbid simple-tone sequences like . MYA TI + . MYA TI. This would be more complex than just allowing any tone sequences. So for ease of implementation it is simpler to encode just . MYA TI and leave *.. mya cya* as a sequence.
- (2) The sequences are already sufficient to be used in matching, searching, sorting (see Section 10. Collating Order.), and other text processes. Line-breaking and word-breaking behaviours will be the same as pre-composed forms because all tone letters have a general category of Lm which comes with alphabetic breaking properties, i.e., no line breaks or word breaks are allowed between any pair of them. A concern has been raised about intra-sequence spacing in mono-space fonts, but that can be easily addressed by simple kerning.

5. Other Modifier Letters. ' NASALISATION MARK is placed after a vowel to make it nasalised, as in o' [ʔõ³³] 'goose'. The vowel _ A GLIDE, pronounced [a] without an initial glottal stop (and normally bearing a 31 pitch), is written after a verbal form to mark various aspects, as in NU JE.,- ΛO., [nu³³dʒe³³ɑ⁴⁴ŋo³³] 'you will go' and GO., ΛE., Λ_ MI., [go³³lɔ³³ŋɑ⁴⁴ɑ³¹mi³³] 'but'. It can be observed that these two characters are similar in appearance and behaviour to U+02BC ' MODIFIER LETTER APOSTROPHE and U+02CD _ MODIFIER LETTER LOW MACRON, respectively. However, it is best to encode them separately (at U+A4FC..U+A4FD) for the following reasons:

- (1) Glyphic distinction: They are **not** identical to their spacing modifier letter look-alikes in fonts. In particular, OLD LISU LETTER A GLIDE is on the baseline (Figure 1) while MODIFIER LETTER LOW MACRON falls below it.
- (2) Script unity: They are part of a patterned set of marks, along with the tone letters and punctuation, specific to the Old Lisu script.

6. Digits. There are no Old Lisu digits. The Lisu use Arabic numerals for counting.

7. Punctuation. The Lisu use about 10 punctuation marks. First we examine the two that need to be encoded and then we examine the rest already in the Unicode Standard.

7.1. Old Lisu Punctuation. -. OLD LISU PUNCTUATION COMMA and = OLD LISU PUNCTUATION FULL STOP are respectively used to denote a lesser and a greater degree of finality. These characters may look like (sequences of) Latin punctuation, but because they are part of a patterned set of marks in Old Lisu, it is

best to encode them together with the other members of the set for script unity. Additional considerations specific to each character are given as follows:

U+A4FE - PUNCTUATION COMMA: One possibility to encode it is to use the sequence <U+002D, U+002E>. This is not preferred in view of the following:

- (1) Glyphic distinction: The representative glyph used in this proposal is only one of several possible renderings. Figure 1 and Figure 2 show an alternative rendering with the dot on the same level as the bar. Figure 4 illustrates yet another rendering option, with the dot below the bar but right justified with it. This argues for a distinct identity of PUNCTUATION COMMA.
- (2) Behaviour difference: It cannot be properly processed as a unit if encoded as a sequence. Even though line-breaking can be handled correctly according to UAX #14 (LB21: \times HY; Pair Table: HY ^ IS), word boundaries cannot be correctly determined. In particular, the sequence will be seen as two words instead of one according to UAX #29 (WB14: Any \div Any). This would be undesirable unless **all** applications can be tailored to recognise the sequence as one unit.

U+A4FF = PUNCTUATION FULL STOP: Though it looks like U+003D = EQUALS SIGN, they cannot be unified because of the following reasons:

- (1) Glyphic distinction: The former is shorter and bolder while the latter, longer and thinner.
- (2) Behaviour difference: They behave differently in relation to text processes. The former is a sentence-ending punctuation (gc=Po) that prevents a line break before (lb=EX) but allows word breaks both before and after (UAX #29, WB14) while the latter, a symbol (gc=Sm) with an alphabetic line-breaking property (lb=AL) and is word-forming (UAX #29, WB5). Unless special tailoring can be done to **all** applications, unification would not be a good solution. It should also be noted that the two characters do not occur in the same context (i.e., EQUALS SIGN is used as per its mathematical usage).

7.2. Other Punctuation. Over time various European punctuation marks have been adopted in Old Lisu (Figure 11). A few Chinese punctuation marks are also used in China (Figure 12). The following table lists all known adopted punctuation with respective contexts of use:

Character	Context of Use	Remarks
U+2010 HYPHEN	Syllable separation in names	Preferred to U+002D HYPHEN-MINUS, which has ambiguous semantics (TUS 5.0)
U+003F QUESTION MARK	Questions	Replaces ..:= (see Section 4.2)
U+0021 EXCLAMATION MARK	Exclamations	
U+0022 QUOTATION MARK	Quotations	
U+0028 LEFT PARENTHESIS	Parenthetical notes	
U+0029 RIGHT PARENTHESIS	Parenthetical notes	
U+2026 HORIZONTAL ELLIPSIS	Omission of words	Always doubled in Chinese usage
U+300A LEFT DOUBLE ANGLE BRACKET	Book titles	Chinese punctuation
U+300B RIGHT DOUBLE ANGLE BRACKET	Book titles	Chinese punctuation

Since these marks are already encoded in the Standard (in the C0 Controls and Basic Latin, General Punctuation, and CJK Symbols and Punctuation blocks) and are not used in ways that their properties cannot handle, no separate encoding is needed.

8. Line-breaking. A line break is not allowed between any pair of characters in the following set:

{a letter in the alphabet, a tone letter, OLD LISU LETTER A GLIDE, OLD LISU LETTER NASALISATION MARK}

A line break is prohibited before a punctuation despite intervening spaces. There is no line-breaking hyphenation except in proper nouns, where a break is allowed after the syllable separator (HYPHEN). All these can follow normal rules when correct categories have been assigned (Section 12).

9. Word-breaking. The Old Lisu script separates syllables using a space or, for proper names, a hyphen. In the uncommon case of polysyllabic words, it can be ambiguous as to which syllables join together to form a word. Thus for most text processing at the character level, a syllable (starting after a space or punctuation and ending before another space or punctuation) is treated as a word except for proper names where the occurrence of a hyphen holds the word together.

