frontiers in Communication

ORIGINAL RESEARCH
published: 09 March 2022
doi: 10.3389/fcomm.2021.652740

A Preliminary Account of the Northern Toussian Balafon Surrogate Language

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Northern Toussian is a language spoken in southwest Burkina Faso. Like many of the ethnicities in the region, members of the musical caste, the griots, have developed a musical surrogate language which is played on the balafon. This article is a preliminary documentation of the Northern Toussian balafon surrogate language, describing its cultural usage, analyzing how the tones of the spoken language are encoded in the surrogate language and comparing the Northern Toussian surrogate language with the neighboring Sambla surrogate language. It was found that the Northern Toussian surrogate language encodes significantly more post-lexical features of the spoken language than the Sambla surrogate language, such as downdrift.

Keywords: Northern Toussian, surrogate language, balafon, tone, Burkina Faso

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Specialty section:
This article was submitted to Language Sciences, a section of the journal Frontiers in Communication

Received: *13 January 2021*
Accepted: *01 October 2021*
Published: *09 March 2022*

Citation:
Struthers-Young A (2022) A Preliminary Account of the Northern Toussian Balafon Surrogate Language. Front. Commun. 6:652740. doi: 10.3389/fcomm.2021.652740

INTRODUCTION

Musical surrogate languages are encodings of speech using musical instruments. They have been found on diverse instruments such as drums, jaw harps, flutes, mouth organs, and a type of xylophone played in West Africa called the balafon (Proschan, 1993; Villepastour, 2010; McPherson, 2019a). However, few musical surrogate languages have been studied comprehensively by linguists and have instead been analyzed only through an ethnomusicological lens. This is unfortunate, since a holistic understanding of a surrogate language is predicated on understanding the structure of the language being represented in addition to the musical culture. Moreover, the study of surrogate languages has much to contribute to the field of linguistics. Speech surrogates, another term for surrogate languages, can represent an utterance word-for-word, but will only encode certain structures of speech, such as tone and prosody. Because of this, they can be useful tools for phonological analysis of tonal languages—often, they pare away much of the phonetic variation found in the tones of speech, allowing researchers to more quickly and efficiently analyze the tonology of the language (McPherson, 2019b; McPherson, 2019c). Additionally, surrogate languages give insight into the speaker's perception of the language, showing what linguistic structures they encode. Learning how speech surrogates function and when they are used can be a useful tool when developing engaging resources for preservation and revitalization programs.

This paper documents the balafon surrogate language of the Northern Toussian language spoken in southwest Burkina Faso. It is based on data elicited in Bobo-Dioulasso with the musician and griot Emile Diabaté in the summer of 2019. The research was exploratory, aimed at determining how the surrogate language functions; this paper is a preliminary description of the system. It demonstrates what linguistic structures are represented in the surrogate language and the strategies for encoding said structures. The primary element of speech which is encoded with the surrogate language is tone, where tones are mapped to specific bars on the balafon. Other elements such as syllable structure and phrase boundaries are represented: syllable structure by two quick strikes called flams, and phrase boundaries by striking octaves or

extra low notes. Similar work has been done on the Sambla balafon surrogate language (McPherson, 2019a). The Sambla and Toussian are neighboring ethnicities who speak different Niger-Congo languages—according to oral history, the Sambla learned how to play the balafon from the Toussian, likely in the late 19th century (Strand, 2009). A comparison of the structure of the Seenku and Toussian balafon surrogate languages is made to examine the relationship of these speech surrogates.

The following topics are discussed: the Toussian people and languages (*The Toussian people and languages* Section), the construction and cultural significance of the Toussian balafon (*Griots and the balafon* Section), relevant elements of Northern Toussian grammar (*Relevant Northern Toussian grammar* Section), the Northern Toussian balafon surrogate language (*Surrogate language* Section) and finally the Sambla balafon tradition and its historical and cultural ties to the Toussian (*Comparison to the Sambla balafon surrogate language* Section).

THE TOUSSIAN PEOPLE AND LANGUAGES

The Toussian[1] people reside in the southwest of Burkina Faso, near Bobo-Dioulasso. Bordered by the Banfora escarpment, a line of cliffs which spans from Banfora to Bobo-Dioulasso, the Toussian live on a plateau which becomes increasingly hilly as one travels west. They are neighbored in the north by the Dzuungo, in the northeast by the Sambla and the Tiefo, in the west by the Siamou, in the south by the Turka and Karaboro, and in the east by the Dioula (Hammarström et al., 2020).[2] There are no urban centers in Toussian country; the people are spread among villages of varying size and most Toussian are subsistence farmers. They grow diverse crops, including their staples corn, millet, and sorghum, fruits such as mangoes and bananas and cash crops like cotton. They are a small minority in Burkina Faso; the most recent survey in 1995 listed the population of speakers of Toussian at around 40,000, though the number of speakers has likely grown substantially since then due to population growth (Eberhard et al., 2020).

The Toussian people speak languages which belong to the Toussian family. Two Toussian languages have been reported in published literature: Northern Toussian and Southern Toussian, which are separated by a sparsely populated area of hilly forests. Within these languages, there is considerable dialectal variation. In addition to Northern Toussian and Southern Toussian, I have suspicions that a variety of Toussian spoken only in the villages Moami and Tien is divergent enough to be classified as a separate language, as the variety they speak is not mutually intelligible with speakers of Northern or Southern Toussian. Based on preliminary research I conducted with three speakers, this variety shares more similarities in vocabulary and phonotactics with Southern Toussian than Northern Toussian—more research is necessary to determine if it is a separate language or a dialect of Southern Toussian. **Figure 1** is a map of the Toussian languages, including the variety spoken at Moami and Tien, as well as neighboring languages.

The vitality of Northern Toussian and Southern Toussian is still strong in most villages—children are exposed to the language from infancy. Most young Toussian are bi- or trilingual, as they speak Dioula from early childhood and learn French in school. However, the elderly (~85 or older) might be monolingual in Toussian and middle-aged speakers (~50 or older) might have limited or nonexistent knowledge of French. Linguistic vitality is not so robust in every village—In Moami and Tien, which are isolated in Dioula- and Seenku-speaking regions, there are indications of loss of vitality. According to individuals from Moami, their language is often not passed on to children. When I elicited preliminary data there, I noted that some middle-aged speakers were found to exhibit linguistic attrition. There have been no surveys to determine how many speakers of the language remain. Moami and Tien appear to be outliers; in most Toussian villages, Toussian is widely and often used, though more sociolinguistic work is necessary to truly evaluate the vitality of Toussian throughout the region.

The genetic affiliation of the Toussian languages has long been debated and there is no consensus. In the 1960s, they were grouped as members the Gur language family and were noted for their similarities with Senoufo languages, which were considered Gur at the time (Prost, 1964). Later, Naden (1989) reanalyzed the Senoufo languages and removed them from Gur, asserting that they belong to their own family. However, he still analyzed the Toussian languages as Gur languages. Recently (Güldemann, 2018) argued that the evidence grouping Toussian into the Gur family is scant and the Toussian languages should be considered an unaffiliated Niger Congo language family until more research has been done.

There is currently no orthography for Northern Toussian, though one exists for Southern Toussian, developed by the SIL missionary Hannes Wiesmann while he studied Southern Toussian (Wiesmann, 2000; Wiesmann et al., 2004). Though Wiesmann primarily studied the dialect spoken at Nianha, the orthography was designed to accommodate all Southern Toussian dialects. Nevertheless, it appears that Southern Toussian literacy is still quite low.

GRIOTS AND THE BALAFON

Construction and Use

Griots are members of a musical caste who fill important cultural roles in many West African societies. In southwest Burkina Faso, most men who are griots will become musicians, mastering the

[1]The word "Toussian" appears to be autonymous, as speakers of the Northern Toussian dialect of Kourinion use the term Toussian (tusiyã). However, there are other words for the Toussian ethnicity, including the Southern Toussian Wi n (wn̩) and the Northern Toussian dialect of Djigouera Trũ (trũ). More details on the languages and dialects of the Toussian people are found below.

[2]Map made with ArcGIS Online by ESRI.

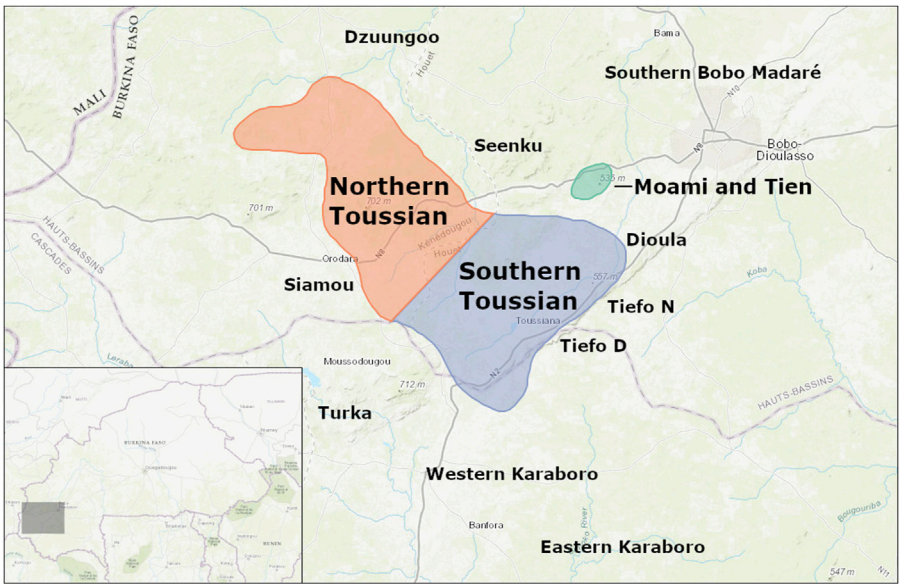


FIGURE 1 | Map of languages of southwest Burkina Faso.

