Musical surrogate languages in the documentation of complex tone: the case of the Sambla *balafon*

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Abstract

In documenting an undescribed language, tone can pose a significant challenge. In practically no other aspect of the phonology can such a small set of categories show such an overlapping range of pronunciation, especially in level-tone languages where f0 slope offers fewer clues to category. This paper demonstrates the unexpected tool offered by musical surrogate languages in the documentation of these tone systems. It draws on the case study of the Sambla *balafon,* a resonator xylophone played by many ethnicities in Burkina Faso and neighboring West African countries. The language of the Sambla people, Seenku (Northwestern Mande, Samogo), has a highly complex tonal system, whose four contrastive levels and multiple contour tones are encoded musically in the notes of the *balafon*, allowing musicians to communicate with each other and with spectators without ever opening their mouths. I show how the *balafon* data have shed light on a number of tonal contrasts and phenomena and raised questions about levels of the grammar and their mental representations.

Index Terms: tone, music, speech surrogate, Mande, language documentation

1. Introduction

Documenting and analyzing the tone system of an undescribed language can be a challenge, even for experienced tonologists. Though it certainly doesn't deserve to induce the fear and trembling we often see among students (or even professional linguists), tone can be at times subtle and slippery; especially in African tone systems, it can be mobile, subject to extreme contextual variation, and native speaker intuitions can be weak. This paper presents an unlikely data source and research tool for analyzing undescribed tone systems: musical surrogate languages.

I focus on the case study of the *balafon* (resonator xylophone) played by the Sambla ethnicity in southwestern Burkina Faso to encode their complex tonal language Seenku (Northwestern Mande, Samogo). Unlike more famous whistling languages or even tension drum languages, the balafon notes that encode Seenku's four contrastive tone levels are discrete. This allows the researcher (and the listener) to better discriminate between tonal categories, accentuating contrasts that may be quite subtle in the spoken language. Further, certain phonological tone rules common in the spoken language are not encoded in the surrogate, revealing underlying representations while also suggesting psychologically real distinctions between levels of the tonal grammar.

The paper draws on my primary data on the surrogate language, collected with Vienna-based Sambla balafonist Mamadou Diabaté (henceforth MD) and his family in Burkina Faso over the last three years. Generalizations about the grammatical system of the balafon language are drawn from a corpus of 138 lines of balafon speech, transcribed for tones, notes, note durations, and a variety of grammatical factors. Half of the lines are played by MD and the other half by two brothers and a nephew.

In this paper, I first provide background on the study of musical surrogate languages cross-linguistically (§2), before introducing the Sambla ethnicity, their language Seenku, and their musical traditions in §3. The grammar of the surrogate language is summarized in §4, showing how Seenku rhythm and tone are represented musically to encode meaning. In §5, I focus specifically on how the Sambla balafon surrogate language has proved a valuable tool in the analysis of Seenku tone, from the determining the number of contrastive levels to offering a glimpse of underlying representations. To conclude, I consider the non-linguistic value of including musical surrogate languages in language documentation.

2. Musical surrogate languages

The study of musical surrogate languages dates back at least a century. Most famous are the African "drum languages" (e.g. many cases described in [1]), but musical surrogate languages have been attested on other instruments, such as flutes (e.g. Gavião, [2]), horns (e.g. Asante, [3]), and, most pertinent to the current paper, xylophones (e.g. Senoufo, [4]). Whistling languages ([1][5]) are also common as speech surrogates, in both tonal and non-tonal languages.

Surrogate languages, or speech surrogates, take a linguistic message and encode it in a non-linguistic modality. As exotic as that may seem, any literate person practices a speech surrogate everyday through writing [6]! Two types of surrogate languages can be distinguished [7]: abridgement systems, which encode phonemic aspects of the language, and lexical ideogram systems, where concepts are symbolized directly, again drawing a parallel to writing systems. As we will see, the Sambla balafon is a case of abridgement.