10. Collating Order. The sorting order of the Old Lisu alphabet generally starts with sequences of voiced, voiceless unaspirated, and voiceless aspirated consonants. The order is more or less fixed before ǵ HHA with only slight differences afterwards in the position of ʀ FA (cf. Figures 6 through 9). This traditional order is evidenced in available literature including a primer, a dictionary and two textbooks. However, due to the fact that ǵ GHA most often represents a consonant rather than a vowel, in China it has recently come to be placed after ʏ YA as the last consonant (rf. Section 3. Alphabet.) As for tones, Figure 6 shows the traditional order that is in use outside China, but in China, TONE MYA NA has been put before TONE MYA JEU for teaching purpose for over 20 years (Figure 13; rf. Section 4. Tone Letters.) Tones are followed by A GLIDE and NASALISATION MARK in that order. The collating order proposed below reflects the three aforesaid phenomena:

. tone mya ti U+A4F8 < , tone na po U+A4F9 < [. tone mya ti U+A4F8 . tone mya ti U+A4F8] <
 [. tone mya ti U+A4F8 , tone na po U+A4F9] < ; tone mya na U+A4FA < : tone mya jeu U+A4FB <
 _ a sae U+A4FC < ' nasalisation mark U+A4FD < ʁ ba U+A4D0 < ʀ pa U+A4D1 < ɖ pha U+A4D2 <
 ɗ da U+A4D3 < ʈ ta U+A4D4 < ɟ tha U+A4D5 < ɢ ga U+A4D6 < ɠ ka U+A4D7 < ɣ kha U+A4D8 <
 ɟ ja U+A4D9 < ɕ ca U+A4DA < ɔ cha U+A4DB < ʒ dza U+A4DC < ʃ tsa U+A4DD <
 ʤ tsha U+A4DE < ɱ ma U+A4DF < ɳ na U+A4E0 < ɭ la U+A4E1 < ʂ sa U+A4E2 < ʐ zha U+A4E3 <
 ʁ za U+A4E4 < ʌ nga U+A4E5 < ʋ ha U+A4E6 < ɥ xa U+A4E7 < ǵ hha U+A4E8 < ʀ fa U+A4E9 <
 w wa U+A4EA < x sha U+A4EB < ʏ ya U+A4EC < ǵ gha U+A4ED < ʌ a U+A4EE < ʋ ae U+A4EF <
 ɛ e U+A4F0 < ɐ eu U+A4F1 < ɪ i U+A4F2 < ɔ o U+A4F3 < ʊ u U+A4F4 < ɲ ue U+A4F5 <
 ʈ uh U+A4F6 < ɖ oe U+A4F7

Outside China a somewhat different sort order is used in that tones follow the traditional order and letters after ʀ FA have different placements:

... [. tone mya ti U+A4F8 , tone na po U+A4F9] < : tone mya jeu U+A4FB < ; tone mya na U+A4FA <
 ... ʀ fa U+A4E9 < x sha U+A4EB < ǵ gha U+A4ED < w wa U+A4EA < ʏ ya U+A4EC < ...

11. Encoding Issues. It can be observed that a number of Old Lisu characters may look similar to certain Latin characters. This leads some to believe they belong to the same script and should be unified. In addition, concerns about IDN spoofing and input method implementation have been raised. These issues are addressed in the following sections.

11.1. Unification. Despite resemblance between certain Old Lisu and Latin characters, Old Lisu is actually a distinct script which is best encoded separately for the following reasons:

- (1) Script definition: According to Lyons et al (2001), a script is "a maximal collection of characters used for writing languages or for transcribing linguistic data that share common characteristics of appearance, share a common set of typical behaviours, have a common history of development, and that would be identified as being related by some community of users." In the case of Old Lisu vs. Latin, only the first of the four requirements is met. They have clearly different behaviours and histories, and no known user community identifies the two as being related. Therefore, they should not be considered the same script.

- (2) Behaviour differences: Firstly, as mentioned in Section 4.1, tone letters are word-forming. If we unify them with their Latin look-alikes, which are non-word-forming punctuation, it would create problems in determining word boundaries in text processes like word selection and whole-word searching. In other words, unification is not able to account for tone characters being word-forming and the difference in normative properties between . as punctuation and . as tone letter, for example.

Secondly, none of the Old Lisu letters has case whereas all Latin ones do. Unification would mean forcing Old Lisu to adopt an imaginary normative property, namely, case. This would introduce the opportunity for lower-case Latin characters to appear in Old Lisu texts, which is unacceptable because these characters are meaningless and unrecognisable to Lisu readers.

Some have referred to the decisions to represent Classical Latin and Sencoten, two unicameral writing systems, with Latin capital letters and argued that the lack of case does not necessarily make Old Lisu a distinct script from Latin. However, these examples cannot be used as a basis of comparison with Old Lisu in the context of unification because:

- a) Both Classical Latin and Sencoten, the latter being found around the southern tip of Vancouver Island, BC, Canada, are used in a Latin script context in that readers of these languages are probably at least semi-literate in a Latin-based language and able to recognise lower-case letters. This is not the case for Lisu readers.
 - b) Classical Latin is a dead language used for academic purposes only. Nobody is going to need it in IDNs or file names or do any processing with it beyond appropriate rendering in books and perhaps sorting. In these cases no tailoring will be done or truly required to be implemented and if it is, only in very particular applications which can be modified to support this particular requirement.
 - c) Sencoten does have a lower-case letter 's' (Harvey, 2005), and so is not a truly unicameral system.
 - d) Sencoten is listed as an extinct language that seems to be undergoing some revival with reportedly 185 students from nursery to Grade 9 being educated in a Sencoten curriculum (Saanich Indian School Board, 2004), but the likelihood of there ever being monolingual speakers of the language is very low indeed.
- (3) No implementation: While certainly not the ideal solution, in theory it is possible to implement tailored case mappings directly in code (see TUS 5.0 Section 5.18, pp. 186–187) to guarantee that no upper-case letter will ever get mapped to lower case in matching, searching, sorting, or any text process involving Old Lisu texts. However, this is an immense task since every application will have to be specially tailored. Furthermore, it is highly unlikely that anyone is going to do the required implementation for a small minority, especially with such far-reaching consequences as changing the casing for **all** upper-case letters in **ASCII**. Interestingly, this is best illustrated by referring to the examples of Classical Latin and Sencoten: To date, it is clear that no implementation beyond perhaps a font and keyboard has been done since there are no special case mappings created for either of these languages. In fact, according to available evidence, there should already be a locale-specific mapping for Classical Latin and for Sencoten—the addition of four Latin characters to cover Sencoten orthography was accepted in 2004 and rolled out in TUS 4.1 in 2005. The continued absence of these mappings even through TUS 5.0 indicates that the Unicode authority in concern failed to do its job when encoding these languages.
- (4) Data corruption: Even if someone should really set out to implement tailoring for all applications, it will be unusable beyond application-level text processing. P.189 of TUS 5.0 states: "In most environments, such as in file systems, text is not and cannot be tagged with language information.

In such cases, the language-specific mappings *must not* be used. Otherwise, data structures such as B-trees might be built based on one set of case foldings and used based on a different set of case foldings. This discrepancy would cause those data structures to become corrupt. For such environments, a constant, language-independent, default case folding is required". Take Microsoft Windows for example, because file name lookups are done with caseless matching, if language-specific case mappings were used, files with names containing lower-case Latin letters would only be retrievable in an English locale (where, e.g., 'A' and 'a' would match) but not in an Old Lisu locale (where 'A' would map to itself).

- (5) Precedence: In Cherokee (U+13A0..U+13FF) over 20 characters look like Latin and yet they are not unified. Why should Old Lisu?
- (6) Imaginary creation: According to the case-folding stability policy, if an upper-case letter is added to the Standard without a corresponding lower case, no corresponding lower-case letter can be added later. This restriction has led some, when unifying with Latin, to create an imaginary lower-case counterpart for encoding with an upper-case letter just in case the former may be needed in the future. This is apparently why the added characters for Sencoten have non-existent lower-case forms (see U+2C65 and U+2C66) which seem to have been added purely for case-folding purposes. Another example is Richard Cook's proposal (N3326) to encode a Latin small letter 'turned j' as the lower-case counterpart to capital letter 'turned J' even though there is no lower-case 'turned j' in Old Lisu. These examples provide yet another vivid argument against unification: Creating some non-Lisu (or non-Sencoten) characters in order to make the script work with Latin clearly proves that it is **not** Latin!
- (7) Visual confusion: The reason that encoding imaginary turned lower-case letters for Old Lisu is so problematic is the intolerable confusion that would arise with certain upright letters, e.g., d vs. turned p, l vs. turned i, n vs. turned u, p vs. turned d, and q vs. turned b.