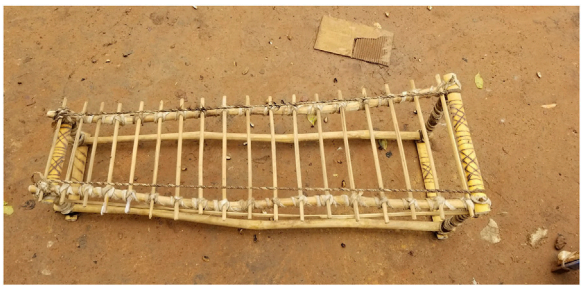


FIGURE 2 | Balafon frame.

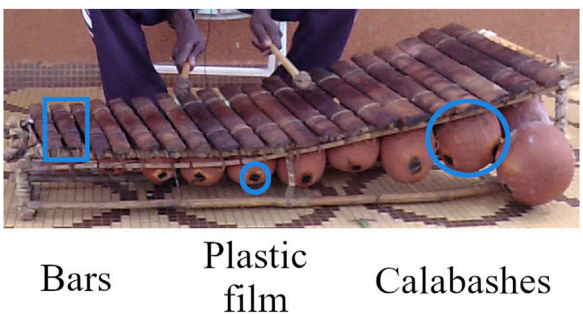


FIGURE 3 | Parts of the balafon.

instrument their fathers played and learning traditional songs. Women who belong to griot families, often called griotes, might sing or play the rattle, but will not traditionally play instruments like the balafon or drums. There are two distinct groups of griots among the Toussian: balafon griots called *jɔ́pī* and drum griots called *kātɔ̰*[3]. Membership in each of these groups is hereditary; whereas a person from a non-griot family can become a balafonist or drummer and learn how to play the balafon or drums, they cannot become a *jɔ́pī* or *kātɔ̰* and fulfill the cultural roles that *jɔ́pī* and *kātɔ̰* do. Likewise, the two types of griots are independent—the child of a *jɔ́pī* can only be a *jɔ́pī*, not a *kātɔ̰*. Only balafon griots of certain families are permitted to construct balafons. At Djigouera and the neighboring villages, a single family from Djigouera has this right, meaning there are only a handful of people in and around Djigouera who can build and supply balafons to all the other griots.[4] In addition to Toussian balafons, this family also makes Sambla, Dioula, Siamou, Senoufo and Manding[5] balafons, each of which are constructed similarly to the Toussian balafon, but use a different scale.

The Toussian balafon consists of a row of 18–22 bars bound to a flat wooden frame which houses a series of resonating chambers. The bars are cut from a hardwood made from the wood of a *jīrɛ̰* [ɲɪ̄nɛ̰] (*Pterocarpus erinaceus*) tree and then are dried over a fire and under the sun for a period of time. Once they have dried, they are tuned by shaving off portions of the underside with an adze. The frame of a balafon is constructed with struts of wood lashed together, and can be seen in **Figure 2**. The lashings are traditionally made of strips of goat hide, but now the griots will often use leather, rope, or twine, depending on what is available. When the bars have been dried and tuned, they will be lashed individually to the frame.

[3]Nasalization of vowels will be indicated by a tilde under the vowel to avoid typographic issues representing both tone and nasalization above the letter.
[4]Not all villages have griots—of villages close to Djigouera, there are only griots in Serekeni, Kleni and Kouini.
[5]The term used by the griot recounting this. He specified this as a type of balafon which came from Guinea but did not state the language or ethnicity of people who use this balafon.

There is one calabash per bar and each calabash is tuned to the resonant frequency of the bar, greatly amplifying its sound. The tuning is accomplished by removing material from the top of the calabash, lowering its pitch. Each calabash has a hole drilled in its side which is covered by a thin film—traditionally from the egg sack of a particular species of spider, but now usually from a thin piece of plastic. This distorts the note slightly, giving the balafon its characteristic buzzing sound. When the calabashes have been finished, the griot will string them up inside the frame so that the mouth of the calabash sits directly below the bar it is is tuned to. **Figure 3** shows a completed balafon, highlighting different components of it.

The balafon is pentatonic and typically has a span of around four octaves. For the Toussian balafon, this range is approximately 90–1120 Hz. There does not appear to be a designated root or note which acts as the musical center; songs can be played in different modalities by choosing any of the five bars as a root. The bars bear the following names:

(1) Bar names and intervals

bar	cents[6]	name
1 (lowest)[7]		tā-ɲépwɛ̄ 'Ta (a name) bar'
	322	
2		dú-fɔ̄-ɲépwɛ̄ 'Major initiation bar'
	214	
3		yā-tɛ̀-ɲépwɛ̄ 'rattle player bar'
	242	
4		ɲépwɛ̄-kà 'unripe bar'
	309	
5		kātɔ̰-ɲépwɛ̄ 'drum griot bar'
	81	
1 (octave)		tā-ɲépwɛ̄ 'Ta (a name) bar'

The word *ɲépwɛ̄* (pl. *ɲéplō*), present in all these names, means 'bar.' The word *tā* refers to a wealthy, important man from long ago. The compound *dú-fɔ̄* refers to a group of people who play an important role in the *dú* initiation ritual, which serves to teach Toussian children important lessons about morals, nature and Toussian culture. It is often held to be the most significant cultural tradition for the Toussian and is discussed below (*Culture and use* Section). The word *yā-tɛ̀* is a gourd rattle that accompanies the griots as they play. The name of the fourth bar, *ɲépwɛ̄-kà* means 'the unripe bar.' It plays a note that is unique to the Toussian balafon, not shared by any other ethnicities in the region, and as such acts as an identifier of Toussian balafons. Finally, *kātɔ̰-ɲépwɛ̄* refers to the drum griots. They are the only people permitted to repair a damaged *kātɔ̰-ɲépwɛ̄*; reserving a bar of the balafon for the *kātɔ̰* is a sign of respect.

Culture and Use

Balafons have historically been important fixtures in Toussian culture and religion; this remains the case for many, if not most, Toussian individuals. However, as the population of Muslims and Christians has increased in recent years, this has affected the cultural role of the balafon, discussed below. At traditional marriages, funerals and festivals, several balafonists will likely be accompanied by a full band comprised of drummers, rattlers, and singers. In these concert settings, the balafonists will often play in tandem on the same balafon, with up to three people playing the instrument from both sides. Additionally, for some events like planting season and the harvest, the griots will join the farmers out in the field with their balafons strapped to them, playing while walking alongside the cultivators. Historically, the griots did no farming; there was a social contract where the rest of the populace would supply them with food in exchange for their music, but this practice is in decline and now griots must often supplement their finances by farming (Trost, 1999). There are specific songs which accompany each of these events. Some of these songs are structured in a call-and-response way, where a portion of the song is sung and then repeated using the surrogate language.

The griot plays an active role in many Toussian customs. An example of this would be during the major initiation *dú~dó*, which the griots help organize and lead certain sacrifices in. The major initiation is a coming-of-age tradition which boys take part in once in their life, starting at the age of around 15 or older. These boys are brought out into the bush for several months and taught skills and lessons important for Toussian society and culture. These lessons are varied, from teaching practical skills such as identifying plants and hunting, to building cultural knowledge with history, stories, songs and dances. During this initiation, the children will be exposed to the surrogate language and learn how to interpret it. Likewise, there is a corresponding initiation for girls, where they spend time learning important lessons, and they will also learn how to interpret the balafon (Trost, 1999). The frequency of these initiations varies by village. According to Trost, the major initiation occurs approximately every 10 years in Toussiana; my consultant from Djigouera said that the major initiation historically happened every 40 years, but there has not been an initiation since 1953 due to lack of interest. In many villages, these initiations and other events are becoming less frequent, in part because the organizers have often converted to Islam or Christianity and prioritize traditional religion less or view their new beliefs and the traditional beliefs as incompatible. Additionally, these initiations are difficult to plan around children's school schedules. Typically, the only extended break children get from school is from August to the end of September. During the school year, they are not able to devote such a long period of time away from their classes and during August and September, their parents often need their help planting or harvesting the fields.

As Islam and Christianity have gained a wider following in the villages, the cultural role of the balafon has been changing for certain groups of Christians and Muslims. Often, individuals will choose to have Muslim or Christian weddings and funerals, where the traditional Toussian balafon plays no major role. There is a rise in non-griot Toussian musicians who play popular music and they are often sought instead of griots for these events. They will usually play Dioula songs, as such songs are not associated with traditional religion, and frequently these musicians are unable to use the Toussian balafon surrogate language.

[6]Cents are normalized musical intervals. 100 cents correspond to one semitone; an octave is 1,200 cents.

