WHAT DO MODERN LANGUAGES WITH *SCRIPTIO CONTINUA* HAVE IN COMMON?¹

MARIKA BUTSKHRIKIDZE

Faculty of English Language, AAB College, Prishtinë, Kosovo

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Abstract: Theoretically, it is possible for any language to practice *scriptio continua* (a style of writing without spaces or any markers between the words/sentences) due to the very nature of language: a system of arbitrary and discrete elements. Two universal functions of sound: distinctive and delimitative, ensure that any language has boundary markers for meaning-bearing units that facilitate both language production and comprehension. We argue that some languages are more adaptive to this writing style than others. The languages that have predominantly isolating/analytic or agglutinative constructions with tones and limited combinatory rules (restricted phonotactic constraints) are more suitable to have *scriptio continua* than inflectional languages with complex phonotactic rules and free stress. This correlation is examined in three modern languages that to this day practice *scriptio continua*: Burmese, Thai, and Lhasa Tibetan.

Key words: *Scriptio continua*, word boundary markers, morphological typology, Burmese, Thai, Lhasa Tibetan

1. INTRODUCTION

Theoretically, it is possible for any language to practice *scriptio continua* due to the very nature of language: a system of arbitrary and discrete elements (for more on form-meaning correlation in a language and its implication on phonotactics see Butskhrikidze, 2002, pp 5–14).² Two universal functions of sound: distinctive and delimitative ensure that any language has boundary markers for meaning-bearing units to facilitate both language production and comprehension.

The aim of this paper is to demonstrate that some languages are more suitable to practice *scriptio continua* than others. We suggest that it is determined by the combination of the morphological type of a language with phonological boundary markers (both segmental and suprasegmental) of a language. The languages that have predominantly isolating or agglutinative constructions with tones and limited combinatory rules (restricted phonotactic constraints) are argued to be more adaptive to *scriptio continua*

¹ I am indebted to an anonymous reviewer for careful reading of the paper and many useful suggestions. The usual disclaimers apply.

² See also Jakobson's (1971) discussion on the nature of a linguistic sign and its twofold character: one sensible and the other intelligible (p. 103).

than inflectional languages³ with quite complex phonotactic rules and free stress. The rationale behind this correlation is explained in detail in the following section.

The correlation is tested in three modern languages that to this day practice *scriptio continua*: Burmese, Thai, and Lhasa Tibetan.⁴ These three languages are either predominantly isolating or agglutinative with very limited combinatory rules and tones that serve as word boundary markers that ensure unambiguous/unhindered comprehension.

The next section serves as the theoretical background for the predictions made in this paper. The interdependence between the morphological typology and the word boundary markers characteristic for each morphological type is illustrated in genetically and geographically diverse languages. In Section three we outline methodology and expectations, while Sections four, five and six focus on the specific linguistic characteristics of individual languages: Burmese, Thai, and Lhasa Tibetan.⁵ Section seven offers a discussion of the findings in these three languages and interpretations of those with respect to the predictions made. Tentative conclusions are drawn.

2. MORPHOLOGICAL TYPOLOGY AND WORD BOUNDARY MARKERS

Marika Butskhrikidze (1996a, 1998 and 2002) claim that the way morphemes combine in a word directly bears on the problem of their formal independence. The formal independence of a word is related to the phonotactic (segmental and suprasegmental) organization of a word, while the word boundary markers are an integral part of this organization. M. Butskhrikidze (2002, p. 55) offered the following simplification to illustrate the difference between three types of languages: agglutinative, inflectional and isolating (see Table 1).

Table 1. The classification of languages with respect to the formal independence of meaning-bearing units.

a) Isolating	#lexical morpheme#	=	#word#
	#grammatical morpheme#	=	#word#

³ We acknowledge the fact that inflectional languages such as Classical Greek and Classical Latin both used *scriptio continua* to some extent. Paul Saenger (1997) argues that up until the Middle Ages writing without spaces or any markers between the words was practiced in England, Low Countries, Germany and France (all are the countries where inflectional languages were spoken) and its decline he attributes to the development of silent reading.

⁴ Only a few modern languages still use *scriptio continua* to various extents. The list includes Thai, Lao, Khmer, Burmese, Javanese, Balinese, Tibetan, Chinese and Japanese.