11.2. IDN Spoofing. Some are concerned that the similarities of certain Old Lisu letters with Latin characters may allow spoofing of IDNs. They believe if the two are not unified, then Old Lisu will have to be excluded from internet protocols. This concern is addressed as follows: In theory, IDNA allows IDNs with labels consisting entirely of ASCII capital letters to be input, resolved and displayed to the user. This indeed allows confusion in that IDNs drawn from different scripts can look the same and the user is unlikely to tell the difference. E.g., SPACE.BC.CA will look the same in Latin, Cyrillic, Cherokee, and Halfwidth and Fullwidth Forms (though Cyrillic capitals and Halfwidth and Fullwidth Forms are not allowed to be output according to `idnchars.txt` in UTS #39). However, this is already an existing condition and encoding Old Lisu separately is not going to create a new problem. If it is believed that Old Lisu should be banned from IDNs on the basis of visual similarity with Latin, then Cherokee and other similar-looking scripts should be banned as well. This is clearly undesirable. One approach would instead be to remove all upper-case Latin characters from `idnchars.txt` as being allowed to be output, then there would be no problem of confusability. Unfortunately, this is unlikely to happen. Another approach would be to implement rules on the domain authority side as well as on the client side.

As part of their anti-spoofing policies, domain authorities (whether over TLDs or sub-domains) can require that all code points in any IDN label belong to a single script so that it is not possible to create mixed-script confusables. In addition, certain characters such as Old Lisu tone letters and punctuation can be prohibited in IDNs to avoid confusion with Latin punctuation and symbols commonly used in IDNs. One can also enforce restrictions to remove the possibility of whole-script confusables by simply disallowing any string that is **entirely** confusable with ASCII, but allowing strings that contain at least one non-confusable character (one of those Old Lisu letters that look like turned Latin capital letters). As long as one character in the string is unambiguous, and as long as mixed scripts are not allowed, then that string is not going to be visually or functionally confusable with anything from Latin. For example, if someone were to try to register `www.MICROSOFT.com` using Old Lisu letters, it would not be allowed

because all of the letters in MICROSOFT are confusable with upper-case Latin (even though the IDN clearly stands out against the usual case-folded format displayed in browsers). But if the string MICROSOFT were changed to M̐CROSOFT, containing one non-confusable character ∇ OLD LISU LETTER AE, then such a name could be allowed since the string itself is not confusable: it consists of characters from one script block and the whole string is not whole-script confusable with Latin due to the one non-confusable character in it.

If the client wants to make the same check, it can, since it is merely a test to see whether a particular string contains any of a set of characters or not. And since it is upper-case ASCII that is in concern, the probability of a single-syllable string being whole-script confusable would be $20/30 * 5/10 = 1/3$ given the general Old Lisu syllable structure is CV. That gives us a $2/3$ chance of a single-syllable label being acceptable. In labels with multiple syllables or exceptional CVC and CVV syllables the probability of acceptance is even higher. This would indeed be very much better than losing all of Old Lisu in IDNs. And even not yet implemented with this simple check, today's browsers (and certain plug-ins to older browsers) already have other built-in measures that greatly reduce confusion. Under the IDNA model, as long as there is one non-ASCII character in a label, the whole string is case-folded and normalised. In today's browsers (e.g., Firefox 2.0 and Internet Explorer 7.0), however, even all-ASCII IDNs are case-folded before being presented to the user. Since there is no case in Old Lisu, case-folding will yield the same string whereas Latin characters will be converted to lower case. This easily distinguishes an Old Lisu letter from a Latin one. Another method, which the IDN-enabling plug-in Quero Toolbar 2.1.0 for older Internet Explorers reportedly adopted, is to display a label with mixed scripts in different colours to warn the user. This can serve as another safeguard on top of the recommendation that domain authorities disallow mixed-script labels altogether. Alternatively, browsers (e.g., Safari) can be configured to display punycode URLs for non-ASCII IDNs. A more advanced approach, which both Mozilla and Opera are using, is to turn on IDN display only for domains run by registries who are taking appropriate anti-spoofing precautions. With all these registry and client measures, the probability of spoofing with Old Lisu and Latin is basically reduced to zero.

11.3. Input Methods. Some believe that encoding Old Lisu separately would make input methods complicated because they would have to distinguish Latin capital letters from Old Lisu letters. However, this scenario will only occur when you create a 2-in-1 keyboard that allows you to type both Old Lisu and Latin characters. This is unnecessary, as it is highly doubtful that such a keyboard will be needed. In practice, separate keyboards are used for typing Old Lisu and, say, English. To switch from one language to another, the user just toggles the keyboard. There is no need to mix them together.

11.4. Conclusion. All available evidence suggests that encoding Old Lisu characters separately is a far better approach than unification, which fails to account for normative differences between Old Lisu and Latin while having its own implementation problems and usage limitations.

12. Unicode Character Properties. All letters in the alphabet have a general category of Lo.

```
A4D0;OLD LISU LETTER BA;Lo;0;L;;;;N;;;;;
A4D1;OLD LISU LETTER PA;Lo;0;L;;;;N;;;;;
A4D2;OLD LISU LETTER PHA;Lo;0;L;;;;N;;;;;
A4D3;OLD LISU LETTER DA;Lo;0;L;;;;N;;;;;
A4D4;OLD LISU LETTER TA;Lo;0;L;;;;N;;;;;
A4D5;OLD LISU LETTER THA;Lo;0;L;;;;N;;;;;
A4D6;OLD LISU LETTER GA;Lo;0;L;;;;N;;;;;
A4D7;OLD LISU LETTER KA;Lo;0;L;;;;N;;;;;
A4D8;OLD LISU LETTER KHA;Lo;0;L;;;;N;;;;;
A4D9;OLD LISU LETTER JA;Lo;0;L;;;;N;;;;;
A4DA;OLD LISU LETTER CA;Lo;0;L;;;;N;;;;;
A4DB;OLD LISU LETTER CHA;Lo;0;L;;;;N;;;;;
A4DC;OLD LISU LETTER DZA;Lo;0;L;;;;N;;;;;
A4DD;OLD LISU LETTER TSA;Lo;0;L;;;;N;;;;;
A4DE;OLD LISU LETTER TSHA;Lo;0;L;;;;N;;;;;
A4DF;OLD LISU LETTER MA;Lo;0;L;;;;N;;;;;
```