[7]The numbering of the bars was chosen not for any inherent properties of the scale, but rather was numbered starting at the lowest bar on the balafon used by the griot with whom I worked.

The Surrogate Language

The Northern Toussian balafon surrogate language is a tone-based speech surrogate, where the tones of speech are represented by striking bars of certain pitches on the balafon. Additionally, aspects of the syllable structure, such as the presence of a consonant cluster or coda, as well as phrase boundaries can be encoded. Many other phonological features, such as vowel quality and type of consonant are not represented.

The speech surrogate can be quite ambiguous in many contexts because certain features are not represented; therefore, it is necessary to learn how to interpret it. As discussed above, this was traditionally taught during the great initiations, which have become increasingly infrequent. Very few people other than griots can still understand the speech surrogate, according to my surrogate language consultant Emile Diabaté and others whom I have interviewed on the subject. He has said that there are currently only a handful of older women who are able to understand the surrogate language. However, 'understanding the surrogate language' can have different connotations, as the surrogate language takes different forms depending on how it is used.

Many speech surrogates are found to employ several 'modes,'[8] which are different encodings of speech (Moore and Meyer, 2014; McPherson, 2019a). In the case of Seenku, there is a 'singing mode' and a 'speech mode,' where the surrogate language encodes aspects of speech differently in each mode. The speech mode is used when a griot communicates with another individual, and it follows the rhythms and structure of speech closely. The singing mode is used in songs, and its rhythm matches whichever song it is played in; moreover, the system is subject to stylistic modification and extra notes and passages might be improvised, further distancing the surrogate language from speech (McPherson, 2019a).

It is not currently understood how many modes the Northern Toussian balafon surrogate language has or when they are used. There appear to be at least two, a speech mode and a singing mode. The singing mode is used during songs—like the Seenku singing mode, it varies substantially from the speech mode. This is the mode which is most used in the public sphere, as the traditional Toussian songs employ it. However, these songs are often both sung and played with the surrogate language. Therefore, it is possible that many people have learned the lyrics of the songs and have learned the portions played in the speech surrogate by means of the lyrics, rather than learning how the system itself functions and being able to understand novel utterances of the surrogate language.

It is unclear how much, if at all, the speech mode is used in the public sphere–it is my impression that the speech mode is largely restricted to griot households, currently. Griots teach their children how to interpret the speech mode young, starting by asking the children to bring them food or drinks, building up proficiency until the children can chat and communicate with other griots using the surrogate language. However, outside of these households, few people can understand it. Moreover, it is equally unclear whether the people Emile claims can understand the surrogate language can interpret the speech mode, or instead are familiar with the various songs played in the singing mode. Historically, it is possible that the speech mode was used at many of the cultural events mentioned above, where conversations would be had with the people present at the events, as is still seen in Sambla villages (McPherson, 2019a). At present though, it appears that speech mode is no longer used in most contexts outside of Emile's home, at least in Djigouera, his home village.

[8]Not to be confused with the term "mode" used in musicology to refer to types of musical scales.

RELEVANT NORTHERN TOUSSIAN GRAMMAR

Basic Grammatical Features

The order of constituents in Northern Toussian is subject-object-verb (SOV) and word order is quite strict; there are only a handful of constructions which can alter this order. Various grammatical elements such as tense, aspect and mood (TAM) morphemes, as well as other elements like auxiliary verbs are found between the subject and the object. These words will henceforth be called 'auxiliaries.' Adjuncts, such as adverbials and postpositional phrases, are found following the verb. An example Toussian sentence is given below.

(2) pə̀ wū ɲīn pɛ̀ sā̰ tə̂r=ɲīŋ
3PL EVID name good place (v) 3SG.EMPH=on
'(It is known) that they gave him a great name.'[9] (0194)

Syllable Structure

Most words—excluding compounds—are monosyllabic in Northern Toussian. Syllables can be of the shape (C)CVC. The consonant inventory is found in (3); consonants in parentheses are exceedingly rare—some, like *g͡b*, are only found in borrowings. The symbols ⟨j⟩ and ⟨y⟩ correspond to IPA [ɟ] and [j], respectively.

(3) Consonant inventory

	Bilabial	Alveolar	Palatal	Velar	Labiovelar
Oral Stops	p b	t d	j	k	k͡p (g͡b)
Nasal Stops	m	n	ɲ	ŋ	
Fricatives	f (v)	s (z)	ʃ	ɣ	
Trills		r			
Approximants		l	y		w

Northern Toussian has an eight-vowel system, /i e ɛ ə a u o ɔ/, with a nasal series which lacks close mid vowels and the schwa, /ĩ ɛ̃ ã ũ ɔ̃/. Vowel length is not contrastive. Further research is required to determine whether vowel-glide and glide-vowel sequences are phonologically diphthongs; for the purpose of this paper, the glides will be transcribed as consonants.

Northern Toussian appears to have true consonant clusters; they do not seem to be reduced disyllabic words as is found in some languages in the region like Dioula, i.e., there is not a phonological rule which reduces CVCV to CCV. The first element of a consonant cluster is an obstruent or, in limited

contexts, a sonorant. The second element can only be a sonorant—specifically, only *l, r, y,* or *w*. Examples of words with obstruent-initial consonant clusters are found in 4).

(4)

Cluster	example	gloss
bl-	blê	'to hang'
bw-	bwɛ̄y	'side'
fl-	flê	'woman'
fw-	fwɛ̄	'cloth'
dr-	drɛ̄	'tail'
kr-	krê	'that'

When both elements of a consonant cluster are sonorants, only *mw-* and *ny-*are permitted.

(5)

Cluster	example	gloss
ny-	nyą̄	'beehive'
mw-	mwɔ	'rat'

There are minimal pairs of *ɲ* and *ny*, such as *ɲār* 'porridge,' and *nyār* 'oil.'

The following codas are permissible: *n, ŋ, m, r, y* and ɣ, though ɣ might not be a true coda. The sound ɣ is only found word-finally, as in the words below.

(6)

Word	gloss
dāɣ	'tomb'
búmblâɣ	'hyena'
fətàɣ	'mud'
nāɣ	'ear'

However, ɣ has two allophones, [x] found phrase-finally and [ɣ] found phrase-medially. Whenever ɣ occurs phrase-medially, it is followed by a copy of the last vowel, which is always *a*. It is cognate to Southern Toussian /k/, which surfaces as [g] intervocalically. Historically, it appears that **k* lenited first to **g*, then to ɣ which was devoiced to *x* following the loss of the final vowel.

(7) Distribution of ɣ

a. Phrase-final

[mə	émíl	pyáx]
1sg	Emile	greet

'I greeted Emile'

b.

[mə	émíl	pyáɣá	kàrì]	
1sg	Emile	greet	today	

'I greeted Emile today'

Vowel-initial words are only found in auxiliaries and borrowings. When ɣ occurs before such a word phrase-medially, the *a* following the ɣ does not surface.

(8)

[blêmpàɣ	émíl	wé]
orphan	Emile	see

'The orphan saw Emile'

Tonology

The balafon surrogate language encodes aspects of both lexical and postlexical tone in Northern Toussian. Lexical tones are the tones which are associated with specific words. Postlexical tone, on the other hand, is the set of tonal processes which are not tied to individual words, but to larger prosodic structures. This includes sandhi, when tones of certain words change when the words are adjacent to one another; phrasal effects, when the tones of words change due to their placement in a phrase; and downdrift, which will be elaborated below.

Lexical Tonology

Like most languages in the region, Northern Toussian has a complex tonal system—a considerable amount of lexical and grammatical information is conveyed by tone. In Northern Toussian, there are three distinct tone heights, high (H), mid (M) and low (L), written here with the diacritics *á*, *ā* and *à*, respectively.

A minimal set of these tonal contrasts are found in 9).

(9)

Word	tone	gloss
yí	H	'year'
yī	M	'laughter'
yì	L	'hair'

In addition to the level tones, there are three lexical contour tones which can be found on monosyllables, HM, HL and LH, written *a᷄*, *â* and *ǎ*.

(10)

Word	tone	gloss
bá	H	'porridge'
bà	L	'limit'
bâ	HL	'leg'
bǎ	LH	'poison'
dɛ̂	HL	'rock'
dɛ᷄	HM	'dream'

Contours of three tones can be found on a single vowel, but only as the result of the combination of a grammatical L tone and the HM contour.[10] For example, this is attested when intransitive verbs are used in a declarative context, as shown in (11a), where the underlyingly HM verb *kō* surfaces with a LHM contour.

(11) Intransitive grammatical tone

a. kō
walk.imp
'walk!'

b.

kàrímù	kō[11]
Karim	walk

'Karim walked'

The tone bearing unit (TBU) appears to be the syllable in Northern Toussian; short open syllables can bear contour tones, and there appear not to be structural differences in tone assignment due to coda consonants. Nasal codas do not bear separate tones, though syllabic nasals can bear tone, as in the word *ǹʃɛ̄* 'ashes.'

[10]When this process occurs with a word which has a HL contour, the word surfaces as L instead of the expected LHL.

[11]There is no IPA diacritic for a LHM contour, so the LHL diacritic will be used instead.

Most combinations of tones can be found in disyllabic words, except for L.M, which is currently unattested in my lexicon. Here are several combinations of different tones in disyllabic words.