⁵ It is important to note that we have randomly chosen these three languages without prior knowledge of their morphological and phonological characteristics. We are aware of the limitations of this study. These three languages might not be representative enough, but we consider that this first attempt to correlate a language's properties (morphological and phonological) with writing styles is worthwhile to pursue.

- b) Agglutinative #lexical morpheme# = #word#
 #grammatical morpheme# ≠ #word#
 c) Inflectional #lexical morpheme# ≠ #word#
 #grammatical morpheme# ≠ #word#

The formal independence of lexical and grammatical morphemes in these three types of languages is summarised and illustrated by languages/language families in Table 2.

Table 2. The classification with language illustrations

Type of a morpheme Type of a language	Lexical morphemes	Grammatical morphemes	Languages/language families
Isolating	Independent	Independent	Chinese, Burmese, Vietnamese
Agglutinative	Independent	Dependent	Altaic languages, Bantu languages, North Caucasian languages
Inflectional	Dependent	Dependent	Most Indo-European languages, South Caucasian languages

Nikolai Trubetzkoy (1971), in his seminal work, offers the classification of boundary markers by considering two aspects: a) phonemic and non-phonemic and 2) individual vs. group ones. In this article, I focus only on some of the word boundary markers mentioned in that work: final obstruent devoicing, fixed stress, consonant clusters and vowel harmony. Additionally, I also consider lexical tone⁶ as a word boundary marker (stemming from the premise that they are distinctive/meaning differentiating in a language). Consider five contrastive tones in Thai: the mid tone ม้า /māj/ ‘mule’, the rising tone ไหม /māj/ ‘silk’, the low tone ใหม่ /māj/ ‘new’, the falling toneไหม /māj/ ‘burn’ and the high tone ม้า /māj/ [particle] (Sleyden, 2009, pp. 5–6). The tones function just like phonemes of word stress. They are both distinctive as well as delimitative. Tones are not discussed in the classification of N. Trubetzkoy (1971). There is a large amount of literature on the role of lexical tone in spoken and written word recognition. Though I am not aware of the claim that a lexical tone is a word boundary marker, due to its versatile syntagmatic and paradigmatic functions, I would like to make such a claim and include lexical tone among all the other word boundary markers, such as word-final devoicing, fixed stress, consonant clusters, etc. In M. Butskhrikidze (1994, 1996a, 1996b and 1998), the correlations between word boundary markers in fifty-five fixed stress languages

⁶ We adopt the definition of tone suggested by Larry Hyman (2018): “A language with tone is one in which pitch is a contrastive feature of at least some morphemes” (p. 698).

are explored. From these studies, it was clear that certain boundary markers are in complementary distribution, while others co-occur. I will spell out a few correlations that were proposed (Butskhrikidze, 1998) just to illustrate which ones co-occur and the complementary ones: 1) the correlation between final obstruent devoicing and fixed stress placement: languages with word-final fixed stress do not have final devoicing (e.g., French, Persian, Grabar, Udmurt, Lezgi, Beluchi, Tat)⁷, while languages with word-initial and penultimate/antepenultimate stress may have final devoicing (e.g. Polish, German, Czech, Georgian). Thus, fixed stress and final devoicing do not occur at the same place, thus are complementary; 2) The correlation between the distribution of consonant (obstruent) clusters and fixed stress placement: languages with word-initial fixed stress are also characterized by word-initial obstruent clusters (e.g. Polish, Czech, Georgian, Old Persian), while languages with word-final fixed stress – with word-final obstruent clusters (e.g. French, Grabar, Persian). Thus, the placement of fixed stress matches with the occurrence of obstruent clusters⁸ in a word; 3) The relationship between the basic word-form/citation form and fixed stress placement: languages with the basic word form = stem + suffix, have never fixed stress on the final syllable (e.g. Polish, Czech, Georgian, Old Persian), while Languages with the basic word form = stem, might have final fixed stress (e.g. French, Grabar, Persian). Henceforth, there is a correlation/match between the placement of the fixed stress and stem.