A4E0;OLD LISU LETTER NA;Lo;0;L;;;;N;;;;;
 A4E1;OLD LISU LETTER LA;Lo;0;L;;;;N;;;;;
 A4E2;OLD LISU LETTER SA;Lo;0;L;;;;N;;;;;
 A4E3;OLD LISU LETTER ZHA;Lo;0;L;;;;N;;;;;
 A4E4;OLD LISU LETTER ZA;Lo;0;L;;;;N;;;;;
 A4E5;OLD LISU LETTER NGA;Lo;0;L;;;;N;;;;;
 A4E6;OLD LISU LETTER HA;Lo;0;L;;;;N;;;;;
 A4E7;OLD LISU LETTER XA;Lo;0;L;;;;N;;;;;
 A4E8;OLD LISU LETTER HHA;Lo;0;L;;;;N;;;;;
 A4E9;OLD LISU LETTER FA;Lo;0;L;;;;N;;;;;
 A4EA;OLD LISU LETTER WA;Lo;0;L;;;;N;;;;;
 A4EB;OLD LISU LETTER SHA;Lo;0;L;;;;N;;;;;
 A4EC;OLD LISU LETTER YA;Lo;0;L;;;;N;;;;;
 A4ED;OLD LISU LETTER GHA;Lo;0;L;;;;N;;;;;
 A4EE;OLD LISU LETTER A;Lo;0;L;;;;N;;;;;
 A4EF;OLD LISU LETTER AE;Lo;0;L;;;;N;;;;;
 A4F0;OLD LISU LETTER E;Lo;0;L;;;;N;;;;;
 A4F1;OLD LISU LETTER EU;Lo;0;L;;;;N;;;;;
 A4F2;OLD LISU LETTER I;Lo;0;L;;;;N;;;;;
 A4F3;OLD LISU LETTER O;Lo;0;L;;;;N;;;;;
 A4F4;OLD LISU LETTER U;Lo;0;L;;;;N;;;;;
 A4F5;OLD LISU LETTER UE;Lo;0;L;;;;N;;;;;
 A4F6;OLD LISU LETTER UH;Lo;0;L;;;;N;;;;;
 A4F7;OLD LISU LETTER OE;Lo;0;L;;;;N;;;;;
 A4F8;OLD LISU LETTER TONE MYA TI;Lm;0;L;;;;N;;;;;
 A4F9;OLD LISU LETTER TONE NA PO;Lm;0;L;;;;N;;;;;
 A4FA;OLD LISU LETTER TONE MYA NA;Lm;0;L;;;;N;;;;;
 A4FB;OLD LISU LETTER TONE MYA JEU;Lm;0;L;;;;N;;;;;
 A4FC;OLD LISU LETTER A GLIDE;Lm;0;L;;;;N;;;;;
 A4FD;OLD LISU LETTER NASALISATION MARK;Lm;0;L;;;;N;;;;;
 A4FE;OLD LISU PUNCTUATION COMMA;Po;0;L;;;;N;;;;;
 A4FF;OLD LISU PUNCTUATION FULL STOP;Po;0;L;;;;N;;;;;

13. Code Chart. A code chart is given on page 13. The encoding order is adapted from Everson (2006) with positions U+A4EA..A4ED and U+A4FA..A4FD mapped differently to reflect the collating order used in China (Section 10. Collating Order.)² Everson (2006) also maps position U+A4FE to PUNCTUATION COMMA but with a missing dot, which he believes is a quite possible error. For the most part, character names are taken from Everson (2006) and adjusted to follow the guidelines set forth in Annex L of ISO/IEC 10646:2003. Certain vowels are named differently to better reflect their phonetic values. Tone letters are given their Lisu names instead of numbers (rf. Section 4. Tone Letters.)

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² It should be pointed out that collating order and encoding order do not dictate one another (see TUS 5.0 Section 2.1, p.12 and Section 5.16, p.179), but for convenience it is common practice to encode characters after a consistent collating order.

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TABLE XX - Row A4: OLD LISU

	A4D	A4E	A4F
0	B	N	E
1	P	L	Ǝ
2	ᄀ	S	I
3	D	R	O
4	T	R	U
5	ᄀ	Λ	U
6	G	V	ᄀ
7	K	H	D
8	K	G	.
9	J	ᄀ	,
A	C	W	;
B	C	X	:
C	Z	Y	—
D	F	B	，
E	F	A	-.
F	M	A	=

TABLE XX - Row A4: OLD LISU

hex	Name	hex	Name
D0	OLD LISU LETTER BA		
D1	OLD LISU LETTER PA		
D2	OLD LISU LETTER PHA		
D3	OLD LISU LETTER DA		
D4	OLD LISU LETTER TA		
D5	OLD LISU LETTER THA		
D6	OLD LISU LETTER GA		
D7	OLD LISU LETTER KA		
D8	OLD LISU LETTER KHA		
D9	OLD LISU LETTER JA		
DA	OLD LISU LETTER CA		
DB	OLD LISU LETTER CHA		
DC	OLD LISU LETTER DZA		
DD	OLD LISU LETTER TSA		
DE	OLD LISU LETTER TSHA		
DF	OLD LISU LETTER MA		
E0	OLD LISU LETTER NA		
E1	OLD LISU LETTER LA		
E2	OLD LISU LETTER SA		
E3	OLD LISU LETTER ZHA		
E4	OLD LISU LETTER ZA		
E5	OLD LISU LETTER NGA		
E6	OLD LISU LETTER HA		
E7	OLD LISU LETTER XA		
E8	OLD LISU LETTER HHA		
E9	OLD LISU LETTER FA		
EA	OLD LISU LETTER WA		
EB	OLD LISU LETTER SHA		
EC	OLD LISU LETTER YA		
ED	OLD LISU LETTER GHA		
EE	OLD LISU LETTER A		
EF	OLD LISU LETTER AE		
F0	OLD LISU LETTER E		
F1	OLD LISU LETTER EU		
F2	OLD LISU LETTER I		
F3	OLD LISU LETTER O		
F4	OLD LISU LETTER U		
F5	OLD LISU LETTER UE		
F6	OLD LISU LETTER UH		
F7	OLD LISU LETTER OE		
F8	OLD LISU LETTER TONE MYA TI		
F9	OLD LISU LETTER TONE NA PO		
FA	OLD LISU LETTER TONE MYA NA		
FB	OLD LISU LETTER TONE MYA JEU		
FC	OLD LISU LETTER A GLIDE		
FD	OLD LISU LETTER NASALISATION MARK		
FE	OLD LISU PUNCTUATION COMMA		
FF	OLD LISU PUNCTUATION FULL STOP		

Figures

1:1 1:18

YI CE YI WU LO 7

1

MU KW MI NY TV CE;_ M

1,2 YI CE YI WU KW WU-S LE MU KW_ BE MI NY TV CE;_ LO = * MI NY NY YI PE,
M: JO M YI GO: A S_ NY ɗi, M NY NY_ M YI JY IV SI KW D_ LO = WU-S V_,
NY YI JY IV SI KW A' TY_ LO =

YI WU ɗi NYI KW NYI MO DU JO L FI_ M

3 WU-S LE -- NYI MO DU JO, L FI -- BV_ LO = GO L3 NY NYI MO DU JO L_
4 LO = * NYI MO DU NY JI_, M A LO -- BE -- WU-S MO KD NY -- WU-S LE NYI
5 MO DU_ BE NY ɗi, M TV B3_, KD_ LO = * WU-S LE NYI MO DU TV NY MO; LO_, --
BE -- MY3 G7 SI -- NY ɗi, M TV NY YI LE -- S XW _ BE -- MY3 G7_ LO = GO
L3 NYI ME, FI. NV; FI JO SI -- YI WU. ɗi NYI A LO =