(12)

Word	tone	gloss
frībú	M.H	'scarab beetle'
înɔ̄	HL.M	'thing'
dúmpwɛ̄	H.HM	'testicle'
jìbɛ̄y	L.HM	'esophagus'

It is exceedingly rare for monomorphemic disyllables to bear two different contour tones, though it is attested in the word *tărtâ* "Wednesday."

(13)

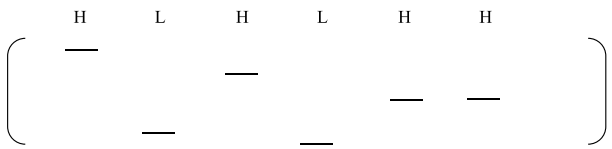
Word	tone	gloss
tărtâ	LH.HL	'Wednesday'

Postlexical Tone

Any combination of tones is permissible across word boundaries; there are no restrictions on which tones can occur on adjacent words. Moreover, few consistent tone sandhi rules have been identified, though some contour tones might be simplified at fast rates of speech. This is common for LH syllables, which will often surface as M or L, e.g., *bŏ* 'father,' which can be realized as *bō* when spoken quickly.

Downdrift and downstep play an important role both in speech and in the surrogate language. They are often characterized as tonal processes that lower the pitch of high tones following low tones; this lowering effect applies to all subsequent high tones within a particular domain (Connell, 2011). This is schematized in (14), where each horizontal line represents the pitch of the utterance. When a H follows a L, its pitch will be lower than the last H in the phrase. If there are two H tones following a single L, as we see with the final three tones of the diagram, both H tones will be at the same pitch level.

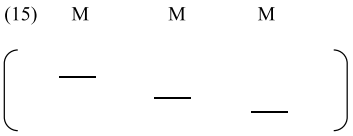
(14)



This lowering effect can be triggered both by surface L tones, where it is called "downdrift" or "automatic downstep," or by floating tones, where it is called "downstep" or "non-automatic downstep" (Connell, 2011). The terms "downdrift" and "downstep" will be used in this paper. The following discussion will focus on downdrift and not downstep, as many properties of the surrogate language's representation of downstep are still uncertain.

When languages have more than two tones, there is variation in which tones can trigger downdrift. In Yala, a three-tone language, a L and M can trigger downdrift of a H, and a L can trigger downdrift of a M (Armstrong, 1968). The language Seenku has four distinct tones and the lowest two tones can trigger downdrift on the highest tone (McPherson, 2020). In Northern Toussian, like Yala, L and M trigger downdrift on H tones, but unlike Yala, both L and M trigger downdrift on M tones, i.e., a series of mid tones will form a pitch track that resembles a staircase, as each M is lowered following the previous M, shown below.

(15)



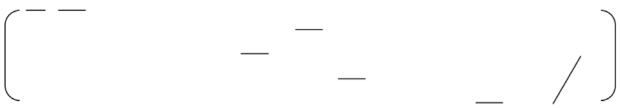
The amount that a tone drops in pitch from downdrift varies by language. In Northern Toussian, as well as Yala, a H lowered by downdrift has a higher pitch than a M. This is different from other languages such as Bimoba, where a lowered H is indistinguishable from a M, or Supyire, where the downdrift of a H can fall to the level of a M or land somewhere between a H and M depending on the speaker (Carlson, 1994; Snider, 1998).

In (16), we see approximations of the surface pitch of the phrase *tá = sú kɛ̄y ń = pī yɔ̀ wě* "His father's wife saw my child's broom." Following the word *kɛ̄y*, the surface pitches of the following words has been lowered due to downdrift. The occurrence of downdrift will be indicated by the symbol ‹↓›.

(16)

tá=sú	kɛ̄y	↓ń=pī	yɔ̀	wě
3SG.HUM.POSS=father	wife	1SG.POSS=child	broom	see

"His father's wife saw my child's broom"



SURROGATE LANGUAGE

Methodology

In this section, I will discuss the methodology used for data collection. I worked exclusively with the *jɔ́pī* Emile Diabaté from Djigouera in August 2019 and this description is based on how he plays the surrogate language. Most data were collected by elicitation, though there are several phrases which Emile produced unprompted—usually idiomatic expressions or jokes. Several recordings of songs were made, but it is currently unclear how the melody in a song might differ from the speech mode, so no songs were used as data for determining how the speech surrogate functions. I worked with a translator, Karim Traoré, who is my primary consultant for the spoken language. I would either ask for phrases in French which Karim would then translate for Emile, or I would say the phrases myself in Toussian. Emile would then produce the sentence on the balafon. All elicitation sessions were recorded as videos; there was approximately 22 h of elicitation, producing a corpus of around 700 phrases spoken on the balafon. Many of these were simple one- or two-word phrases, eliciting the tones of individual words or tonal paradigms. This methodology allowed me to investigate specific tonal phenomena; most of the structures I elicited were to better understand the structure of the balafon surrogate language, but many were to verify certain aspects of the tonology of the spoken language, for example eliciting a particular word whose tone had been difficult for me to hear.

There are notable limitations when using only elicited sentences for evaluating how the speech surrogate functions. For example, the

duration of syllables often varies quite substantially, from as short as 80 ms to as long as 350 ms. Some of this variation is certainly due to inherent differences in syllable length, though much of it might be attributable to other factors, such as Emile slowing down so I could accurately detect which bars were being struck. Therefore, the duration of the syllables might not be representative of actual speech rate in certain phrases. Other features, such as the tones which are encoded on the balafon, do not vary at all when phrases are repeated and are likely unaffected by elicitation.

Ideally, to determine how much elicitation affects the production of the surrogate language, naturalistic data would be analyzed in conjunction with the elicited data. Naturalistic data would reveal how the surrogate language is used under normal circumstances, such as at cultural events or at home—if Emile does, in fact, vary his production of the speech surrogate to accommodate me, this would reveal which, if any, features' productions are affected. Conversely, perhaps the elicited data do reflect how the speech surrogate is typically used, and syllable length is always variable. Until naturalistic data have been analyzed, it is not possible to understand more deeply the nuances of the surrogate language.

However, this work was done in the regional capital Bobo-Dioulasso, not in Djigouera, so I have little data of the surrogate language being played naturally in either cultural events or in daily life beyond the accounts Emile has described to me. Another trip to gather naturalistic data in Djigouera was planned for the summer of 2020 but has been postponed due to the COVID-19 pandemic.

The following sections demonstrate how the surrogate language functions, starting with its basic structure in the *Basic surrogate language structure* Section. Following this, representation of syllable structure by the use of flams—two notes struck in very quick succession—for encoding consonant clusters and codas is shown in the *Codas and consonant clusters* Section. The surrogate language encodes phrase boundaries in certain circumstances, detailed in the *Phrase-final syllables* Section. Certain postlexical tonal processes are encoded with the balafon, namely downdrift, which are elaborated in the *Downdrift* Section. The inherent ambiguity of the system and disambiguation strategies are described in the *Managing ambiguity* Section. Finally, I discuss the linguistic structures encoded by the speech surrogate in the *Linguistic structure of the surrogate language* Section.

The Encoding of the Surrogate Language

Basic Surrogate Language Structure

The Northern Toussian balafon surrogate language functions by selecting a frame of three adjacent bars which appear to correspond to the three tones of speech. Emile generally used the bars *dú-fɔ̃-ɲépwɛ̃*, *yā̰-tɛ̰̀-ɲépwɛ̃*, and *ɲɛ́pwɛ̃́-kà*, which are 440, 473 and 533 Hz respectively, though sometimes he starts a phrase one bar higher or lower. This is approximately two octaves higher than the average pitch of his voice. This frame can be shifted up or down due to downdrift, but no notes will be played outside of this frame, with the exception of notes which represent phrase boundaries.

To represent a level tone, a single bar will be struck; a H by striking the bar with the highest pitch within the frame, a M by striking the middle bar and a L by striking the bar with the lowest pitch. Examples of the speech surrogate such as (17) will be schematized following the methodology of McPherson (2019a): the names of the bars and their respective scale heights are shown vertically on the left. The fifth bar is the highest scale degree, and the first is the lowest. There are some examples where the notes played span more than one octave; the numbering will restart for the next octave, e.g., (25b). The rows at the bottom show the sentence in Northern Toussian, a gloss, and the duration in milliseconds from the start of the note to the beginning of the following note. Since the griot will not stop the bar from resonating at the end of a phrase, the final note cannot provide any useful duration data, so it is represented with ellipses. The shaded cells show which bar is played for what word.

Example (17) shows a sentence of three monosyllables, each bearing a different tone. The word *à* is played on *dú-fɔ̃-ɲépwɛ̃*, *lɛ̰̄* on *yā̰-tɛ̰̀ɲépwɛ̃*, and *béy* on *ɲépwɛ̃́-kà*. The widths of the cells do not represent duration.

(17) 'She/he sang the words'

5	kɔ̄tɔ̰̄-ɲépwɛ̃			
4	ɲépwɛ̃́-kà			
3	yā̰-tɛ̰̀-ɲépwɛ̃			
2	dú-fɔ̃-ɲépwɛ̃			
1	tā-ɲépwɛ̃			
	words	à	lɛ̰̄	béy
	gloss	3SG	speech	sing
	durations (ms)	297	271	...

