THOT
THEORY
OF TONE

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Eastern Soninke. **Analytical report on the tonal system**

On the basis of the Version 8b of the Questionnary

1. General information about the language

1.1. Language name

Soninke, *Sòonìnkê*.

Alternative names: Sarakole, *Sàrakullé* (in Mandinka), *Saraxolle* (in Wolof), *Màraka* (in Bambara), *Wakkore* (in Songhay), *Ceddo* (in Pulaar), *Aswanek* (in Arabic).

ISO-639: snk, Glottolog: soni1259.

1.2. Genetic affiliation

Soninke-Bozo < Western Mande < Mande < Niger-Congo.

Geographic area: NE Senegal, NW Mali, southern Mauritania, eastern Gambia; an important diaspora.

Number of speakers: more than 2 mln. (estim. 2012).

1.3. Dialects

Two major dialectal groups: eastern and western, and two excentric dialects: Sillanka in Burkina Faso (several thousands of speakers, influenced by Fulfulde and Moore) and Azer (an extinct dialect spoken till the first half of 20 century in Tishit and Walata oases in Mauritania; no data about tones in Azer).

The current analysis is based on Creissels' (2016) description of the Kingi dialect belonging to the Eastern Soninke dialect cluster. According to (Creissels & Diagne 2013; Creissels 2016: 28), tonal system in Western Soninke dialects (in particular, in Bakel) are considerably different and evolve toward disappearence of tonal contrasts.

2. Segmental phonology

2.1. Phonemic inventory

2.1.1. Vowels

	Short		Long	
i		u	i:	u:
e		o	e:	o:
	a			a:

Table 1. Soninke vowels

Long vowels (designated henceforth with double letters) appear only in non-final position in the word and not in closed syllables. Therefore, long vowels are disallowed in monosyllabic

words. Monosyllabic nominal and verbal stems, when included into a disyllabic or multyllabic word, have their vowel elongated:

kâ 'house' – *kàa-nû* 'houses'

ró 'enter' – *róo-nó* gerund of *ró*

Long vowels are interpreted as monophonemes, with the exception of rare words where they carry contour tones: Creissels (2016: 30) suggests biphonemic interpretations for the long vowels in such words, e.g. *dá.à.rú* 'yesterday', *hà.á.mù* 'understand'. Vowel length manifests some instability.

2.1.2. Consonants

2.1.2.1. The consonant inventory

	Labial	Dental	Palatal	Velar	Uvular	Glottal
Occlusive unvoiced	**p**	**t**	**ʧ**	**k**	**q**	
Occlusive voiced	**b**	**d**	**ʤ**	**g**		
Fricatives		**s**				**h**
Nasals	**m**	**n**	**ɲ**	**ŋ**		
Lateral approximant		**l**				
Vibrant		**r**				
Glides	**w**		**j**			

Table 2. Soninke consonants

/q/ has two allophones: an occlusive [q] in geminates and after a nasal consonant, [ŋq]; a fricative /x/ in word-internal intervocalic position. In the word-initial position, realization of this phoneme ([q] or [x]) varies among dialects.

The occlusive unvoiced consonants, nasals and lateral approximant (*p, t, ʧ, k, q, m, n, ɲ, ŋ, l*) can be geminated in the word-internal position. Occlusive voiced consonants *b, d, ʤ* can be also geminated, althouth rarely.

In the current Malian orthography, long vowels are designated by double letters; ʧ is represented by *c,* ʤ by *j,* j by *y.* These conventions will be also followed in this paper.

2.1.2.2. Consonant alternation

An initial consonant of a word, if preceded by a nasal underspecified consonant N, is replaced by another consonant. This alternation concerns the following consonants:

Default consonant	Ø	r	w	y	s	h
After N	ŋ	l	ŋ	ɲ	ʧ	p

Table 3. Consonant alternation in Soninke

2.2. Prosodic units

2.2.1. Syllable and mora

TBU is a syllable, there is no reason to postulate a mora. In tonotactics, heavy syllables behave in the same way as light syllables.