K NY ɗi NYI KW MN: WU: TV XY,_ M

6 WU-S LE -- YI JY KO LO KW MN: WU JO, FI = GO L3 SI MN WU GO M LE YI
7 JY_ BE YI JY TV B3_, KD FI -- BV_ LO = * GO L3 SI WU-S LE MN WU XY, SI --
MN WU NY. XW M YI JY_ BE -- MN WU IV SI M YI JY TV B3_, KD NY YI GO L3
8 ɗY3; L_ LO = * WU-S LE MN WU GO M TV -- MU KW -- BE -- MY3 G7 LO =
GO L3 NYI ME, FI. NV; FI JO SI -- NYI: NYI ɗi NYI A LO =

S NYI ɗi NYI KW MI ɗU DO L SI -- Z XN Z JE: R_ L_ M

9 WU-S LE -- MU KW NY. XW KW M YI JY TV ɗi W_; Z; LE FI SI_ MI ɗU_ TV DO
10 L FI -- BV_ LO = GO L3 NY YI GO L3 ɗY3; L_ LO = * WU-S LE MI ɗU TV --
MI NY -- BE -- MY3 G7 SI -- ɗi W_; BE Z; ɗ_ M YI JY TV NY YI LE -- YI,
LU B3 -- BE -- MY3 G7_ LO = GO M NY JI_, M A LO -- BE -- WU-S LO. MO_,
11 LO = * WU-S LE -- MI NY TV NY MO; ɗ XN. ɗ_ BE YI XN. D3;_ M WO: XN:
WO: JE;_ BE -- YI XN. ɗ3, ɗ_ M S7, S7: D3;_ M SI, ZI LO ZI, JE: XN JE CO SI
12 MI NY KW R3, L FI -- BV_ LO = GO L3 NY YI GO L3 ɗY3; L_ LO = * GO L3 NY
MI NY KW MO; ɗ XN. ɗ_ BE -- JE: XN JE CO SI YI XN. D3;_ M WO XN WO JE_
BE -- JE XN JE CO SI YI XN. ɗ3, ɗ_ M S7, S7: D3;_ M SI, ZI LO ZI R3 L_ LO =
13 GO M NY JI_ M A LO -- BE -- WU-S LO. MO_ LO = * GO L3 NYI ME, FI NV;
FI JO SI -- S NYI ɗi NYI A LO =

LI NYI ɗi NYI KW MI: MI V B KU ɗ XY,_ M

14 WU-S LE -- MO LO_ BE S XW TY B3_, N, M MU KW KW M MN WU KW RO.. DU
B.. DU JO FI = RO.. DU B.. DU GO M NY SQ LE DU YE N, M_ BE -- YI FI_ BE --
15 YY; NYI_ BE -- XO; TY B3_, KD N, M ɗY3; L FI -- * GO M NY MI NY IV SI KW
RO.. G7 L N, M_ MI MU KW KW M MN WU KW RO.. DU B.. DU ɗY3; L FI -- BV_
16 LO = GO L3 NY YI GO L3 ɗY3; L_ LO = * GO L3 SI WU-S LE RO DU B DU D: M
NYI: M XY_ LO = RO DU B DU WU: ɗi M M NY MO LO TV JN: LO = RO_ ɗi M M
17-18 NY S XW TV JN_ LO = KU ɗ_ MI XY_ LO = * GO L3 SI MI NY TV RO.. G7 N, M_

1:1. YO 1:1,3. VI 1:10. BE 38:4. S 44:24. RO 1:20. KO 1:16. VI 1:13 MO 4:11.
1:2. YE 4:23. S 40:13,14. 1:3. GW 33:9. 1:5. GW 74:16. 1:6. BE 37:18. GW 33:6, 136:5. YE 10:12.
1:9. BE 26:10, 38:8. GW 33:7, 35:5. 1:11. VI 6:7. LU 6:44.
1:14. JN 4:19. BE 25:3,5. GW 74:16, 136:7. 1:17. GW 8:1.

1

Figure 1: Sample from a 1968 Lisu Bible (Genesis 1:1-17), showing examples of LETTER NASALISATION MARK and _ LETTER A GLIDE. The vertical position of the latter is contrasted with that of the underlining.

GO L3 NYI NU W W: XU_ NY I3 L3 BV -- MU KW IY SI KW TY_ M AW NU: B,
 B:O -- NU MY3_ SI XY_ M TV dO: TY FI = * NU KUQ DO L FI = MU KW IY SI
 KW NU NI, L7: dY3; L_ M_ LE BE -- MI NV KW_ MI dY3; L FI = * I1 NYI LE I1
 NYI AW NU: R3: YV;_ M Z: DU -- NYI_ NYI AW NU: TV G7 Z: LV = * AW NU: TV
 CY., L SU TV AW NU: G: G7_ M_ LE BE -- NU LE AW NU CY., KO M G: G7 L7 =
 8, NYI_ M KW AW NU: TV I: HO: DO JE -- A7_ M KW BE N: AW NU: TV CYU DO
 G7 LV = A LIO BV NY KUQ;_ BE W: NYI_ M_ BE MY3 DO: NY -- I1 I1; I1 P NU
 TV M A L7 -- BE -- BV NV_ LO = * A LIO BV NY SU CY., KO M TV NU W: G:
 G7_ IY N: -- MU KW IY SI KW M NU W B, B_ MI NU W CY KO M G G7 L_ AO =
 SU CY KO M TV NU W M: G G7 IY N: -- NU W B, B_ MI NU W CY KO M TV M: G
 G7 L, =

Figure 2: Sample from a Lisu Bible (Matthew 6:9-12), showing -. PUNCTUATION COMMA and = PUNCTUATION FULL STOP.

D7: LV XO_ M

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ONWARD, CHRISTIAN SOLDIERS

F 4/4 -- 1 (LI ON)

5--	5--	5--	5--	5--	6	5--	2--	2--	1--	2--
3--	3--	3--	3--	3--	4--	4--	7--	7--	6--	7--
(1) JI--	SU	MV;	8	NU	W:--	MI	IY	SI	JE	
(2) HW.	LE	M	SG.	DU	TV--	S--	DV;	LO.	MO	
(3) JI--	SU	XU	ZI;	JO	NY--	MV;	ZU	LE	BE	
(4) W:	NYI	SU	RO,	LE	D--	KUQ;	MI	BY.,	LE	
(5) MI	NV	L	JO	NU	W:--	AW	NU:	TV	DO	
1--	3--	5--	1'--	1'--	7--	5--	5--	5--	5--	
1--	1--	1--	1--	2--	5--	4--	4--	3--	2--	

3--	1--	3--	5--	1'--	1'--	7--	6--	6--		
1--	1--	1--	1--	2--	2--	1--	1--	1--		
(1) G:=	YE--	SU	RO	MV;	SI:	d:	RO	TV		
(2) IY--	YI.	JO.	SI	OE,	JE	AO	A.	MI.		
(3) K,=	RO	X3:	M	J	GU	Y--	WU--	S		
(4) AO=	JI--	SU	XU.,	ZI;	JO	N	II:	JI;		
(5) LV=	YE--	SU	TV	X3.	G7:	M--	II	DO		
5--	5--	5--	5--	5--	5--	6	5--	0--	0--	
1--	3--	3--	3--	3--	2--	2--	2--	2--	2--	

3--	0--	5--	2--	2--	5--	2--	3--	4	3--	
1--	1--	7--	7--	7--	2--	7--	1--	2	1--	
(1) HO	JE	L=	II:	JI;	W	TI.	R3:	SU--		
(2) G;	NV,	LO=	X3.	G7	SV;	P	J	IY--		
(3) J	GU	A.,=	II	NI,	M	LE;	R3	LO=		
(4) FE.,	T.	AO=	CY;	MN	WO,	NYI	BN.,	NYI--		
(5) BE	GW	LV=	MY3	DO:	BE	W:	NYI	M--		
5--	6--	5--	5--	5--	5--	5--	5--	5--	5--	
2--	2--	5--	5--	5--	7--	5--	1--	1--	1--	

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Figure 3: Sample from a Lisu hymn book, showing another rendering of -. PUNCTUATION COMMA.