3. The Sambla

The Sambla are a small Mande ethnicity living in southwestern Burkina Faso. The term Sambla (variant: Sembla) is an exonym that refers to both the people and the language. The endonym for the language is Seenku (IPA [sɛ́ɛ́:-kû]), literally 'language of the Sɛ̃: ethnicity'. Throughout this paper, I will refer to the ethnicity as Sambla and to the language as Seenku.

3.1. Seenku

Seenku is classified as a Northwestern Mande language in the Samogo group. It is spoken by approximately 17,000 people, divided between two dialects (northern and southern). This

paper focuses on the more populous southern dialect, spoken by 12,000 people in Bouendé and surrounding villages.

Like most Mande languages, Seenku shows S-Aux-O-V-X word order. It has little segmental morphology, thanks to heavy phonological reduction; tone has largely taken up this role.

3.1.1. Seenku phonology

Seenku has a large phoneme inventory but restricted word shapes. The language boasts 22 consonants (including palatal and labiovelar stops and alveolar affricates) and 26 monophthongs (8-9 oral qualities, depending on the speaker, 5 nasal qualities, and contrastive length for each) in addition to over a dozen diphthongs. What is gained in phonemic contrasts is lost in word shapes, with most Seenku stems being mono- or sesquisyllabic [8]. More common in Southeast Asia than in Africa, the latter term refers to a short half syllable followed by a full syllable, e.g. *səgùa* 'stack', *bəlĕ* 'big', *mənĭ* 'woman'.

The tone system of the language is very complex, with 4 contrastive levels and 12 simple and complex contour tones (of which 4 are lexical and the other grammatical). The 4 level tones are illustrated in (1):

(1)	a. Extra-low (X)	*sän*	'river'
	b. Low (L)	*sà*	'second-born son'
	c. High (H)	*sá*	'cry'
	d. Super-high (S)	*sa̋n*	'God'

The contour tones HX and LS are the most common two-tone lexical contours, followed by HS:

(2)	a. HX	*kṵ̂ị*	'*néré* seeds'
	b. LS	*kṵ̌ị*	'grass sp.'
	c. HS	*kṵ́ĭ̋*	'burp'

The tri-tone contour XHX is also attested lexically, in words like *dääân* 'hanging basket holder' or *kə̈nṵ̂* 'stone'.

The half syllable of sesquisyllabic words is not tonally contrastive; the same melodies are found on both mono- and sesquisyllabic words.

3.1.2. The Sambla balafon

The term *balafon* refers to a family of resonator xylophones common in West Africa, where wooden keys are suspended over hollow gourds tuned to resonate at the same frequency. In the Sambla balafon tradition, small holes are cut into the gourds which are covered by a thin membrane (traditionally spider egg sac, though now more commonly paper or plastic), which creates a characteristic buzz when the key above is struck.

The Sambla balafon is tuned to an atypical pentatonic scale. The names of the keys and their closest equivalent notes in a Western major scale are illustrated in (3):

(3)	1	*bĝ̱g̱-ɲä*	lit. '*balafon*-mother'
	♭ 3	*jĭo-bg̱̈g̱-dën*	lit. 'fetish-*balafon*-key'
	3	*bĝ̱g̱-ɲà-gṵ̈-nʒ̀*	lit. 'the one under the *balafon*-mother'
	5	*tərɔ́n-tərɔ́n*	(no translation)
	6	*sərə̀kùa-kɔ̀-nʒ̀*	lit. 'the one above the *sərakua*'
	(8	*sərə̈kṵ̈a*	(no translation))

The 3rd and the 6th do not have fixed names but rather always refer to their position relative to the other keys; different musicians offer different designations, and the ones given in (3) represent the names given by MD. Note that 'under' and 'above' refer to the spatial orientation of the keys with respect to the ground and not the pitches, as we might expect—higher notes have smaller calabashes under them and so are closer to the ground. The 23 keys of the balafon span four and a half octaves; the two highest tonics are referred to as *sərə̈kṵ̈a* as opposed to *bĝ̱g̱-ɲä*.