Syllable types allowed in Soninke are V, CV, CV:, VC, CVC. Heavy syllables (CV:, CVC) are disallowed in the word-final position. The types V and VC are attested in personal pronouns and in the reflexive pronoun.[1]

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[1] There are rare words, like *dáàrú* 'yesterday', *hààmù* 'understand', which have tonal contours on long vowels in non-final position in a word. Creissels adheres to a biphonemic interpretation of such long vowels (*dá.à.rú, hà.á.mú*) in order to avoid an assignment of two different tones to one syllable. However, this procedure

In VC and CVC syllables, only N or C° are allowed in the coda position (C° = the following consonant, i.e. the initial consonant of the subsequent syllable; i.e. the initial component of a geminate consonant).

When a personal or reflexive pronoun with initial (or the only) syllable appears after another word (i.e. otherwise than in a phrase-initial position), the final vowel of the preceding word is usually elided. The vowel elision has incidence on the tonal density count, for it diminishes the number of syllables.

2.2.2. Foot
There seem to be no reason to postulate a prosodic foot in Eastern Soninke.

2.2.3. Word
A word in Eastern Soninke is established by morphological criterion. For prosodic criteria of wordhood, see §4.2.2. The prosodic criteria are sometimes in contradiction with morphological ones, this concerns, in particular, certain suffixes, see §4.5.

There are some restrictions on tonal patterns in a word, see §4.2.

3. Tonal inventory
3.1. Character of tonal system
Soninke has two level tones: high and low.

The only contour tone is HL, it is available on the final syllable of a definite noun before a pause, if the preceding syllable carries a low tone, or in monosyllabic nouns: *yàxàrê* 'woman', *sèrê* 'human, person', *sî* 'horse'.

The rare words mentioned above can have a contour LH (in particular, *hàámù* 'understand') or HL (like *dáàrú* 'yesterday') in non-final syllables with long vowels.

3.2. Inventory of tonemes

3.2.1. Tonemes L and H
Two level tonemes can be postulated in Soninke, L and H.

The tonemic character of L is proved by the following criteria:

1) the Floating Criterion: L can float (see §3.3);

2) the Shared TBU Criterion: there is a HL contour (resulting from a tonal process) on one TBU (see §3.2.3);

3) the Activity Criterion: L can spread rightwards, see the LHH → LLH rule (§6.1);

4) the Tonal Morpheme Criterion: there are grammatical L tone morphemes (see §7).

Criteria for the tonemic status of H are the following:

1) the Shared TBU Criterion: the HL contour is possible on one TBU (the same as criterion (2) for the L toneme above, i.e., this criterion supports the tonemic status of both Soninke tones);

2) the Activity Criterion: H can spread leftwards, see the H-tone plateauing rule, §6.3;[2]

3) the Tonal Morpheme Criterion: a tonal morpheme H marking syntactic status of the 3SG and 3PL pronouns (Creissels 2016: 72–74).[3] Besides, H appears in the LH morphemes of status constructions and of the predicative function of adjective (see §7.1.3, §7.1.4).

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seems unnecessary, because in Soninke, two tonemes can be assigned even to a syllable with a short vowel, see §3.2, 3.4; therefore, segmentation into syllables of the type *dáa.rú, hàá.mù* does not require to recognize the mora as the TBU in Soninke.

[2] An alternative interpretation of this rule is also possible (if Soninke tonal system would be interpreted as privative): it can be seen as erasing of the L tone(s) between two Ø tones.

[3] According to his privative interpretation of the Soninke tonal system, Creissels, while speaking of a "morphotoneme H", considers this tonal modification as erasing of the morphotoneme L on these pronominal forms, followed by the attribution of a default H tone.

It can be concluded that the Soninke tonal system is omnitonal (rather than privative), where L tone is characterized by a higher degree of activity than H, – contrary to Creissels' opinion who considered H as a zero tone.

3.2.2. L^nH: toneme or not?

The sequence L^nH (where n = 0 to 3 syllables) manifests some characteristics which could be indicative of its tonemic status. As shown in §4.2, this tonal sequence can be mapped onto segmental strings of various length, from one syllable (in which case L floats: on the surface, the tone carried by the syllable is opposite to the preceding tone) to four syllables (LLLH). The L^nH sequence appears as exponent of two homonymous tonal morphemes, see §7.1.3, 7.1.4.