These studies demonstrate that a language utilizes only a certain number and type of word boundary markers, and the next obvious question is to find out what is it that constrains what a language chooses. An attempt to try to answer this question is in Butskhrikidze (2019): in any language word boundary markers guarantee the autonomous nature and internal coherence of words. The aim is one, but the strategies of how it is achieved vary from language to language depending on its morphological makeup. The formal dependence of both lexical and grammatical morphemes entails the existence of the biggest (the most varied) number of word boundary markers in inflectional languages. The great uniformity of word types in isolated languages entails a limited number of word boundary markers in these languages. Agglutinative languages characterized by vowel harmony stand in-between those two types.

Hence the following typology, given in Table 3, is proposed in M. Butskhrikidze, 2019:

⁷ From first sight, because of the established literature on Turkish final devoicing, Turkish seems an exception to this generalization, but it is not. The issue is explored in an article by Butskhrikidze (1994b), and after considering diachronic (starting from the Proto-Turkic language) and synchronic data (modern Turkic languages), it is demonstrated that the word-final voiceless consonants in Modern Turkish (and also other Turkic languages) are not devoiced, but primary. Intervocalic voicing is secondary in all of these languages. It is positionally conditioned, since morphophonological voicing in cases like at: ad-īm ‘name’ vs. at: at-īm ‘horse’ reflects an original difference in the length of the preceding vowel.

⁸ Note the co-occurrence between the stress placement and phonemic/non-phonemic secondary articulations in languages, e.g., aspiration, glottalization, nasalization, pharyngealization, etc.

Table 3. The morphological typology and word boundary markers⁹

Type of a morpheme Type of a language	Lexical morphemes	Grammatical morphemes	Word boundary markers
Isolating	Independent	Independent	Lexical tones ⁹ , 'initials' and 'finals' (sometimes mutually exclusive sounds attested word-initially and word-finally)
Agglutinative	Independent	Dependent	Vowel harmony
Inflectional	Dependent	Dependent	Consonant clusters, final obstruent devoicing, fixed stress

3. METHODOLOGY AND EXPECTATIONS

Our interest in word boundary markers has naturally led us to the languages that use *scriptio continua*. The primary question that occupied our attention was: how do modern languages with *scriptio continua* practice such a script without compromising clarity/unambiguity and fluency in language processing/comprehension? Do these languages have some characteristics in common? Our expectations, based on the previous studies on word boundary markers, were two-fold: a) to find if these languages have predominantly isolating/analytic or agglutinative type of morphology. The rationale being that the former guarantees formal independence of both lexical as well as grammatical morphemes/words, while the latter guarantees formal independence of lexical morphemes/words and dependence of grammatical morphemes. Thus, we did not expect these languages to have inflectional morphology (no one-to-one mapping between the form and meaning in both lexical and grammatical morphemes, leading to the difficulties in delimitation/chunking of words); and b) to find if these languages have very straightforward word boundary markers, guaranteeing a proper language comprehension, e.g. from the suprasegmental/prosodic word boundaries we expected these languages to have lexical tones or fixed word stress; while from segmental word boundary markers, we expected to find the occurrence of certain sounds/sound groups exclusively only at word edges (initials' and 'finals') and very limited/simple combinatory (phonotactic) rules.

A desk study was used to investigate common characteristics of modern languages that practice *scriptio continua*. We consulted with grammar books and articles on a particular language. The focus was on the specificities of the writing systems of each

⁹ The reason why in isolating languages lexical tones function as word boundary markers is that in this type of language, syllable boundaries usually coincide with morpheme and word boundaries.

language, morphological type and word boundary markers that exist on the phonological level: phonotactic characteristics with a special focus on the distribution of consonants and vowels at the word edges and prosodic characteristics of words, both accentual and tonal.

In order to find out whether our expectations were met, we have randomly chosen to investigate three modern languages using *scriptio continua*: Burmese, Thai, and Lhasa Tibetan. Below we provide detailed information on each of them in that given order.

4. BURMESE

4.1 General info

Burmese (Myanmar) is the national language of Burma/Myanmar and is the mother tongue of the Burman (Bamar) ethnic majority (Bradley, 1996; Watkins, 2009). It has the largest number of speakers among the Tibeto-Burman languages and, along with Tibetan, has the longest written record (Gutman – Avanzati, 2013). About 32 million people in Myanmar speak Burmese as a first language (Eberhard – Simons – Fennig (eds.), 2019). Burmese belongs to the Tibeto-Burman language family.