Example (18) shows two phrases which have disyllabic words.

(18) Phrases with disyllabic words

a. 'Sesame'

5	kɔ̄tɔ̰̄-ɲépwɛ̃		
4	ɲépwɛ̃́-kà		
3	yā̰-tɛ̰̀-ɲépwɛ̃		
2	dú-fɔ̃-ɲépwɛ̃		
1	tā-ɲépwɛ̃		
	words	dɛ̀míŋ	
	gloss	sesame	
	durations (ms)	227	...

b. 'Your father saw a squirrel'

5	kɔ̄tɔ̰̄-ɲépwɛ̃					
4	ɲépwɛ̃́-kà					
3	yā̰-tɛ̰̀-ɲépwɛ̃					
2	dú-fɔ̃-ɲépwɛ̃					
1	tā-ɲépwɛ̃					
	words	á	sú	kɪ̰̄dí		wé
	gloss	2sg	father	squirrel		see
	durations (ms)	225	194	164	299	...

If the tone is a contour tone, it will be represented by a flam, a word adopted from percussion terminology which refers to a note preceded closely by a grace note. In the context of the balafon surrogate language, it refers to two strikes on the balafon played closely together. Flams are used to represent contour tones, as well consonant clusters and codas, detailed in *Codas and consonant clusters* Section. In (19), the LH contour in the first syllable of the word *bă* 'poison' is represented by the lowest and

highest of the three bars of the frame, and the duration of the first note is significantly shorter than the other notes in the phrase since the contour is played with a flam.

(19) 'Your father ate poison'

5	kātɛ̰-ɲépwɛ̂					
4	ɲépwɛ̂-kà					
3	yā̰-tɛ̰-ɲépwɛ̂					
2	dú-fɔ̄-ɲépwɛ̂					
1	tā-ɲépwɛ̂					
	words	á	sú	bǎ		tá
	gloss	2sg.POSS	father	poison		eat
	durations (ms)	217	227	77	249	..

The first component of a contour tone is usually around 25–50% of the duration of a syllable with a level tone, as seen in (19), as well as (20a) and (20b). The second component of the contour tone is typically longer, sometimes as long as level-toned syllables. In (20b), three notes are struck, played on the scale degrees 4, 2 and 3. The notes played on 4 and 2 correspond to the syllable *î*, which has a HL contour tone. The first note of the contour tone is 77 ms, almost half the duration of the second note, which is 143 ms.

(20) Disyllabic contours

a. 'I saw a needle'

5	kātɛ̰-ɲépwɛ̂					
4	ɲépwɛ̂-kà					
3	yā̰-tɛ̰-ɲépwɛ̂					
2	dú-fɔ̄-ɲépwɛ̂					
1	tā-ɲépwɛ̂					
	words	mɔ́	mísɛ̌n			wé
	gloss	1SG	needle			see
	durations (ms)	481	197	96	218	...

b. 'Thing'

5	kātɛ̰-ɲépwɛ̂			
4	ɲépwɛ̂-kà			
3	yā̰-tɛ̰-ɲépwɛ̂			
2	dú-fɔ̄-ɲépwɛ̂			
1	tā-ɲépwɛ̂			
	words	înɔ̄		
	gloss	thing		
	durations (ms)	77	143	...

The frame of three notes has been shifted down in (20a); the frame of (20a) is between the scale degrees 1 and 3, whereas the frame of (20b) is one note higher, between 2 and 4. The shift in frame above is not a systematic frame shift; there are examples of systematic frame shifting due to downdrift, which is discussed below (*Downdrift* Section). It is difficult to determine why (20a) has been shifted down a note—it could be changed to better represent the pitches of speech, or it might be for some non-linguistic reason such as stylistic variation.

Codas and Consonant Clusters

There are several additional properties of the surrogate language. Level-toned syllables with codas (*n, r, ŋ*, etc.) are often, but not always, struck with a flam. In (21), Emile played the sentence *mə́ sú wən* "my father left" two different ways, one where *wən* "leave" was struck once, the other where the same note is struck twice with a flam.

(21) 'My father left.'

a. With one strike for *wən* 'leave' in 'my father left'

5	kātɛ̰-ɲépwɛ̂			
4	ɲépwɛ̂-kà			
3	yā̰-tɛ̰-ɲépwɛ̂			
2	dú-fɔ̄-ɲépwɛ̂			
1	tā-ɲépwɛ̂			
	words	mɔ́	sú	wɔ̄n
	gloss	1SG	father	leave
	durations (ms)	221	329	...

b. With two strikes for *wən* 'leave' in 'my father left'

5	kātɛ̰-ɲépwɛ̂				
4	ɲépwɛ̂-kà				
3	yā̰-tɛ̰-ɲépwɛ̂				
2	dú-fɔ̄-ɲépwɛ̂				
1	tā-ɲépwɛ̂				
	words	ń=[12]	sú	wɔ̄n	
	gloss	1SG	father	leave	
	durations (ms)	202	229	70	...

For the sentence *à pɛ̰̀* 'he/she is selling a pot' in example (22), Emile gave three versions, differing by the representation of two coda consonants. In the first, the *tár* in *tárkó* and the word *ɲəŋ* were both struck twice (22a); in the second, only *ɲəŋ* was struck twice (22b); in the final one, only *tár* was struck twice (22c). This variation is due to the presence of the coda consonant; since the subject does not have a coda (or consonant cluster), it will never be struck with two notes—the TAM marker is represented with a flam because of its contour tone.

(22) 'She/he is selling a pot'

a. Flams for both *tár-* and *ɲəŋ*

5	kātɛ̰-ɲépwɛ̂								
4	ɲépwɛ̂-kà								
3	yā̰-tɛ̰-ɲépwɛ̂								
2	dú-fɔ̄-ɲépwɛ̂								
1	tā-ɲépwɛ̂								
	words	à	pɛ̰̀		tárkó			ɲɔ̄ŋ	
	gloss	3SG	IPFV .NPST		pot			sell	
	durations (ms)	287	199	260	84	168	284	94	...

b. Flam for only *ɲəŋ*

5	kātɛ̰-ɲépwɛ̂							
4	ɲépwɛ̂-kà							
3	yā̰-tɛ̰-ɲépwɛ̂							
2	dú-fɔ̄-ɲépwɛ̂							
1	tā-ɲépwɛ̂							
	words	à	pɛ̰̀		tárkó		ɲɔ̄ŋ	
	gloss	3SG	IPFV .NPST		pot		sell	
	durations (ms)	199	109	192	198	284	108	...

c. Flam for only taŕ-

5	kə̄tə̰-ɲépwɛ̂							
4	ɲépwɛ̂-kà							
3	yə̰̄-tɛ̰-ɲépwɛ̂							
2	dú-fɔ̄-ɲépwɛ̂							
1	tā-ɲépwɛ̂							
	words	à	pə̰̂		tárkó			ɲə̄ŋ
	gloss	3SG	IPFV .NPST		pot			sell
	durations (ms)	184	126	191	85	137	252	...

Similarly, syllables beginning with consonant clusters such as *kr-*, *bl-*, *bw-*, etc. will sometimes be struck with a flam. As with codas, this is optional, as demonstrated in (23b) and (23c), where the former uses a flam and the latter does not.

(23) Consonant Clusters

a. 'My uncle got stuck'

5	kə̄tə̰-ɲépwɛ̂				
4	ɲépwɛ̂-kà				
3	yə̰̄-tɛ̰-ɲépwɛ̂				
2	dú-fɔ̄-ɲépwɛ̂				
1	tā-ɲépwɛ̂				
	words	ń	lè	blè	
	gloss	1SG	uncle	stick	
	durations (ms)	184	126	191	...

b. 'Cough, father!' with a flam

5	kə̄tə̰-ɲépwɛ̂			
4	ɲépwɛ̂-kà			
3	yə̰̄-tɛ̰-ɲépwɛ̂			
2	dú-fɔ̄-ɲépwɛ̂			
1	tā-ɲépwɛ̂			
	words	sú	bwɛ́	
	gloss	father	cough	
	durations (ms)	270	118	...

c. 'Cough, father!' without a flam

5	kə̄tə̰-ɲépwɛ̂		
4	ɲépwɛ̂-kà		
3	yə̰̄-tɛ̰-ɲépwɛ̂		
2	dú-fɔ̄-ɲépwɛ̂		
1	tā-ɲépwɛ̂		
	words	sú	bwɛ́
	gloss	father	cough
	durations (ms)	326	...

These double strikes might serve the useful function of disambiguating level-toned syllables with codas or consonant clusters from those without. Since flams tend to have about half the duration of full syllables, the two strikes for a consonant cluster or coda can usually be disambiguated from a series of strikes representing two separate syllables. However, (23a) shows a word with a consonant cluster where the duration between the first note of the flam is longer than the duration of the words before it. Therefore, while flams might often be useful cues, they do not unambiguously differentiate consonant clusters/codas and word/syllable boundaries.