The balafon tradition is passed from father to son in just two extended families, comprising around one hundred musicians in total, of whom a much smaller number are recognized as true experts in the tradition. In traditional Sambla music, a single instrument is played by three musicians at once, with the treble soloist and the bass player seated on one side and the youngest musician seated opposite playing the simplest part in the middle. The speech surrogate is largely confined to the soloist's playing.

4. Grammar of the surrogate language

There are two modes of the balafon speech surrogate: a speaking mode, used explicitly for communication, and a singing mode, used to encode the largely proverbial lyrics of songs. This section provides a brief overview of the principles of encoding of the speaking mode of the surrogate.

4.1. Tone encoding

Tone is the primary phonological characteristic of Seenku that is encoded in the surrogate language. Like natural language phonology, there is no one-to-one mapping between tonemic categories and notes on the balafon; tone continues to be relative and dependent upon the mode of the song being played. Nevertheless, there is a default mode when playing phrases outside of the context of a song, and here there are strong tendencies for tone-note mappings, summarized in (4). The top row shows an octave of the balafon scale and beneath it where each tone most commonly occurs:

(4)	1	♭ 3	3	5	6	8
	X	---	X	L	H	S

A couple of observations can be made. First, there is a conspicuous absence of tones mapped to the ♭ 3. As the traditional name of this note suggests, the ♭ 3 has spiritual connotations and is often reserved for speech related to the spirits or the "fetishes" (cf. French *fétiche*) they inhabit rather than everyday speech. Second, there are two notes commonly associated with X: the tonic (1) and the 3rd. If encoded with the tonic, then the four tones of Seenku span the whole octave. If encoded with the 3rd, then the four tones map up to the four consecutive notes 3, 5, 6, and the tonic an octave up.

While we can discern these tendencies for tone encoding, they are only that: tendencies. If we consider instead what the most common tone associated to a particular note would be (rather than the most common note for any given tone), then we find that the 5th *tərɔ́n-tərɔ́n* is most often linked to H tone, though X and L are both very frequent as well. The precise encoding of tones will depend upon the song a musician has in mind when speaking (which will determine the mode), the tonal context, and sometimes just free variation.

Contour tones are encoded by playing the notes associated with each tone in the contour; the first tone is played almost as a grace note, followed almost immediately by the second tone.

These tone encoding principles are illustrated in the transcription in Figure 1. The relative length of each note before the next note is struck is indicated by the width of the cell; thus,

the L of the LS contour receives less time than the S, and the H of the HX contour receives less time than the X.

S (1+)			■			
Sk (6)	■			■		
T (5)		■				
Bg (3)					■	■
J (b3)						
B (1)						
Text	mó		nă		jo̱	sù

Figure 1: *Encoding of* mó nă jo̱ sù *'I will get water'*

4.2. Segmental encoding and ambiguity

As in most musical surrogate languages, segmental phoneme identity is not encoded. In other words, there is no distinguishing *t* from *m,* or *u* from *ɛ*. Unsurprisingly, this introduces a lot of ambiguity into the system.

Vowel length and syllable structure, on the other hand, are encoded, though this encoding is often obscured by tone. Consider first the difference between a short and long vowel. We saw in Figure 1 that short-voweled words like *mó* 'I' or *sù* 'take' are played with one strike of the relevant note; long vowels are encoded by two strikes, a shorter one followed by a longer one. Interestingly, this same strategy is used to encode sesquisyllabic words as well, as well as words with a (floating) nasal coda (though in this case, only optionally).

Already, this presents further kinds of ambiguity, but the situation is made worse for words with contour tones, since the tones are already encoded by two rapid strikes. This means there is no salient difference between contour-toned words with long vowels, short vowels, or sesquisyllabic structure. These ambiguities are illustrated in Figure 2, which gives two (of many) possible interpretations of a balafon phrase.

S (1+)				
Sk (6)			■	
T (5)				
Bg (3)	■	■		■
J (b3)				
B (1)				
Text1	səgà		bâ	
Text2	bɛ̃ɛ		kərê	

Figure 2: *Ambiguous encoding of length, tone, and syllable structure;* səgà bâ *'ram'* ~ bɛ̃ɛ kərê *'male pig'*

Similarly, in Figure 1, the sequence that encodes *jo̱ sù* can also encode *təgê ŋmà* 'eat chicken'.