However, in the synchrony, these arguments seem insufficient. Soninke has a considerable number of lexical tonal patterns on words, see Table 1 in §4.2. If the L^nH contour manifests some characteristics that make it resemble an extensible toneme, the same can hardly be said about the other lexical tonal contours of Soninke words. The diversity of word tonal contours and the insufficient conformity between the types of words of different size makes more natural an interpretation of all these contours in terms of combinations of L and H tonemes (even if these combinations are restricted by some rules). Therefore, I also regard the L^nH contour as a combination of two tonemes (L and H), rather than as a single contour toneme.

Another strong argument against the tonemic status of the L^nH contour is its realizations in a tonal phrase, see §4.4.

3.2.3. The non-tonemic status of the HL contour

The HL contour should be interpreted as a combination of two level tonemes, H and L, on the following ground.

– both components of the HL contour exist in Soninke as separate tonemes, therefore, the Non-Compositionality Criterion of a contour toneme is not applicable;

– the HL contour on a light syllable always results from a tonal process, therefore, the Persistence Criterion is not applicable.

3.3. Floating tone

In Soninke, only low tone can float. There are three instances where the floating low tone (fL) appears.

1) When a vocalic elision occurs, and the adjacent vowels carry opposite tones, the remaining vowel carries H, and the low tone floats: $(\grave{V}_1)\acute{V}_2 \rightarrow \acute{V}_2$`, $(\grave{V}_1)\acute{V}_2 \rightarrow$ `$\acute{V}_2$.

2) Monosyllabic words and suffixes with lexical tones fLH, see §4.5.

3) fL tone is an exponent of a definite article. In citation form, it is the only exponent of the article; in phrasal contexts this article is represented both by a syllable-final consonant *n* and a floating low tone.

Tonal realization of the article depends on the syllabic and tonal structure of the defined noun:

- if a noun in its indefinite form ends in a low-toned syllable, the floating low tone of the definite article is erased: *kìtáabè* 'book (indef.)' → *kìtáabè(n)* 'book (def.)';

- if a noun in its indefinite form ends in two (or more) high-toned syllables, the floating L is docked onto the final syllable erasing its H tone: *yúgó* 'man (indef.)' → *yúgò(n)* 'man (def.)';

- if a noun in its indefinite form ends in one high-toned syllable (e.g., if the span of the preceding H is equal to one syllable), the realisation of the floating L of the definite article depends on the right context:

a) before a pause, the floating L is docked onto the final syllable of the noun producing a HL contour: *jí* ''water (indef.)' → *jî* ''water (def.)', *yàxàré* 'woman (indef.)' → *yàxàrê* 'woman (def.)'.

b) if the following word has a H tone on the initial syllable, this H is downstepped:

(1) *Ỳàxàré-n   ˈmá   rì.*
     Yàxaré-nˋ   má   ˋrí.
     woman-DEF PFV.NEG come
     'The woman did not come'.

c) if the following word has a L tone on the initial syllable, the floating L is erased.

(2) *Ń   dà   yàxàrén   ŋàrí.*
     Ń   dà   yàxaré-nˋ   ŋàrí.
     1SG TRANS woman-DEF see
     'I saw the woman'.

3.4. Downdrift and downstep

There is downdrift in Soninke. It serves the basis of the downstep (a lower realization of a H tone after fL preceded by another H, e.g. in the context HˈH), cf. §3.3.

3.5. Upstep

No information.

3.6. Other suprasegmental features of tonemes, apart from pitch

Tonemes in Soninke are not characterized by features other than pitch.

4. Tonotactics

4.1. Tonal span limits

4.1.1. Tonal span size

If we assume that prototypically, a tonal span in Soninke tends to coincide with a syllable, following deviations are attested.

1) Tone span is zero for a fL positioned between two Hs, see §3.3 (in particular, example (1)).

2) Two tonal spans are assigned to one syllable when a fL is docked onto the preceding H-toned syllable (if the latter does not belong to a plurysyllabic H-tone span), like in *dèbé* 'village (indef.)' → /dèbéˋ/[4] [L dè][H .bé][L -ǹ] 'village (def.)'.

3) A tonal span can extend to more than one syllable. I postulate that within a word, any sequence of syllables carrying identical tones constitute one tonal span. E.g., [*dùgu*][*tá*] 'to finish', [*jùgijip*][*pí*] 'to stammer', [*dákkaba*][*nà*] 'miracle', etc.