All the data here are from elicitation and are not naturalistic; therefore, it is difficult to know how systematic the use of flams is. When eliciting a word or phrase, both the griot and the person eliciting know which words are played, so there is no ambiguity as to which words are being encoded on the balafon. However, if the griot is producing spontaneous speech with the balafon, the interlocutor will have to infer from context which specific words are being said. I hypothesize that the griots employ this doubled strike to disambiguate sentences such as *má yə̆ má nà ɲār náŋ* 'bring me food' from *má yə̆ má nà tə̰̄ wó* 'bring me beer,' both of which are tonally identical and differ only in that the second-to-last word in the former sentence has a coda and the latter does not. The usage of flams in Northern Toussian is quite similar to their use in the Sambla balafon surrogate language in representing contour tones and coda consonants (McPherson, 2019a). Further comparisons between the two surrogate language systems will be made in the *Comparison to the Sambla Balafon Surrogate Language* Section.

Phrase-Final Syllables

Emile often ends phrases whose final tones are H or M by striking the same scale note across two octaves. This is presumably to demonstrate phrase boundaries, allowing interlocutors to better determine the ends of sentences. In elicitation sessions, Emile often varied when he would end phrases with octaves. Usually, he reserved this for more natural sentences which he would say when demonstrating idioms or making jokes. During elicitations where I would ask him to say certain words or sentences, he would not usually end them with octaves. Example (24) was an inside joke between Emile and my consultant Karim which Emile told when I was eliciting examples of the word *fwó* "to farm."

(24) 'Karim works the fields'

5	kə̄tə̰-ɲépwɛ̂							
4	ɲépwɛ̂-kà							
3	yə̰̄-tɛ̰-ɲépwɛ̂							
2	dú-fɔ̄-ɲépwɛ̂							
1	tā-ɲépwɛ̂							
5	kə̄tə̰-ɲépwɛ̂							
4	ɲépwɛ̂-kà							
3	yə̰̄-tɛ̰-ɲépwɛ̂							
	words	Kàrímù			pə̰̂		swā	fwó
	gloss	Karim			IPFV .NPST		field	farm (v)[13]
	durations (ms)	184	126	191	85	137	252	...

In addition to striking octaves at the end of phrases, Emile sometimes struck phrase final L with a note much lower than what came before it. This occurs with phrase-final syllables bearing L or HL tones. Example (25a) demonstrates an extra-low note with a HL contour and (25b) with a word bearing a low tone. The latter uses a flam because of the consonant cluster.

[12]Northern Toussian employs both emphatic and clitic pronouns. Here, the clitic form *ń* = is used instead of *má*, seen earlier.

[13]This was not a perfect octave and the lower note was likely struck one note too low by accident.

[14]A single strike was used for a disyllabic word, perhaps reflecting a reduction to *snɔ̄* in speech.

(25) Extra-low notes

a. 'I looked for father'

5	kɔ̄tʊ̰̄-ɲépwɛ̄				
4	ɲépwɛ̄-kà				
3	yā̰-tɛ̰̀-ɲépwɛ̄				
2	dú-fɔ̄-ɲépwɛ̄				
1	tā-ɲépwɛ̄				
5	kɔ̄tʊ̰̄-ɲépwɛ̄				
4	ɲépwɛ̄-kà				
3	yā̰-tɛ̰̀-ɲépwɛ̄				
	words	mɔ́	sú	jâ	
	gloss	1SG	father	look	
	durations (ms)	281	244	68	...

b. 'I dug'

5	kɔ̄tʊ̰̄-ɲépwɛ̄			
4	ɲépwɛ̄-kà			
3	yā̰-tɛ̰̀-ɲépwɛ̄			
2	dú-fɔ̄-ɲépwɛ̄			
1	tā-ɲépwɛ̄			
5	kɔ̄tʊ̰̄-ɲépwɛ̄			
4	ɲépwɛ̄-kà			
3	yā̰-tɛ̰̀-ɲépwɛ̄			
	words	mɔ́	krɛ̀	
	gloss	1SG	dig	
	durations (ms)	333	79	...

In speech, phrase boundaries are not indicated by such a precipitous drop in pitch, therefore this appears to be a balafon-specific strategy of showing the end of phrases. These two patterns, striking octaves for H and M tones and striking extra-low notes for L and HL tones might be a consistent encoding—in my corpus, there are no examples of octaves struck for L and HL or extra low notes for H or M tones. Toussian additionally has the contours LH and HM, however there are no examples in my dataset of these tones using either method. Since there are no such examples it is unknown whether griots employ a specific method for representing phrase-final LH or HM tones.

The use of octaves or extra low notes is the only example of notes being played outside of the frame of notes. Generally, Emile picks a frame which spans the scale degrees 2–4, as seen in many of the figures above. There have been no examples of phrases which have the sequence of tones H L H which are played with the notes 4 1 4. Likewise, the sequence L H has not been represented by the notes 2 5. Therefore, it appears that each note within the frame maps to a particular lexical tone, rather than representing the surface pitch of speech. This hypothesis will be elaborated in the *Linguistic Structure of the Surrogate Language* Section below.

Downdrift

Downstep and downdrift can lead to many more surface pitches than there are lexical tones: when H is lowered due to downdrift, it surfaces higher than a M; likewise, when a M is lowered by a M or L, it surfaces higher than a L. Each instance of downdrift alters the pitch range, which means that there can be many more surface pitches than lexical tones.

Since the balafon can only play discrete notes, it is unable to precisely represent the subtle difference in pitch found as a result of downstep or downdrift while keeping within the three-bar frame. The Sambla balafon surrogate language resolves this issue simply by not representing downdrift or downstep. Northern Toussian does encode these phenomena in certain circumstances, using several different strategies. For the following examples, the gloss will show each instance where downdrift is found in speech. In the transcription of speech, downdrift will be indicated by the symbol ‹ᵎ›. The realization of downdrift on the balafon can be seen in the diagrams and will be indicated in the prose below.

Most instances of downdrift which are encoded on the balafon surrogate language are found in sequences of M tones. In (26a), downdrift is encoded after every instance of a M, as *kɛ̄y* 'wife' is lower than *ɲɔ̄ŋ* "person," *nīŋ* 'water' is lower than *kɛ̄y,* and *wé* 'see' is one note higher than *nīŋ,* which is lower than the phrase initial M on *ɲɔ̄ŋ* However, in (26b) downdrift is not encoded in the surrogate language following *kɛ̄y*, though it is found in speech.

(26) Downdrift

a. "The person's wife saw the water"

5	kɔ̄tʊ̰̄-ɲépwɛ̄				
4	ɲépwɛ̄-kà				
3	yā̰-tɛ̰̀-ɲépwɛ̄				
2	dú-fɔ̄-ɲépwɛ̄				
1	tā-ɲépwɛ̄				
	words	nɔ̄ŋ	ᵎkɛ̄y	ᵎnīŋ	ᵎwé
	gloss	person	wife	water	see
	durations (ms)	359	302	280	...

b. "The person's wife saw the stream's water"

5	kɔ̄tʊ̰̄-ɲépwɛ̄					
4	ɲépwɛ̄-kà					
3	yā̰-tɛ̰̀-ɲépwɛ̄					
2	dú-fɔ̄-ɲépwɛ̄					
1	tā-ɲépwɛ̄					
	words	nɔ̄ŋ	ᵎkɛ̄y	ᵎyɔ̄	ᵎnīŋ	ᵎwé
	gloss	person	wife	stream	water	see
	durations (ms)	265	305	291	296	...

In (27), the *-wú* of 'hunter,' *wé* 'see,' the past tense morpheme *á,* and *k͡pɔ̄* 'kill' are all subject to downdrift in speech, because they are preceded by a L or M, though the pitch lowering is not represented in the surrogate language. If downdrift were consistently encoded, one would expect the frame of three notes to shift down at each of these words.

(27) 'If the hunter had seen the squirrel, he would have killed it.'

5	K															
4	N															
3	YT															
2	DF															
1	T															
	words	bānkó-ᵎwú				á	sɔ́nɔ́[14]		tɛ̰̄fwār			ᵎwé	à	ᵎá	nɔ̀	kà	ᵎk͡pɔ̄
	gloss	hunter				PST	COND		squirrel			see	COND	PAST	SS	3SG. NON HUM	kill
	(ms)	330	48	101	179	192	197	77	156	196	197	156	175	254	187	...

Generally, it appears that downdrift is encoded often for series of M tones, but rarely elsewhere. Downdrift between two different tones such as L H or L M will not substantially change the second

[15]An immediate sequencing morpheme, indicating that the following clause occurs immediately after the events of the first.

tone; there will be a slight difference in relative height between a H and a lowered H, but the H will still be high relative to a L or M. However, the difference between two M tones which are lowered and two which are not is much more significant, as the former will have two different pitches and the latter will have two identical pitches. It appears that downdrift between two M tones is more salient than downdrift between two different tones and is therefore more likely to be encoded.

When there are long sequences of M tones, in addition to not representing downdrift, as seen in (26b), the frame of tones might be reset and shifted up one bar. There does not appear to be a corresponding pitch rise in speech. In example (28a) between *kɛ̄y* 'wife' and *lɔ̄* 'cailcedrat,' the bars two and three are struck in the surrogate language, showing a rise in pitch on the balafon where the frame of notes is shifted up, but in the spoken language there is a drop in pitch between the two words due to downdrift. Similarly, in (28b), we find that a higher note is played for the word *tɛ̰* even though it has a lower pitch than the preceding word in speech from downdrift.