4.2 Script and orthography

Burmese script is the *abugida* and is a descendant of the Brāhmī script (the ancestor of many Indic scripts found in South and Southeast Asia). Burmese is written from left to right without using spaces between words. In modern writing, spaces are generally used after a clause to enhance comprehension/processing.

Burmese has a long, written tradition (dating back to 1112 AD) and sound changes that took place during the development of the language are not reflected in the modern orthography. For instance, certain initial consonants underwent some changes and final consonants have disappeared (the only exception being a glottal stop, the status of which is debated in the relevant literature: some suggest treating it as a proper consonant, while others attributing it to a tonal feature of the language). Final nasal consonants have been replaced by a parallel series of nasalized vowels. In general, many combinations of symbols are pronounced differently from the sounds represented by the symbols individually (Watkins, 2009, p. 171).

Concerning the tones in the orthography, “Low tone is unmarked. A high tone is marked with a visarga (like a colon) in the script and with a grave accent in transliteration. The creaky tone is marked with a subscript dot in the script and by an acute accent in transliteration. The checked tone is indicated by a hook and is transliterated with an apostrophe” (Gutman – Avanzati, 2013).

4.3 Morphological type

Vadim Kasevich (1990, p. 75) characterizes Burmese as an isolating type of language with some significant characteristics of agglutination. From affixation, suffixation is more common than prefixation.

“Words are not inflected for person, number, gender, case, tense, aspect, or mood. Grammatical functions are carried out mainly by particles and word order. Prefixation, reduplication and compounding serve to derive new words from pre-existing ones (derivational morphology)” (Gutman – Avanzati, 2013).

Morphemes in Burmese are predominantly monosyllabic. Except for Indo-European loans, typically from Pali or English, compounding is the major source for polymorphemic words (Watkins, 2009, p. 173).

4.4 Phonology/phonotactics

There is no agreement concerning the exact number of consonants and vowels in Burmese. William Cornyn (1944) claims that it has 29 consonants, 9 vowels, and 4 tones. According to N. Trubetzkoy, “...the phonemic inventory of Burmese is extremely rich: it contains sixty-one consonants and fifty-one vowels (if prosodic differences are included)” (1971, p. 256). Many scholars suggest that Burmese has 33 consonants and 12 vowels.

The vowel and consonant inventories of Burmese are given in Table 4 and Table 5 (the data comes from Green, 1995, pp. 68–70).

Table 4. Vowel inventory of Burmese.

Monophthongs	Diphthongs
i(:) u(:)	ei ou
e: o:	ai au
ə ɔ:	
ɛ(:) a(:)	

Table 5. The consonant inventory of Burmese.

Stops (the palatals and affricates)

p	t	c	k	ʔ
p ^h	t ^h	c ^h	k ^h	
b	d	j	g	

Fricatives

θ	s	ʃ	h
	s ^h		
ð	z		

Nasals (N is placeless)

m	n	ɲ	ŋ	N
^h m	^h n	^h ɲ	^h ŋ	

Liquids and glides

l y w (r)

l^h (w^h)

r and *w^h* are rare. (Green, 1995, p. 70)

Regarding the phonotactic restrictions in Burmese, they are quite limited: Within a morpheme, neither combinations of two consonants nor combinations of two vowels are permitted. (The phonemes transcribed by “consonant + y and consonant + w” are in reality palatalized or rounded consonants. *hl*, *hm*, etc., represent voiceless *l'* and *m'*, and the diphthongs are to be considered monophonemic.) The only admissible monomorphemic combination is the combination “consonantal phoneme + vowel phoneme” (Trubetzkoy, 1971, pp. 246–247).

This great uniformity of Burmese word types is related to the limited scope of combinatory possibilities in this language.

N. Trubetzkoy (1971, p. 248) makes an interesting comparison between Burmese and English. Burmese has 8 combinatory rules/constraints on sounds; while English – as many as requiring 22 pages to describe them fully (Trubetzkoy [1971], refers to Trnka’s [1935] analysis of English phonotactics).

4.5 Word Prosody

Burmese is a tone language. The same as with the sounds of Burmese, there are different opinions expressed concerning the number of tones in this language: three, four or five (some of the scholars consider the neutral vowel [ə] as a separate tone. Most experts suggest 4 tones instead of three by analysing the final glottal stop as tonal rather than a segmental feature, thus considering the existence of only two-syllable patterns in Burmese: V and CV (Thein Tun, 1982, p.77). According to Justin Watkins (2003), the four tones can be described as low, high, creaky, and killed (in some other studies called checked).