With respect to the latter case, the following question is justified: what are the reasons to analyze a sequence of isotone syllables as one polysyllabic tonal span, rather than a sequence of monosyllabic tonal spans? I.e., why [*dùgu*][*tá*], [*dákkaba*][*nà*], and not *[*dù*][*gù*][*tá*], *[*dák*][*ká*][*bá*][*nà*]? The following agruments can be adduced in favor of the polysyllabic tonal spans:

- If the indefinte form of a noun ends in a sequence of two H-toned syllables, its definite form has final L tone, i.e. the fL of the definite article replaces the H tone of the final syllable: *yúgó* 'man (indef.)' → *yúgò(n)* 'man (def.)'. And if it ends in one H-toned syllable, the final syllable of the definite form carries a HL contour: *yàxàré* 'woman (indef.)' → *yàxàrê* 'woman (def.)'. If *yúgó* would host two H tonemes (*[*yú*][*gó*]), one would expect, in the definite form, a tonal realization *yúgô*.

- There are several non-segmental L-tone morphemes in Soninke (see §6), these morphemes are always mapped onto a whole word, whatever be the number of its syllables. In such cases, it is appropriate to think that the morphemes represent one toneme mapped onto a variable number of syllables. If we accept plurisyllabic tonal spans for grammatical tonal

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[4] In the phonemic transcription, only one tonal diacritic per toneme is used. If a vowel has no tonal diacritic, it belongs to the same tonal span as the preceding syllable.

morphemes, they can be also accepted for the sequences of identical tones representing lexical tonal patterns.

4.1.2. Change of tonal span boundaries

Tonal span boundaries are modified by means of all the tonal rules mentioned in §6.

4.1.3. Tonal span and prosodic units

Tonal span limits do not coincide with the boundaries of prosodic units. There is a kind of conformity: a tonal span cannot exceed word boundaries.

4.2. Combinations of tonemes. Tonal melodies

In Table1, tonal types of non-compound words in Eastern Soninke are represented. In this representation, each letter (H or L) stands for a tone on one syllable (and fL stands for a floating low tone)

1 syllable	2 syllabes	3 syllables	4 syllables
H	HH	HHH	HHHH
fLH	LH	LLH	LLLH
	HL	HHL	HHHL
		HLH	HHLH
			HLLH
		LHL	LLHL
			HLHL
			LHLH
L	(LL)	(LLL)	(LLLL)

Table 1. Lexical tonal types of non-compound words in Soninke

Notes: 1) The type L in monosyllabic words is attested only in a small number of auxiliary words.

2) Rare words with contour tones on long vowels, like *dáàrú* 'yesterday', *hààmù* 'understand', are not taken into account in this table.

In what follows, toneme associations are represented in form of autosegmental diagrams.

	Tonal spans	σ σ σ	σ σ σ σ

$$\sigma\ \sigma\ \sigma \qquad \sigma\ \sigma\ \sigma\ \sigma$$
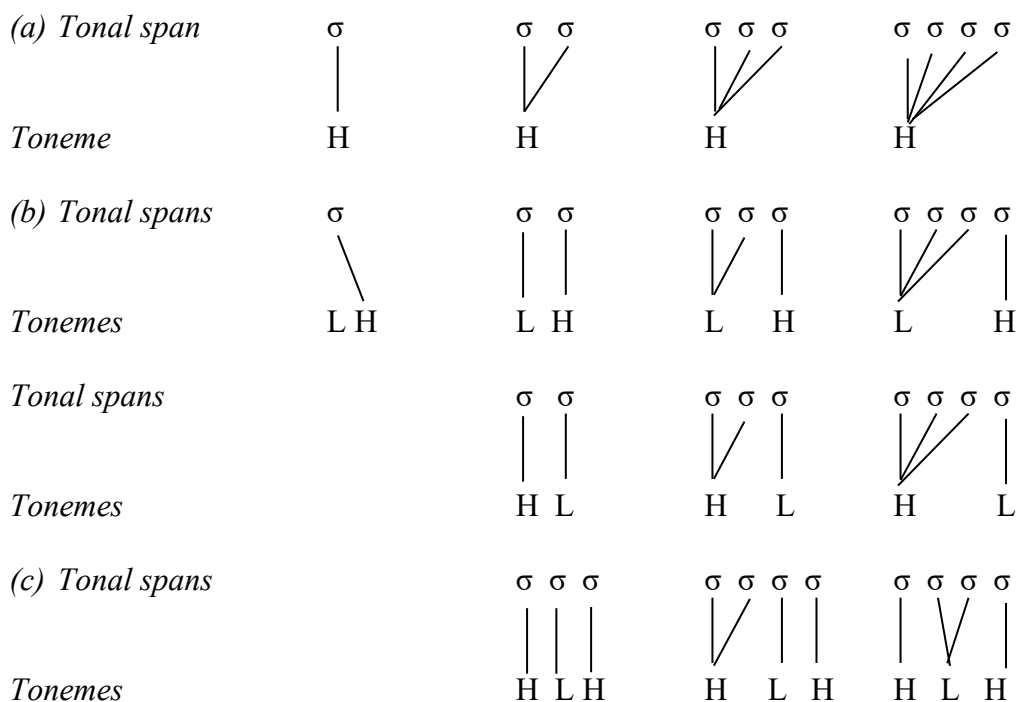
Tonal spans