(28) Frame shift

a. "The person's wife saw the cailcedrat's flower."

5	kɔ̄tɛ̰-ɲépwɛ̄					
4	ɲépwɛ̄-kà					
3	yā-tɛ̰-ɲépwɛ̄					
2	dú-fɔ̄-ɲépwɛ̄					
1	tā-ɲépwɛ̄					
	words	nɔ̄ŋ	ˈkɛ̄y	ˈlɔ̄	ˈfɔ̄ŋ	ˈwé
	gloss	person	wife	cailcedrat	flower	see
	durations (ms)	321	330	282	297	...

b. "The person's wife insulted the odor of the millet beer (made) from the stream's water."

5	kɔ̄tɛ̰-ɲépwɛ̄							
4	ɲépwɛ̄-kà							
3	yā-tɛ̰-ɲépwɛ̄							
2	dú-fɔ̄-ɲépwɛ̄							
1	tā-ɲépwɛ̄							
	words	nɔ̄ŋ	ˈkɛ̄y	ˈyɔ̄	ˈnīŋ	ˈtɛ̰	ˈpān	ˈfī
	gloss	person	wife	stream	water	millet beer	odor	insult
	durations (ms)	359	300	338	348	300	362	

Instead of not representing downdrift, as we saw in (26b), the frame of notes is shifted up in (28). If each instance of downdrift is encoded on the balafon by shifting the frame down, then after only a few instances of downdrift, the pitch of the balafon will have diverged widely from speech. Resetting the frame up one note is a way to realign the pitch of the balafon so that it is more in accordance with speech.

There are three ways that the balafon surrogate language interacts with downdrift: 1) it ignores it and does not encode it; 2) it faithfully encodes downdrift by shifting the frame down and playing a lower-pitched note; 3) it resets the frame of notes up one, realigning the pitch of the balafon with the pitch of speech so that downdrift can be encoded on the next note. The variance in encoding seems to revolve around one central fact about the balafon surrogate language: it cannot accurately represent the many phonetic pitches of speech. If downdrift were encoded on the balafon at each instance of it in speech, then the pitches played by the balafon would be quite divergent from the pitches in speech. After each subsequent instance of downdrift in speech, the relative difference in pitch decreases, i.e., the pitch drops less and less after each time downstep is triggered. However, the intervals between the notes of the balafon stay the same across octaves and the balafon cannot encode the subtle changes in speech faithfully. Therefore, the intermittent encoding of downdrift and frame shifting seems to be ways of preventing the divergence of the pitches of speech from the pitches played on the balafon.

Managing Ambiguity

Since the surrogate language does not encode every aspect of speech, many utterances are ambiguous. For example, the speech surrogate utterance in (17), reproduced below, would resemble any series of monosyllabic words which bear the tonal sequence L M H. Several such examples are given in (30).

(29) 'She/he sang the words' (ZOOM0003 2019-8-15 13:02)

5	kɔ̄tɛ̰-ɲépwɛ̄			
4	ɲépwɛ̄-kà			
3	yā-tɛ̰-ɲépwɛ̄			
2	dú-fɔ̄-ɲépwɛ̄			
1	tā-ɲépwɛ̄			
	words	à	lɛ̰	bɛ́y
	gloss	3SG	speech	sing
	durations (ms)	297	271	...

(30) Phrases with the tonal sequence L M H

a. pɔ̀ bō tá
3pl.hum African eggplant eat
'They ate the eggplant'

b. dɔ̀ dā wé
buffalo shea nut see
'The buffalo saw the shea nut.'

c. lò pɔ̄ dó
third son IS[15] sleep
'When the third son slept...'

There are a number of strategies which griots employ to reduce the ambiguity of a phrase. One such strategy is to use idiomatic constructions which are partially or completely lexicalized. These idiomatic phrases will be easily recognizable by many people, even those who cannot understand the surrogate language, and they can give context that will help the interlocutor understand the topic of discussion. Many of these idioms are found only in the speech surrogate and are not used in speech. For example, to call people for food, the idiomatic phrase 'an insect is flying because it is hungry,' perhaps better rendered in colloquial English as 'bugs are buzzing around because they are hungry.'

[17]Where a flam would be expected for encoding the contour tone, instead only a single L is struck. This is another example of how the idiomatic expressions do not always abide by the same rules detailed above.

[18]An example of downstep.

(31) 'Come eat food,' lit. 'an insect is flying because it is hungry.'

5	kɔ̄tɔ̰-ɲépwɛ̄								
4	népwɛ̄-kà								
3	yā̰-tɛ̰-ɲépwɛ̄								
2	dú-fɔ̄-ɲépwɛ̄								
1	tā-ɲépwɛ̄								
5	kɔ̄tɔ̰-ɲépwɛ̄								
4	népwɛ̄-kà								
	words	sɔ̄mâ			ń=	dyɛ́	kɔ́	dyē	ˈsāŋ
	gloss	insect			NPST	fly	3SG.NONHUM.POSS	intestines	because
	durations (ms)	350	231	285	300	255	320	434	...

It is still encoding Northern Toussian, rather than being a code completely divorced from language, but the phrase it encodes is used exclusively in the surrogate language, not in speech. Tonally, it differs from what we would expect in speech, as downdrift/downstep does not occur between *dyɛ́* and *kɔ́* in speech, but it is found within the surrogate language. This tonal difference appears not to be systematic in the speech surrogate and might reflect that, when the idiom was originally devised, the phrase used was slightly different, or that the spoken language has changed tonally while the idiom has resisted change.[16]

Some of these idiomatic expressions are partially productive, meaning that certain elements are replaceable. For example, when a griot requests something to eat or drink, they will use a phrase *mɔ́ yɔ̌ mɔ́ nɔ̀ N V*, literally 'I said that I will V N.' The phrase 'bring me a beer,' literally 'I said I will drink beer,' is given below.

(32) 'Bring me a beer,' lit. 'I said I will drink beer.'

5	kɔ̄tɔ̰-ɲépwɛ̄							
4	ɲépwɛ̄-kà							
3	yā̰-tɛ̰-ɲépwɛ̄							
2	dú-fɔ̄-ɲépwɛ̄							
1	tā-ɲépwɛ̄							
	words	mɔ́	yɔ̌[17]	mɔ́	nɔ̀	bíér		wó
	gloss	1SG	say	1SG	NPST	beer		drink
	durations (ms)	99	170	98	218	67	238	...

This is not the typical way a beverage is requested in speech, instead, a phrase such as 'I want N,' or 'give me N' will be employed, as seen in (33).

(33) Ways of requesting something in speech

a. mɔ́ ˈpɛ́[18] bíér=rɛ́
1sg COP beer=LOC
'I want beer,' lit. 'I am at beer'

b. mɔ́ kɔ̰́ bíér=sɛ̄
1SG give.IMP beer=with
'Give me beer,' more literally, 'supply me with beer'

The object and verb of this idiomatic expression can be replaced with other elements, including different drinks or types of food. Example (34) shows this construction with *tɔ̰́* 'millet beer' and (35) with *dì vɛ̰́* 'some wine (*du vin*).'

[16]McPherson (2019a) posited that the singing mode of the Seenku balafon surrogate language might represent an older stage of the language, as the language of the singing mode is symbolic and based on proverbs.

(34) 'Bring me millet beer,' lit. 'I said I will drink millet beer.'

5	kɔ̄tɔ̰-ɲépwɛ̄						
4	ɲépwɛ̄-kà						
3	yā̰-tɛ̰-ɲépwɛ̄						
2	dú-fɔ̄-ɲépwɛ̄						
1	tā-ɲépwɛ̄						
	words	mɔ́	yɔ̌	mɔ́	nɔ̀	tɔ̰́	wó
	gloss	1SG	say	1SG	NPST	millet beer	drink
	durations (ms)	71	165	74	209	232	...

Other idioms include phrases for asking people to come, as well as ways of addressing different types of people. There are specific phrases used when addressing balafon griots, drum griots and blacksmiths.

(35) 'Bring me some wine,' lit. 'I said I will drink some wine.'

5	kɔ̄tɔ̰-ɲépwɛ̄							
4	népwɛ̄-kà							
3	yā̰-tɛ̰-ɲépwɛ̄							
2	dú-fɔ̄-ɲépwɛ̄							
1	tā-ɲépwɛ̄							
	words	mɔ́	yɔ̌	mɔ́	nɔ̀	dì	vɛ̰́	wó
	gloss	1SG	say	1SG	NPST	some	wine	drink
	durations (ms)	116	185	106	222	152	318	...

A common feature of these idioms is redundancy; they express ideas in sometimes circuitous ways, so that there is more input which a listener can analyze and interpret. As stated above, there is not yet naturalistic data to analyze, but redundancy is potentially employed even in fully productive and fluent use of the surrogate language to aid in comprehension.