J. Watkins (2003) investigates to what extent tonal identity can be recovered from the pitch characteristics of a string of tones in Burmese speech when intonation is overlaid on them. He suggests: “At the intonational sentence level, we find a low + rise tune characteristic of the final intonational phrase in the sentence. Another tier of the hierarchy which emerges in this study is at the intonational phrase level, where the following example suggests that the pitch of phrase final syllables seem to be determined by phrase-level syntax”. (p. 1291)

From the discussed information on Burmese, we can conclude that this isolating language with some features of agglutination has lexical tones that are marked orthographically and can serve as word boundary markers. Additionally, monosyllabic word structure and very limited phonotactic constraints (for instance, the ban on monomorphemic bi-consonantal and bi-vocalic sequences), facilitate unambiguous chunking of continuous strings.

5. THAI

5.1 General info

Thai (also known as Siamese) is the official and national language of Thailand, natively spoken with more than 20 million speakers in Thailand (Eberhard – Simons – Fennig (eds.), 2019).

Thai is a member of the Tai group of the Kra-Dai language family. There is a high degree of mutual intelligibility with other Tai languages like Lao and Isan.

5.2 Script and orthography

The Thai script is the *abugida* (a type of writing where consonantal symbols have inherent/default vowels, while other vowels are marked by diacritics), derived from the Old Khmer¹⁰ script. The language has a long written tradition dating back to 1292 AD.

According to Diller (1996), the Thai script is the first to introduce diacritic markers to denote distinctive tones. Such markers are absent in the Mon-Khmer, from which the Thai script originated. The new trend of tone marking has influenced Tibeto-Burman languages (see above on Burmese). It is written from left to right without using spaces between words. Thai writing may use a comma in a sentence for a phrase boundary and a blank space or a period at the end of a sentence.

Two factors could be identified that make grapheme-sound correlation not very straightforward in Thai: a) historical tone split associated with the disappearance of voicing distinction in consonants. This resulted in the existence of two different letters representing the same sound, but associated with different tones, and; b) a large number of borrowings from Sanskrit and Pali leading to the introduction of “duplicate” letters and silent letters.

5.3 Morphological type

According to Plam (1990, p. 503), Thai belongs to the isolating type of language. It is described as the noun head initial language with SVO order and prepositions. Meaning bearing units are syllable-sized.

5.4 Phonology/phonotactics

Most experts agree that Thai has twenty consonant phonemes (Abramson, 1962; Plam, 1990; Diller, 2008, p. 32). All consonant phonemes contrast in word/syllable/ –initial position (see Table 6). Only ten out of 20 can appear word/syllable-finally: unvoiced oral stops /p t k/, nasals /m n ŋ/ approximants /w j/ and fricatives /s f/ (attested only in loanwords) (Iwasaki – Ingkaphirom, 2005, p. 4). Neither voicing nor aspiration contrast is attested in the syllable-final position.

¹⁰ The Khmer language also uses *scriptio continua*. Its morphological structure is isolating/analytical with fixed stress on the word-final syllable.

Table 6. Syllable-initial consonant phonemes in Thai.

	Bilabial	Labiodental	Alveolar	Post-Alveolar	Palatal	Velar	Glottal
Plosive	p p ^h b		t t ^h d			k k ^h	
Nasal	m		n			ŋ	
Trill			r				
Fricative		f	s				h
Affricate				tɕ tɕ ^h			
Approximant							
Lateral					j		
Approximant			l				

w - Voiced labial-velar approximant (Sleyden, 2009, p. 2).

Concerning the vowel phonemes, eighteen monophthongs (including nine short and nine long) are attested. Compound vowel phonemes (the combination of long monophthongs with /a/) in closed and open syllables are also attested. Interestingly short monophthongs do not allow such a combination (Diller, 2008, p. 33).

According to Shoichi Iwasaki and Preeya Ingkaphirom (2005), the structure of a maximal syllable is given in Table 7.

Table 7. The structure of a maximal syllable in Thai.