Tonemes　　　　L H L　　　L　H L
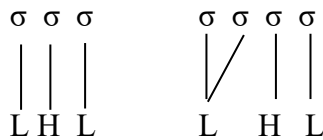
4.2.1. Constraints on tonal combinations within a word

Certain generalizations can be made concerning distribution of tonal spans within one word:

- Same tones realized on adjacent syllables represent the same toneme.

- Lexical contour of a word cannot be all-L (i.e., the span of a low lexical toneme cannot extend to an entire word); however, it is possible for a grammatical L-tone morpheme, see §7.1.1, §7.1.5, §7.1.7., and for the first component of a tonal phrase, see §4.4);

- When two tonemes are associated with a word, the first one spreads up until the penultimate syllable, and the second one docks onto the last syllable.

- When more than two tonemes are associated with a word, the first and the last tonemes are associated with the first and the last syllables correspondingly, but the internal tones can be mapped with fewer restrictions, e.g. HHLH, LLHL with the first toneme mapped on the first and the second syllable, and HLLH with the second toneme mapped on the second and the third syllable.

4.2.2. Prosodic word: criteria of wordhood

In Eastern Soninke, different types of connection of roots and affixes are available. I consider as "prosodic word" a sequence of morphemes to which the "tonal span merger rule" and the "avoidance of final plurisyllabic H tonal span rule" can be applied, see §6. These rules are not applied across the limits of the components of a tonal phrase, see §4.4.

4.2.3. The fLH type of monosyllabic words

A great majority of monosyllabic words in Soninke is subdivided into two tonal classes: H and fLH. The third tonal class of monosyllabic words, L (constantly low tone in any context) is attested only among predicative markers, see §8.

The fLH monosyllabic words surface alternatively with H or L tone, depending on the syntactic context: if there is any stuff to the left, their tone is opposite to the preceding tone (3, 4); if such a word appears after a pause, its tone is high (5), unless it is provided with a suffix (6) or appears as the initial component of a tonal phrase (7); in the latter case, its vowel lengthens and surfaces with a low tone.

(3) Ń   dà   Múusá   **ɲì**   dèbén   dì.
    Ń   `dá   Múusa   `**ɲi** dèbé-n`    `dí.
    1SG   TR   Musa   find   village-DEF in
    'I found Musa in the village'.

(4) Ń   dà   Dénbà   **ɲí**   dèbén   dì.
    Ń   `dá   Dénbà   `**ɲi** dèbé-n`    `di.
    1SG   TR   Demba   find   village-DEF in
    'I found Demba in the village'.

(5) **Ɲí**   sáxàn   ɲá   qùnbàné!
    `**Ɲí**  sáxà-n`   ɲa   qùnbané!
    find   market-DEF   at   tomorrow
    'Be at the market tomorrow!'

(6) **ɲìiní**
    `**ɲí**-ní
    find-GER

'find' (gerund form)

(7) ***nàa-*** *xátì*
     `**ná**-xátì
     'cow milk'

If a noun of the fLH type appears in its definite form, it acquires a HL contour: /`ná`/ 'cow\DEF' → *nâ*.