4.3. Understanding balafon speech

Not all Sambla people understand the balafon, at least in its entirety. Non-musicians are likely to understand their names and certain common phrases played in festival settings (such as requests for money and beer), but not more spontaneous messages. Musicians who have grown up around the balafon (including both balafon players and talking drum players, from a different musical lineage) understand more, but they rely on two crucial ingredients: linguistic context and social context.

For the former, ambiguous phrases can be made clearer by embedding them in a larger surrogate language discourse. For instance, the difference between getting water and eating chicken can be made depending on whether the phrase is preceded by "I am dying of thirst" or "I am dying of hunger" (common phrases with distinct representations on the balafon). Of course, *təgê* 'chicken' may still be confused with another animal like *bî* 'goat', both HX contour tones that neutralize the distinction between mono- and sesquisyllabic words. In this case, social context becomes important. Consultants have explained that in a case where it is ambiguous whether someone should offer a chicken or a goat to the musicians, the one interpreting the speech should take into account the financial means of the individual being addressed: Is he too poor to afford a goat? Then chicken is the most likely reading.

5. The Sambla *balafon* as an analytical tool

Musical surrogate languages have most often been studied (and understandably so) by ethnomusicologists. Here, I will argue that more linguists should pay attention to musical surrogate languages: Not only do they provide an additional data source in the description and analysis of tone, but they also raise larger questions about levels of grammatical representation. Further, while ethnomusicologists have often done an admirable job of analyzing the speech aspect of surrogate languages, linguists may be in a better position to analyze the subtleties of the phonology and how it is encoded.

This section focuses on two facets of Seenku tone that were revealed through the study of the balafon language and discusses their implications for the architecture of grammar.

5.1. Four contrastive levels

When I first began work on Seenku, I expected a three-tone language, typologically more common both cross-linguistically and in the region. Lexical elicitation largely supports this hypothesis, as level L-toned vocabulary is quite rare in the language. Early on, it became clear that plurals are formed by raising the tone level of the singular by one level; this meant that what I now refer to as X-toned vocabulary would raise to M (what I now call H). I analyzed this using tone features ([9][10]), which resulted in two featurally distinct configurations both being realized as M. Put side-by-side, there would be subtle differences in pitch, but I attributed this to downstep or even a more phonetic principle like declination.

During my second trip to the field, I recorded singular and plural nouns played on the balafon and the so-called "derived" and "lexical" M tones displayed consistently different behavior: the derived tone, as in the plural, was always lower, regardless of whether it preceded or followed the lexical tone. This indicated that the featurally distinct tone was in fact distinct on the surface as well, suggesting a fourth category. Shortly thereafter, lexical L tones were identified, including the numeral *nɔ̀* 'five' (lower than *sóen* 'one' but higher than *sùɛ* 'three') and many birth order names like *sà* 'second son'. Post-hoc acoustic analysis of the four levels shows a significantly different and non-overlapping f0 for each tone.

Figure 3 on the next page shows an example of the same phrase played with a singular and plural possessed noun, demonstrating the different encodings of L and H (on the 3rd and the 5th, respectively); note that the verb takes on the same tone as the object due to a process of tone sandhi. Identifying the raised plural tone as L likewise helped point to the phonemic representation of rising tones, discussed in the next subsection.

5.2. Underlying rising tones

Figures 1 and 3 show the prospective auxiliary verb *nă* with a LS rising tone. In spoken Seenku, this rise is rarely realized. Instead, early elicitations revealed a distinction between auxiliary verbs that varied in pronunciation between what I then called H and M (now S and L) depending upon context, and