(C₁) (C₂) V^T (/a/) (C₃)

C₁ = any consonant

C₂ = /w/, /l/, /r/

V = any monophthong

T = Tone

C₃ = /p/, /t/, /k/, /m/, /n/, /ŋ/, /j/, /w/

As seen from the scheme, initial consonants are optional, but in case both are present, their co-occurrence is constrained. Arthur Abramson (1962, p. 11–12) suggests the following constraint on the initial consonant clusters: C1 {p p^h t t^h k k^h} and C2 {l r w} (t^hr being rare). The approximant /w/ has limited combinatory power, it combines only with velar k and k^h. On the cluster simplifications in some of the Thai sub-dialects see Slayden (2009).

5.5 Word Prosody

Most of the scholars agree on the existence of five contrastive tones (3 level and 2 contour) in Thai (for other opinions see McFarland (1944, p. X) and Noss (1964, p. 17).

The classification of tones is given in Table 8.

Table 8. Tones in Thai.

Dynamic	Static
Falling $\wedge$	High /
	Mid $\circ$
Rising $\vee$	Low \

(Abramson, 1962, p. 18)

Every syllable uses only one toneme. A. Abramson finds an interesting generalization concerning the correlation between the vowel length and tones: "...it can at least be said that the mid and low tones tend to be longer, high and falling tones shorter, and than the rising tone. With these findings as a point of departure, such correlations should be investigated in running discourse" (1962, p. 117).

Some of the interactions between the sentence intonation and lexical tones are illustrated by the examples given in Table 9. (the data comes from Slayden, 2009, pp. 10–11).

Table 9. The interactions between the sentence intonation and lexical tones in Thai.

/tone-33/_{syllable} → [tone-32]/_{phrase}
At the end of a phrase, the mid tone is dropped very slightly.

/tone-45/_{syllable} → [tone-454]/_{phrase}
+low
At the end of a phrase, the high tone has a glottal stricture and drops quickly.

There is an interesting experimental study by Heather Winskel (2011) that makes the following claim: "These results indicate that tone is playing an important role in early word recognition in Thai. The tone markers could also be functioning as salient word or syllable segmentation cues (e.g., หน้าต่าง/ na:2ta:N/ 'window'), as Thai does not have interword spaces to serve this function (Winskel – Radach – Luksaneeyanawin, 2009). These findings concur with results from Chinese that tonal information is an essential component for word processing (Xu et al., 1999). When consonant and vowel information is activated in conjunction with tonal information, then this dramatically narrows the number of items potentially activated in tonal languages. Lexical tone in Thai is important as it can change the meaning of the word, as typically there are many syllables that are phonologically the same apart from the assigned tone." (p. 754).

From the given information on Thai, we can conclude that Thai is isolating language using lexical tones and 'initials' and 'finals' as word boundary markers.

6. TIBETAN/LHASA

6.1 General info

Tibetan is spoken in the Tibetan Autonomous Region of China, and in neighbouring high-altitude parts of Bhutan, India (Ladakh in Kashmir and parts of Himachal Pradesh), Pakistan (Baltistan), Nepal (Mugu, Dolpo, Mustang, Solu Khumbu), Burma, and the Chinese provinces of Yunnan, Sichuan, Gansu, and Qinghai. The number of speakers is between three to seven million (Denwood, 2006). Tibetan belongs to the Bodic branch of the Sino-Tibetan language family. In this article, we focus on the best-known contemporary Tibetan dialect, Lhasa Tibetan (LT) (a variety spoken in Central Tibet, also referred to as Standard Tibetan). It serves as the *lingua franca*, “common language”, in both the Tibetan Autonomous Region and the diaspora communities (Delancey, 2003, for other opinions, see also Tournadre, 2013).

6.2 Script and orthography

The written language is based on Classical Tibetan and is highly conservative. It has been used as the written language of the Tibetic area for more than a thousand years. It is an *abugida* that originated from Brahmic scripts. There is a big mismatch between the current spelling and pronunciation. Tones are not marked in the orthography due to the fact that the language did not have tones when the script was invented. Spaces are not used to mark word boundaries.

6.3 Morphological type

The language can generally be described as an agglutinative, SOV language (Lim, 2018) characterized by noun head initial constructions, definite and indefinite articles and ergativity. ‘Morphology is key to interpreting the pitch patterns of morphologically complex words and phrases in LT’ (Lim, 2018, p. 25).