In addition to the use of redundancy and idioms, representation of phrase boundaries, consonant clusters and codas, as discussed in the *Codas and consonant clusters* Section and *Phrase-final syllables* Section, are potentially other ways of reducing the ambiguity of the phrase. Moreover, if they are viewed as disambiguation strategies, rather than systematic, structural features of the surrogate language, this could explain why their use is optional. If a particular phrase is being encoded which can only be read in one way, there is no reason to encode consonant clusters or codas. However, if two or more phrases might be valid for a particular utterance, representing consonant clusters or codas could differentiate the phrases. For example, the phrases in (36) are both phrases with three monosyllabic words which have a sequence of tones L M H. None of the words (36a) can be represented by flams, since there are no contour tones, consonant clusters, or codas. In (36b), both *ɲār* 'porridge' and *ɲáŋ* 'eat,' have codas and can be represented with flams. Using a flam for either *ɲār* or *ɲáŋ* will necessarily indicate to the listener that (36a) cannot be what the speaker is saying. If no flams are used, it will still be ambiguous between the two readings, but the fact that no flam was present in an ambiguous phrase might intimate to the listener that the coda-less phrase was the intended one.

(36) Tonally identical phrases

a. mɔ́ tɔ̰́ wó
1SG millet beer drink
'I drank millet beer.'

b. mɔ́ ɲār ɲáŋ
1SG porridge eat
'I ate porridge.'

Though the surrogate language might at first appear very ambiguous, it employs several strategies which can help the listener interpret what is being represented. These include a number of useful idioms, ample use of redundancy and representation of linguistic features other than tone, namely syllable structure and phrase boundaries.

Linguistic Structure of the Surrogate Language

As has been demonstrated, the primary linguistic feature encoded by the Northern Toussian surrogate language is tone. Both lexical and postlexical tone is encoded, depending on the utterance. The frame of three notes seems to correspond to the lexical tones of speech and the griot will not strike notes outside of this frame except for when phrase boundaries are encoded. This might indicate that, for most utterances, the lexical tones of speech are encoded, rather than just the surface pitches. However, downdrift, a postlexical feature of tone, is at times encoded, though largely restricted to series of M tones. It is either faithfully represented by shifting the frame of notes down by one scale degree, or unfaithfully represented by shifting the frame of notes up, allowing faithful representation of downdrift later in the phrase. The shifting of frames has many parallels with the register shifting effects of downdrift in speech. In effect, these different approaches to representing downdrift appear to allow the realization of surface-level tonal phenomena while maintaining the lexical identity of the tones. Moreover, they accommodate the limitations of the medium used to play the speech surrogate, namely the discrete nature of the notes of a balafon.

All the other features which are encoded by the balafon surrogate language appear to be part of the prosody of speech, including aspects of syllable structure, namely complex onsets and codas, as well as phrase boundaries. The encoding of all these features is optional, though there are trends for when they are used.

As codas are represented by flams, one might be tempted to posit that the surrogate language is encoding moraic structure. Complex onsets are also represented by flams, which presents some issues for this hypothesis, as onsets are typically analyzed as not being moraic (Hayes, 1989). Recent work by (Topintzi and Nevins (2006; 2017)) posits that onsets can be moraic; however, there are no clear cases of CCV being heavier than CV, which would be expected if the balafon represents CCV differently from CV. Instead of representing moras, the speech surrogate appears to use flams whenever the syllable diverges from a level-toned, CV structure.

In sum, the balafon surrogate language utilizes many aspects of the phonological structure of speech, including both lexical and postlexical tone, the syllable structure of words and phrase boundaries.

COMPARISON TO THE SAMBLA BALAFON SURROGATE LANGUAGE

The Sambla people have a balafon surrogate language which is reported to have been brought to them by the Toussian (Strand, 2009). This raises several questions about how similar they are structurally—whether the Sambla learned how the Toussian surrogate language functions and fit this system to their language, or if they saw the balafon being used for a speech surrogate and devised a new system independent of the Toussian system.

Genetically, Northern Toussian and Seenku are quite different. Seenku is a Mande language, whereas Northern Toussian has generally been classified as a Gur language. Seenku has four contrastive tone levels, phonemic vowel length, it only allows a single noncontrastive nasal phoneme as coda, and many words have sesquisyllabic structure, meaning the words have a CəCV structure where the first vowel is a greatly reduced schwa which does not bear its own tone (McPherson, 2020). Northern Toussian exhibits certain differences, as it has three contrastive tone levels, non-contrastive vowel length, and many different sonorants as codas. It does have examples of words of the shape Cə(C)CV, though the schwa can bear its own tone, as in the word *kə̀tyɛ̄* 'courtyard.' However, regardless of the structural differences, the core fundamentals of the Toussian surrogate language are quite similar to the Seenku surrogate language. Like the Northern Toussian surrogate language, syllables with level tones are encoded by single strikes and contours as well as codas are encoded by flams; Seenku extends the use of flams to long vowels, and sesquisyllabic words are encoded in the same way as onset consonant clusters in Northern Toussian. It appears that in both languages, flams can be used for any complex syllable which is not of the shape CV.

There is one important structural difference between the two surrogate languages: the Northern Toussian balafon surrogate language often represents postlexical processes, whereas the Sambla balafon surrogate language generally encodes only lexical processes—the Sambla balafon surrogate language does not encode downdrift. This can give credence to the hypothesis that, if the Sambla did indeed learn how to play the balafon from the Toussian and based their balafon surrogate language on the Toussian one, they did not learn it structurally, but rather created their own system. That is, they were not trying to replicate how precisely the speech surrogate functions at a basic level—instead, they created a speech surrogate which aesthetically resembled the Toussian balafon surrogate language but did not wed itself closely to the inner-workings of Toussian surrogate language. With that said, the Toussian balafon surrogate language does not strictly encode all postlexical processes. In Northern Toussian, especially in rapid speech, monosyllabic LH syllables tend to flatten and sound similar to M. This is especially true for the postposition *=rɔ̌* 'in,' which I only learned bears a LH tone from hearing it played on the balafon. However, I have not found any words bearing a LH contour which were represented by a single M strike on the balafon. Therefore, it cannot be said that the Northern Toussian balafon surrogate language only represents surface tone; rather it exists on a gradient where the Northern Toussian surrogate language tends to encode more postlexical processes but does not strictly represent the surface form of the spoken language.

Beyond structural differences, there are several notable differences between the balafon culture of the Toussian and the Sambla. The Sambla view the balafon as speaking for itself—it is not the griot who chooses the words, but rather the instrument itself. A griot will never speak Seenku while playing a balafon, only the surrogate language. If a griot who is using the speech surrogate and an interlocutor are speaking and the griot insults the other person, the person cannot become angry at the griot, as it is not viewed as the griot speaking, but the balafon itself (Strand, 2009). The Toussian do not hold this perspective; they view the griot as speaking with the instrument, and Toussian griots have no qualms accompanying the balafon with speech or singing. Though they will not speak, the Sambla griots will hum when playing the surrogate language—this is also found with Toussian griots (McPherson, personal communication).

Certain differences between the Northern Toussian balafon surrogate language and the Sambla balafon surrogate language have been underscored—it must be noted that, while the balafon is rather new to the Sambla, present only for ~ 130 years, the Sambla have played other instruments long before the balafon was introduced. These include a flute and a horn, both of which have their own speech surrogates. The horn, unlike the balafon, can play any pitch the musician can vocalize and therefore is not restricted to the discrete notes that the balafons are. However, the flute has the same tuning as the balafon (McPherson, 2019a). Perhaps, then, when the Toussian brought the balafon to the Sambla, they adopted certain features of the Toussian balafon surrogate language such as the use of flams, but also transferred aspects of their flute or horn speech surrogate to the balafon, such as the tuning and the degree of postlexical representation. The use of flutes and horns could also explain the prohibition on speaking while playing the balafon surrogate language—if they had a well-established surrogate language tradition based on instruments where it is physically impossible to speak and play at the same time, that could have developed into a cultural prohibition.

CONCLUSION AND FUTURE DIRECTIONS

This paper has described the musical culture of the Toussian and demonstrated how the surrogate language functions at a basic level, showing that lexical tone is the primary feature represented by the balafon. Likewise, it has described the other aspects of prosody which are represented by the speech surrogate, namely syllable structure, phrase boundaries, and downdrift. Complex syllables are represented optionally by flams and might serve to disambiguate phrases. Downdrift is sometimes represented as found in speech, by lowering the pitch of a word, but other times, it is represented by raising the frame of notes even though the pitch of the spoken word was lowered from downdrift allowing downdrift to be encoded faithfully later in the phrase. In addition to the structure of the surrogate language, this paper has described the cultural and musical exchange between the Toussian and Sambla.

The most pressing work that remains to be done on the Northern Toussian balafon surrogate language is to gather a corpus of naturalistic data. All data used for this study were elicited and it is possible that there are substantial differences between naturalistic and elicited data. Emile explicitly stated that he frequently talks with his family using the speech surrogate, though it is currently unclear what its function currently is within the wider culture. According to Emile and Karim, it seems that most people who are not griots can no longer understand the speech surrogate, but the rate of comprehension remains to be determined. Naturalistic data would be of interest for linguists when studying Northern Toussian phonology or the encoding of speech by surrogate languages, as well as for ethnomusicologists, but most importantly, they would preserve an endangered tradition that seamlessly unites music and language.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the University of Michigan. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

FUNDING

This material is based upon work supported by the National Science Foundation-National Endowment for the Humanities Documenting Endangered Languages Program and the National Science Foundation Program in Linguistics, under National Science Foundation Award No. BCS-1943896 awarded to PI Laura McPherson.

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Conflict of Interest: The author declares declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.