T; DO: XE, DO: LI PCN SO, M NYI PU, LI PU, M =

CYU SI, d: YE-SU MI NV KW MYE: YE KU, M =

YE-SU MYE: YE WU, TU, M = (6, 8 V NV,; KW) A. D. 27 XO; =

1. YU-T MU: KW YI, MYE YE KU, M =

21 JE-RU-S-LI KW

B. YE-SU LE SI XY VI TV SI XY LE FI, M = YO 2:13-22; 2:13 GO LV YU-T
L JO VI-XO-PAI: NI: L NYI, YE-SU NY JE-RU-S-LI KW DV JE LO =

YE-SU BE YI, LI VI L JO BU NY, YI GO DV, BU BE LI W,; N-S-

LI KW BE X-DE-LO DE KW CT, DO L SI, DO KW LI P, R: TY LV: VI-

HO-PAI: LI M NY, YU-T L JO BU BE T PAI D: M LI M A, NYI, YU-T L

EO NY YI W K XN KW 12 XO; LV: SI M R P R: NY VI-XO-PAI KW M: JE

M D M YI, LI: JO, LO = A XN: WU, NYI BV, NY, YI-SC-LE L JO NY YI

JI; MU; KW CO P, YE, M KW BE WU-S LE CYU, J KU M TV DO: J DI L N

M PAI: A, LO =

GO M LV SI YI-JI MU: TV MO WU-S LE BV MU XI, M KW BE YI, W LI,

JE KU, M TV A, MI DO: J DI L N, M PAI: D: M A, LO = DO 12 LI BE

13 LI KW JO, LO = 12:11-14 FI KW Q, NYI LV VI-XO-PAI: A XN: A, M

SC, LE, AO =

Figure 4: Sample from a Lisu Bible study resource, showing a third rendering of -. PUNCTUATION COMMA.

R: KT:

MT: SU KT: N:: N: KDO M:

N3 LE: J N:: T. GTO M:

LE, M LV: SI: R: SU ST:

LE, M NV: SI: EN LE: J

R: TI: LI: HW, SI: JY, AO,

R: RO LI: HW, NI, CU, AO,

SU LE, AW, KU, LI: BV GT:

LE: LE, A, SD, LI: DE: GT:

KT: M: KU, MI SI: JY R:

J M: SD, MI NI, CU, EN

NI, ME LE, LI: NYI, M LE

NYI, VY; LE, LI: VY; M N:

NI, ME YI; MY XO, LE BE

NYI, VY; WU, DU: GU, LE BE

YI; MY XO, LE P J, LV:

WU, DU: GU, LE DO: J, LV:

WO, d: LI: DU: NU, A, BV:

WU, DU: GU, LE DO: J, LV:

A: NYI, DU: NU, P J: LEO

A WU ZI, NU, DO: J: LEO

Z, GW: Z, C. WU: T. BV:

WO: NYE, WO: TO MU T. BV:

A: NYI, DU: BV, CE, AO, LV:

A WU ZI, DE: DE; AO, LV:

A: DU: CE, KW DU: BV, BD,

P M DE; KW ZI, DE: BD,

CE M: A, BE R: M: BV

PE; M: A, BE NE M: DE:

A: NYI, TV LI WU: T: MI

A WU BO LI MU T: MI

A: NYI, DU BV, J: LI: X.

A: WU ZI, DE: J: LI: TO

A: NYI, DU: NU, DU: B, CU,

A WU ZI, DE: ZI, TI CU,

NU, LE: R: CO, LI: G: CU,

NU, LE: NE B, LI: G: CU,

NE B, NV, BE GO; RU, GL

T. B: K KT: MT: XO, KD

Y B: DE: LO, PL. YV; GL

KO. KO LI: DU: NU, GO, JO:

M L: LI: ZI, NU, GO, JO:

KO. KO YI. BV, LE, LE BVO

M L: YI. DE: LE, LE DE: O

A: NYI, VU, M S: NYI, JO:

A WU TV, M S VY; JO:

S: NYI, VU, KD, M: WU: L,

S VY; TV, GL M: MU L,

A: NYI, TV LI LI: G: JO:

A WU BO LI LI: G: JO:

TV LI LI: G: M: WU: JO:

BO LI LI: G: M: MU JO:

S: NYI, GO, PO. KO. KO VU,

S VY; GO, PO. M L: TV,

KO. KO M: VU, M: WU: JO:

M L: M: TV, M: MU JO:

Figure 5: Samples from a Lisu song book, showing various combination tones. Those circled in red are exceptional permutations used to transcribe special intonations and vowel lengths as the song is sung.

LI-SU IO 7 YI. M.. FO,	LI-SU IO 7 YI. SV;
傈 傈 文 声 母	傈 傈 文 声 调
	TO, DU
	符 号
B P d D T L G K	• MY.. TI. 高平调55
K J C C Z F F M	, N. PO.. 中升调35
N L S R R A V H	.. MY.. CY. 次高平调44
G ɣ W X Y	., MY.. BO.. 中平调33
LI-SU IO 7 YI. R: FO,	: MY.. JE., 中降调31
傈 傈 文 韵 母	; MY.. N. 次高降调42
A V E E I O U U	
L D B	

Figure 6: Samples from a Lisu-Chinese dictionary, showing the traditional alphabetical order (left) and tone order with tone names (right).

YI. M.. FO,
B P d D T L
G K K J C C
Z F F M N L
S R R A V H
G ɣ W X Y
YI. R: FO,
A V E E I O
U U L D B

Figure 7: Sample from a Lisu primer, showing the same alphabetical order.

S	s	246
R	ʒ	260
ʁ	z	260
ʌ	ŋ	266
V	h	271
H	x	279
ə	h	287
ɾ	f	288
W	w	292
X	ʃ	305
Y	j	315
A	ʔ	322
ʋ	æ	340
E	e	340
ɛ	ø	341
I	i	341
O	o	342
U	u	343
ʊ	y	343
ɿ	yw	343
ɔ	yv	345
ə	ɣ	346

B P ɸ D T ɿ G K ʁ J C ɔ Z F ɸ M N L S
 b p p^h d t t^h g k k^h dz tʂ tʂ^h dz ts ts^h m n l s
 R ʁ ʌ V H ə ɾ W X Y
 ʒ z ŋ ɸ x h f w ʃ j

The northeastern Central Lisu syllables with retroflex initials /dz tʂ tʂ^h ʒ/ before /a/ are written with the single consonants J C ɔ R X, while the syllables with alveopalatal initials /dz tʂ tʂ^h c/ before /a/ are written with digraphs ʎ CY ɔY XY as discussed above. This contrast is absent from Southern Lisu and many subvarieties of Central Lisu, operates differently in Northern Lisu, and causes confusion for most learners of Lisu writing.