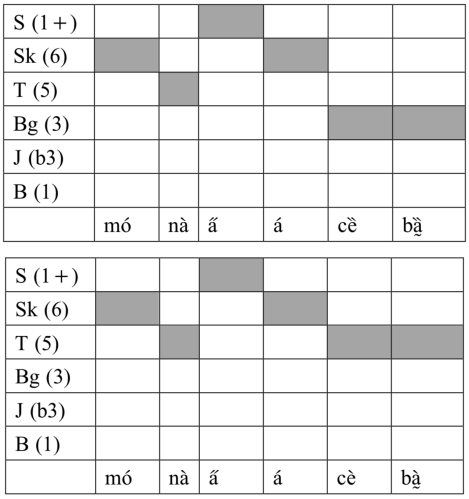

Figure 3: *'I will hit your hand' (above) vs. 'I will hit your hands (below)*

others that were always S (such as the immediate past *sĭo*). (5) shows these variable data in early three-tone transcriptions vs. current four-tone transcriptions:

(5) a. *mō nā́ bèɛ sɔ̀ɔ* *(mó ˈnā́ bɛ̏ɛ sɔ̏ɔ)*
1SG PROSP pig sell
'I will sell a pig.'

b. *à nā̄ bí sɔ́ɔ* *(à nà bĭ sɔ̆́ɔ)*
3SG PROSP goats sell
'He will sell goats.'

I suspected an underlying contour tone that simplified to yield the two surface variants, and this suspicion was confirmed when hearing the prospective on the *balafon*: it is almost always played with this underlying LS rise, regardless of context. I return to this point in §5.3.

The musical surrogate language revealed more LS contour tones that never appear on the surface, due to tonal absorption. For instance, transitive verbs inflected in the progressive are followed by an S-toned particle *nɛ̃́*. For a long time I thought that this particle was simply added after X-toned verbs, leaving a sequence like *bà nɛ̃́* 'doing'. The balafon revealed instead an underlying form *bă nɛ̃́,* with the verb LS. This would imply the same simplification process seen with the auxiliaries, meaning the surface form of 'doing' is actually *bà nɛ̃́;* closer listening to spoken Seenku after this balafon discovery showed this to be correct: X-toned verbs are in fact pronounced L in this context.

5.3. Implications for grammatical architecture

Looking at how tone is encoded in the surrogate language, we see an interesting distinction: lexical tone and grammatical tone (including plural formation and tone sandhi, Figure 3) are exceptionlessly encoded while postlexical phonological processes like rising tone simplification are not.

If all of these tone processes were cognitively represented in the same way, we may expect more uniform behavior. Instead, data from the balafon surrogate language point to a psychologically real division. It is up to linguists to theorize about where this division falls in the grammatical architecture. I argue that both meaningful tonal alternations like the plural and grammatically constrained but otherwise meaningless alternations like tone sandhi belong in the morphology and rising tone simplification in the phonology, meaning musicians access the output of the morphological component when encoding the surrogate language; the data would also be consistent with a division between different levels of the phonology. Thus, as unexpected as it may be, surrogate language data may come to bear on questions of mental representation and metalinguistic awareness of the grammar.

6. Conclusions

In this paper, I have shown how the study of musical surrogate languages can advance tonal analyses and raise interesting questions about the mental representation of grammar. The balafon data were by no means the only evidence pointing to the tonal contrasts or processes, nor is it the case that the analyses could not have been done with spoken language data alone; rather, musical surrogates can expedite analysis, providing yet another angle or data source to choose between hypotheses. Ideally, it is an interplay, gathering data in the spoken language, comparing it to the musical language, then testing the musical findings back in natural speech.

A final point I wish to make is that including musical surrogate languages in language documentation serves the dual purpose of gathering useful linguistic data and documenting potentially endangered cultural practices. In the case of the Sambla balafon, the music is closely tied to traditional animist religious practices and is commonly called upon during the farming season to encourage people in the fields. Thus, any balafon data recorded and translated is valuable not only for the formal encoding of the message but for the cultural knowledge that message contains. Finally, the musical tradition itself is threatened by increasing interest in foreign music (both regional and global) and by the expansion of formal education in the region, which is arguably a positive thing on the whole but which disrupts the traditional chain of transmission for this complex musico-linguistic form.

In conclusion, linguists have a valuable role to play in studying and documenting musical surrogate languages. It is time to move them in from the fringes and recognize their potential as an analytical tool and as a rich object of study in their own right.

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