Lhasa Tibetan has largely monosyllabic roots (just like other Sino-Tibetan languages). Morphologically complex words are derived by affixation (both prefixation and suffixation (predominantly)) and compounding (for the detailed account of noun and verb morphology see Lim, 2018).

6.4 Phonology/phonotactics

We follow Lim’s (2018) description of consonant (see Table 10) and vowel (see Table 11) inventories on LT.

Table 10. Vowel inventory of LT.

Vowels	Front		Back
	Unrounded	Rounded	Rounded
Close	i	y	u
Mid	e	ø	o
Open	ε		ɑ

Table 11. The consonant inventory of LT.

Consonants	Labial	Alveolar	Retroflex	Palatal	Palatalized velar	Velar	Glottal
Plosive	p p ^h (b)	t t ^h (d)	ʈ ʈ ^h (ɖ)		k ^j k ^{hj} (g ^j)	k k ^h (g)	
Affricate		ts ts ^h		tɕ tɕ ^h			
Nasals	m	n		ɲ		ŋ	
Trill		r					
Fricative		s (z)		ɕ/ʃ (z)			h
Approximate	w			j			
Lateral		l ɭ					

Keh Sheng Lim (2018) notes that: “...onset obstruents have lost voicing contrast in colloquial speech. However, voiceless plosives (p, t, k) are often voiced when a syllable bears low tone in citation form and intervocally” (p. 10).

Concerning the phonotactic restrictions, all consonants can appear syllable-initially, but consonant occurrence in the syllable-final position is quite constrained.

According to Lim (2018), this is a simple syllable structure in Lhasa Tibetan: (C_i)V(:)(C_f). The details are given in Table 12.

Table 12. A simple syllable structure in Lhasa Tibetan.

Position	Possible Segment
C _i	All consonants
V	All vowels
C _f	p, k, ʔ, m, ŋ, n, r

(Lim, 2018, p. 13)

6.5 Word Prosody

“There is a typological tendency for the languages of central Tibet to have phonemic tone as well as relatively simplified syllable structure, whereas the dialects of the periphery lack tone and have complex syllable structure” (Hill, 2010, p. 111). That said, the issue of the tonal inventory in Lhasa Tibetan is quite controversial. I follow the analysis of tone and intonation in Lhasa Tibetan proposed by Lim (2018). He claims that “...there are three basic lexical tones: L, LH, and H. H can be found in both stems and affixes, LH can only be found in stems, and L can only be found in affixes” (p. 18).

He illustrates them by the following examples in Table 13.

Table 13. The tonal inventory in Lhasa Tibetan.

Transcription	Segments	Underlying form	Gloss
<i>spa</i>	pá	/H/	‘warrior’
<i>sba</i>	p/bǎ	/LH/	‘cane’
<i>pa</i>	-pá	/H/	‘nominalizer’
<i>pa/ba</i>	-p/bà-	/L/	‘past tense verb linking particle’

(Lim, 2018)

Lim (2018) proposes the following prosodic hierarchy for Lhasa Tibetan:

Table 14. The prosodic hierarchy in Lhasa Tibetan.

...I...	Intonational phrase
...Ω...	Prosodic word group
...ω...	Prosodic word
...σ...	Syllable
...μ...	Mora

K. S. Lim (2018) gives the following description to the notations in Table 14: “...a) the mora encodes vowel length contrasts, b) the syllable is the tone-bearing unit (TBU), c) the prosodic word, which is non-recursive and maximally binary, delimits the application of most tonal processes, and d) the prosodic word group, which matches grammatical words, is the domain of downstep” (pp. 155 – 156).

Concerning the intonational phonology in Lhasa Tibetan, K. S. Lim (2018) claims that: “The surface realizations of phrase-final boundary tones mostly agree with the Frequency Code, where L% communicates finality (e.g., declarative sentences) and H% communicates non-finality (e.g., continuatives and interrogative sentences without final particles) (Ohala, 1984). Boundary tones are associated with the last syllable (i.e., TBU) of the intonational phrase. As L% and H% are respectively lower and higher than corresponding lexical tones, the phrase-final L% and the tone (H or L) of the last syllable form a falling contour (i.e., H+L% or L+L%), while the phrase-final H% and the tone of the last syllable form a rising contour (i.e., H+H% or L+H%)” (pp. 157–158).