The vowels and the velar voiced fricative are:

A ʋ E ɛ I O U ʊ ɿ ɔ B
 a æ e ø i/ɿ o u y/ɿ w ɣ

Most Lisu people think of A as a vowel, but it could also be regarded as an initial glottal stop automatically followed by the inherent vowel /a/.

The alphabetical order of the six tones, and their numbering in Fraser (1922), is:

orthography	˙	ˊ	ˊˊ	ˊˊ	ˊˊˊ	ˊˊˊ
pitch	55	35	33	33	21	21
Fraser (1922)	1	2	3	4	5	6

Figure 8: Samples from a Lisu-English dictionary, showing the same alphabetical order (circled) and a corresponding look-up order (top; only second part shown). The traditional tone order is also listed (bottom).

LISU CATECHISM AND HYMN BOOK

B P P D T I G K K J C C Z F
M N L S R R V V H W G X Y
B D L U O I E A A

1. MI NY IV SI JO- M A I PO-. A M LE CE; T- LO...=
WU- S LE CE; T- LO=
2. WU- S LE CE T- M A NY-. NI: GU SI GU- M-. OY KD- L-.. M: OY KD L...=
NI: GU SI GU- M-. A XT OY KD- LO=
3. A LI BE SI OY KD- LO...=
NI: NY-. RO TV CE; SU M: A NYI-. OY KD- LO=
4. GO LE NY-. RO TV CE SU A M A LO...=
RO TV CE SU NY-. RO B, B WU- S A LO=
5. WU- S NY-. A M A LO...=
WU- S NY-. II II M: LU M: BY LE-, YI CE.. YI WU. M: JO= II II
LE YI GO LE JO TY M A LO=
6. WU- S M-. WU- S d: BY D- L...=
WU- S M-. WU- S d: BY M: D=

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LI-SU								
B P d FO,								
B	P	d	D	T	L	G	K	K
J	C	C	Z	F	F	M	N	L
S	R	R	V	V	H	G	J	X
			B	W	Y			
A	A			E	E	I	O	
			U	U	L	D		

Figure 10: Sample from a Lisu primer used outside China, showing an alternate alphabetical order. Note the letter positions after 9 HHA.

1 CE, FO, YI MYE.. d7 M. G7_ M

-	MYE.. A M SD. LE DU=
-.	V: DU=
=	N: DU=
?	N.. NYI.. M SD. LE DU= (N.. NYI.. M M. MI JO.. M BA K7: LI CE, GU.. LE TA-.. N.. NYI K7: SD. LE DU TE M RE: NA, LO=)
()	BE.. DU-.. A NY LU: DU D: M= (YI TE, YI M. MI LI LO. TA BE.. DU A LO=)
'	N.. BI SA; DO SI BA.. M SD. LE DU = (A.. ' LE -.. SW.' NYI) YI FO, WU. DU SI KW BO.. LO
"..."	SD. LE DU TE NYI: M NYI: KU C.; KW M BA K7: NY-.. LO T BO SU M: A A-.. NE. BA; LI RO BA K7 A M SD. LE DU A LO=
!	DU: J M7.. M SD. LE DU (VE. LE-.. A.. ' LE-.. A NY DU: J: M7 LE.. M-.. A NY LI:.. M BA K7 SD. LE DU)=

Figure 11: Sample from a Lisu primer used outside China, describing how punctuation marks are used.

XL: CY, DU

“—” M NY X. 13 XL: KO LO KW RE: DU
Λ=YI. MYE NY XL: N: DU=

“=” NY X. 13 XL: M 13 GU LE 1V: RE: DU
Λ=YI. MYE NY XL: H1, DU=

TV ΛO: BV=

RO: LI-SU NY-- L DI R: K, _M JO XU: Λ_
LO=

“—” NY JO MYE MU: MYE ST. LE DU ΛO=

TV ΛO: BV=

PD: -CE GW: -CY-S

() BE DU=X. 13 XL: PL M. DU Λ_LO=

TV ΛO: BV=

A. DU(R: WU: TV. BV Λ)

“ ” ΛW. XL: =XL: ΛW. 1V: RE: Λ=

..: (?) N., NYI DU=N., NYI.. XL: TV. CY, DU
Λ=

35

TV ΛO: BV=

NU H V. HW: TY, L..: (?)

..... 1E: XL: CY, DU=XL: 1E: K1 M CY, DU=

TV ΛO: BV=

ΛW NU: NY.....

《 》 1O: 1: MYE CY, DU=

TV ΛO: BV=

ΛW NY 《LI-SU 1O: 1: FO, SO DU 1E 1I:

PDN M A: 1U: SO GU LEO=

! SI: JY XL: =XI. LE--A' LE-- DU: J: M1 LE
M ST. LE DU=

Figure 12: Samples from a Chinese Lisu primer, describing how punctuation marks are used.

声调表

文 字 符 号	调 值	例 词		
		文 字	国际音标	汉 意
.	˥ 55	LO.	lo˥	(狗)叫
,	˨ 35	LO,	lo˨	过(去)
..	˨ 44	LO..	lo˨˨	扔
.,	˨ 33	LO.,	lo˨˨	轻
;	˨ 42	LO;	lo˨˨	够
:	˨ 31	LO:	lo˨˨	(斤)两

Figure 13: Sample from a Chinese minority script journal describing the Lisu tones. Note the switched order of the last two tones.

SV; ZE.,

YI SV; (SV; TI.) NYI: M TI W.,; JO L M NY-. (8) M JO_ LO=
(LE M TV SV; ZE.,- BE BV_ LO=)

SV; TI.=	.	,	..	.,	:	;	-
SV; ZE.,=					.,:	.,;	
					..:	..;	
					.,:	.,;	
					.:	.;	

Figure 14: Sample from a Lisu primer used outside China, listing six simple tones and eight combination tones.



Figure 15: Banner in front of a shopping mall in Yunnan, China.

(1) 8 M7.. KU MU: GW

1. A: TI. d

YO, YI; DV BV YO, YI; DV--
W LD, DV BV W LD, DV--
A: TI. d BU \W., NU: NY--
A: RO 8 BU \W., NU: NY--
B, B OY, SI. PE. SI. NYI--
M, M.. MU: OU: DE; SI. NYI--
SI, NV M.. KW.. HW HW.. JE--
S: DE; M.. KW.. BY TE, JE--
GO NY.. d7., OE; TI: ZE MO W.. LEO--
NY, NI TI: M.. LO. W.. LEO--
NY, NI GO M.. JE; JO BB, --
d7., OE; GO M.. CE. VY; BB, --
LE; LE; B7 TV. LO. KD.. LEO--
XY, XY, Z: TV. NYI KD.. LEO--
B7 d XY. _MI ZE; JO BB, --
J: M.. XY. _MI CE. VY; BB, --
JE; M JO M.. \W., NU: LE: --
CE. M VY; M.. \W., NU: LE: --
BE; L SI, SU: LU: _LE BE--

1

Figure 16: Sample from a Lisu song book.