6.6 Vowel harmony

Lhasa Tibetan has both progressive and regressive height harmony affecting vowels in stems as well as in affixes (for details see Sprigg, 1961; Chang – Chang, 1968; Dawson, 1980).

From the given information on Lhasa Tibetan, we can conclude that it is an agglutinative language with lexical tones, vowel harmony and “initials” and “finals” serving as word boundary markers.

7. DISCUSSION

One simple answer to the question raised in this article is that modern languages with *scriptio continua* traditionally used ancient scripts that are more “organic” and several of them simply maintain that tradition. Thus, keeping *scriptio continua* is just historical inertia.

An alternative answer to the question is that the languages that practice *scriptio continua* are being in the sphere of Chinese cultural influence.

One could also say that the script traditions of Burmese, Thai, and Tibetan are all based on the Indian abugida tradition. It is not the language type, but the historical and cultural context of the scripts that have conditioned the way these scripts function. I would oppose this argument by saying that Sanskrit uses Devanagari, a descendant from the Brahmi script (just like Burmese, Thai and Tibetan), however, it is not written in *scriptio continua*. The reason for this is that Sanskrit is an inflectional language with much more complex phonotactic restrictions than the languages discussed in this article.

Clearly, we have chosen to explore the issue from another angle, namely, if there are linguistic features that favour or do not *scriptio continua*.

Three modern languages: Burmese, Thai and Lhasa Tibetan, which to this day practice *scriptio continua*, have been examined. We found out that all these three languages are predominantly monosyllabic, have lexical tones and very limited constraints on the distribution of sounds within meaning-bearing units. Concerning the morphological type, Burmese and Thai are isolating languages, while Lhasa Tibetan – agglutinative. The agglutinative morphology of Lhasa Tibetan correlates with a vowel harmony¹¹ as an extra word boundary marker in this language. The findings are summarized in Table 15.

Table 15. The summary of the findings.

Language	Morphological Type	Word boundary markers
Burmese	Isolating with some characteristics of agglutination	Lexical tones, constraint on monomorphemic two consonants and two vowels
Thai	Isolating	Lexical tones, ‘initials’ and ‘finals’
Lhasa Tibetan	Agglutinative	Lexical tones, vowel harmony, ‘initials’ and ‘finals’

¹¹ We are aware that not all Agglutinative languages have vowel harmony, for instance, Dravidian languages (with the exception of Telugu and some others). Interestingly vowel harmony still predominates in agglutinative languages, while in inflectional – umlaut/ablaut.

We see that in all these languages the absence of spaces between the words is compensated by the presence of word boundary markers (tones, sounds found only at certain word edges (“initials” and “finals”) and vowel harmony). We think that all of these means serve for speedy and accurate comprehension in these languages. Nevertheless, more in-depth studies are needed to investigate the relationship between lexical tones and intonation.

Throughout history, a great many languages have been written with *scriptio continua* (including Latin and Greek¹² at various stages). Over time, along with the sharp decline in the number of languages using *scriptio continua* (e.g., Vietnamese and Javanese no longer practice such a writing style after adopting the Latin alphabet), we also see some form of *scriptio continua* emerging on the Internet. It is interesting to explore in which domains, in which form and to what extent we find the usage of such form of writings on the Internet.

We argued that some languages are more adaptive to *scriptio continua* writing style than others. The languages that have predominantly isolating or agglutinative constructions with tones and limited combinatory rules (simple phonotactic constraints) are more suitable to have *scriptio continua* than inflectional languages with complex phonotactic rules and free stress. This correlation is tested, and the predictions were validated in three modern languages that to this day practice *scriptio continua*: Burmese, Thai and Lhasa Tibetan.

Other well-known Modern languages that practice *scriptio continua* are Chinese, Japanese and Lao. Just like Burmese, Thai and Lhasa Tibetan, these languages also meet the predictions made in this article. For the sake of brevity, we had to omit them from the discussion. In the future, it would be interesting to encompass all the languages with *scriptio continua* in one comprehensive study.

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¹² As we noted at the beginning of the article, theoretically it is possible for any language to practice *scriptio continua*, and, indeed, both Latin and Old Greek, being inflectional languages, at early stages were written with no word boundary markers between the words.

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