(5)



Figure 17: Sample from a Lisu magazine in Yangon, Myanmar.

:LK UP AB

«JE: LO. MO: GW: »LE LI: CE, M NY 1981 XO; 12
 V 5-6 NYI KW LD: -OC(TD, -W:)XV, KU-YO:
 XY KW M YI: -OY: -ST TV PAO-X, KW SV; X..
 T M A LO= GO K. NV. XUI-MI KW YI, CI L LV:
 SI..SV; X DU KW BE BO CI. T M A LO= GO LE
 SI. MO: GW: GW d: YI: -OY: -ST. NY A MT M:
 NY, AO=

«JE: LO. MO: GW: » LE LI: CE, M. MI; NY
 A: KL. LI_M A_LO= MY: NYI NY R NE LE LI:
 RO LI; RO LV: YI. JE: R A LI BE LO. M BE WU:
 L NY YI MI: YE LU. YE AO GW T. _M A LO= YI
 BV KL: A MI A: KLN N, S_LO=

MU GW LE LI CE, M NY LI-SU A LI JO JO_
 M BE VY: NYI A LI BE KO, TY, _M TV GW DO L
 _M A LO=

MU GW LE LI CE, GW SU NY R EN R LI: RO
 A SI. - YI d YI. M A MI LI; RO M VY NYI KW
 NY JE LO. SU A LO= R EN R LE LI: RO M IF
 NYI: S OK; JO LV NY YI P YI M TV. CI F. LV; F
 SI. NYI JE R G; SI W CI W B: LO KU LO M KW JE
 LO. JE_LO=

WU: L LV: NY YI. A MI JO TI LE BE MI YE
 LU. YE_LO= MO: GW: LE LI: CE, M NY YI: CE,

Figure 18: Sample from a Lisu song book preface.

**ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646³**

Please fill all the sections A, B and C below.

Please read Principles and Procedures Document (P & P) from <http://www.dkuug.dk/JTC1/SC2/WG2/docs/principles.html> for guidelines and details before filling this form.

Please ensure you are using the latest Form from <http://www.dkuug.dk/JTC1/SC2/WG2/docs/summaryform.html>.

See also <http://www.dkuug.dk/JTC1/SC2/WG2/docs/roadmaps.html> for latest Roadmaps.

A. Administrative

1. Title:	<i>Proposal for encoding the Old Lisu script in the BMP of the UCS</i>		
2. Requester's name:	<i>China</i>		
3. Requester type (Member body/Liaison/Individual contribution):	<i>Member body</i>		
4. Submission date:	<i>2007-10-10</i>		
5. Requester's reference (if applicable):	<i>CN/07-005R2</i>		
6. Choose one of the following:			
This is a complete proposal:	<i>Yes</i>		
(or) More information will be provided later:			

B. Technical – General

1. Choose one of the following:			
a. This proposal is for a new script (set of characters):			<i>Yes</i>
Proposed name of script:			<i>Old Lisu</i>
b. The proposal is for addition of character(s) to an existing block:			
Name of the existing block:			
2. Number of characters in proposal:			<i>48</i>
3. Proposed category (select one from below - see section 2.2 of P&P document):			
A-Contemporary	<input checked="" type="checkbox"/>	B.1-Specialized (small collection)	<input type="checkbox"/>
C-Major extinct	<input type="checkbox"/>	D-Attested extinct	<input type="checkbox"/>
F-Archaic Hieroglyphic or Ideographic	<input type="checkbox"/>	G-Obscure or questionable usage symbols	<input type="checkbox"/>
4. Is a repertoire including character names provided?			<i>Yes</i>
a. If YES, are the names in accordance with the "character naming guidelines" in Annex L of P&P document?			<i>Yes</i>
b. Are the character shapes attached in a legible form suitable for review?			<i>Yes</i>
5. Who will provide the appropriate computerized font (ordered preference: True Type, or PostScript format) for publishing the standard?			
			<i>David Morse</i>
If available now, identify source(s) for the font (include address, e-mail, ftp-site, etc.) and indicate the tools used:			
6. References:			
a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided?			<i>Yes</i>
b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached?			<i>Yes</i>
7. Special encoding issues:			
Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)?			<i>Yes</i>
<i>Addressed throughout proposal.</i>			

8. Additional Information:

Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script. Examples of such properties are: Casing information, Numeric information, Currency information, Display behaviour information such as line breaks, widths etc., Combining behaviour, Spacing behaviour, Directional behaviour, Default Collation behaviour, relevance in Mark Up contexts, Compatibility equivalence and other Unicode normalization related information. See the Unicode standard at <http://www.unicode.org> for such information on other scripts. Also see <http://www.unicode.org/Public/UNIDATA/UCD.html> and associated Unicode Technical Reports for information needed for consideration by the Unicode Technical Committee for inclusion in the Unicode Standard.

³ _ Form number: N3102-F (Original 1994-10-14; Revised 1995-01, 1995-04, 1996-04, 1996-08, 1999-03, 2001-05, 2001-09, 2003-11, 2005-01, 2005-09, 2005-10, 2007-03)

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before?	No
If YES explain	
2. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)?	Yes
If YES, with whom? <i>Yunnan Minority Language Commission, David Morse, David Bradley</i>	
If YES, available relevant documents:	
3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included?	Yes
Reference: <i>See Section 1. Introduction.</i>	
4. The context of use for the proposed characters (type of use; common or rare)	Common
Reference: <i>Scriptures, commentaries, dictionaries, hymn books, poetry, newspapers, magazines...</i>	
5. Are the proposed characters in current use by the user community?	Yes
If YES, where? Reference: <i>China, Myanmar, Thailand, India</i>	
6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP?	Yes
If YES, is a rationale provided?	
If YES, reference: <i>It is widely used among the Lisu communities, which number 1 million.</i>	
7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)?	Yes
8. Can any of the proposed characters be considered a presentation form of an existing character or character sequence?	No
If YES, is a rationale for its inclusion provided?	
If YES, reference:	
9. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters?	No
If YES, is a rationale for its inclusion provided?	
If YES, reference:	
10. Can any of the proposed character(s) be considered to be similar (in appearance or function) to an existing character?	Yes
If YES, is a rationale for its inclusion provided?	
If YES, reference: <i>Although some appear similar to Latin capital letters, this is a different script altogether with different behaviours. Hence, it would be best to encode them as a block.</i>	
11. Does the proposal include use of combining characters and/or use of composite sequences?	Yes
If YES, is a rationale for such use provided?	
If YES, reference: <i>Tone mya cya, tone mya bo, as well as combination tones are encoded as sequences to avoid confusion with pre-composed forms.</i>	
Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided?	
If YES, reference: <i>See Section 4. Tone Letters.</i>	
12. Does the proposal contain characters with any special properties such as control function or similar semantics?	No
If YES, describe in detail (include attachment if necessary)	
13. Does the proposal contain any Ideographic compatibility character(s)?	No
If YES, is the equivalent corresponding unified ideographic character(s) identified?	
If YES, reference:	