When more than one monosyllabic words of the fLH type form a sequence, the polarization principle is applied consequently, as in (8).

(8) *Á*   *dà*   *búurìn*   *qóbó*   *Múusá*   ***yà***   ***dá***   ***bà?***
     Á   `da    búurù-n`   qóbo   Múusa   `**yá**    `**dá**   `**bá**?
     2SG   TRANS   bread\DEF   buy   Musa   FOC   for   Q
     'Is it for Musa that you (sg.) bought the bread?'

Interpretation of the underlying tone of these words as fLH (rather than, for example, *fLØ) is supported by the following evidence:

- the substitutive tonal morpheme for the status constructus (see §6.3) is L^{n}H. If the head noun consists of two or more syllables, the tonal morpheme is realized as LH, LLH, etc.; and if the head noun is monosyllabic, its tone is opposite to the preceding tone, exactly in the same way as the tone of the verb 'find' in ex. (3, 4);

- when a personal pronoun of the syllabic structure V with a H tone is preceded by a predicative marker CV with a low tone, a vocalic elision takes place, and the resulting pattern is exactly fLH, see §3.4.

4.3. Toneless syllables and morphemes

4.3.1. Toneless syllables

There are no superficially toneless syllables in Soninke.

4.3.2. Toneless morphemes

There are no toneless morphemes.

4.4. Tonal phrase

There are constructions in Soninke of different syntactic types which are considered by Creissels (2016: 49–54) as compounds.[5] Tonal patterns of the components of these constructions undergo certain modifications, with respect to their lexical tonal patterns, and these modifications can be regarded as tonal sandhi. Creissels admits that the lexical tonal patterns of the components of such "compounds", although modified, are not lost altogether, and that certain constraints peculiar to Soninke words (see §4.2) are not pertinent for "compounds".

In particular, the interdiction of the pattern LH^n, typical of non-"compound" words (see §4.2.2, 5.2), is not valid for the "compounds", e.g. *nàmàsà-kórómè* 'banana peel'.

Another characteristic feature of "compounds" is that one tonal span cannot stretch over the boundaries of a component of a "compound". This manifests itself in the tonal behavior of a high-toned monosyllabic final component: when the fL of the definite article is docked onto such a component, the latter acquires a HL contour (*táaxú* 'sit down' + *hô* 'thing' → *táaxú-hô* 'seat' (def.), rather that L (**táaxú-hò*) that would be expected if a single H toneme would cover the entire H-tone sequence.

From the tonotactical viewpoint, such constructions can be regarded as tonal phrases, rather than compound words.

The constructions representing tonal phrases are the following:

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[5] Creissels uses the term *composé* as a nominalized adjective; seemingly, he intently avoids a less ambiguous term *mot compose* 'compound word'.

- genitival construction N + N, e.g. *ɲògon-qírixè* <camel-saddle> 'camel saddle';
- construction V + N, in fact, of the same type as the preceding one, with nominalization of the verb, e.g. *líhindi-másì* <sew-machine> 'sewing machine';
- construction N + Adj, e.g. *dòroko-bìnnê* <gown-black> 'black gown' (the numeral *báane* also behaves as an adjective);
- constructions N + V, of various semantics: *yúgu-n-ŋúru* <man-run> 'to run like a man' (*–n-* is a connective element which appears irregularly in constructions of all these types).

All these constructions are characterized by the following features:
- if the first component is a noun, it appears in its "non-autonomous" inflectional form;
- the tone of the first component of the construction is simplified, its initial toneme spreads over till the right edge of this component, e.g.: *qálísí-dárè* 'banknote' (*qálìsí* 'money', *dárè* 'leaf'); in other words, all non-initial tonemes of the first component are erased. If the component is monosyllabic, of the tonal type fLH (`CV́), it appears with a low tone and a long vowel, e.g.: *nàa-xátì* 'cow milk' (`ná 'cow', *xátì* 'milk');
- the second component of a tonal phrase keeps its lexical tone; the monosyllabic nouns of the type fLH surface with HL contour (in the same way as the monosyllabic words of the type H)[6]. The lexical tone of the second component is modified through the "high tone bridge" rule (see §6.3) if the first component of the phrase is H-toned, e.g.: *másalà* 'conversation', *nòqqû* 'place' → *másala-nóqqù* 'place of conversation'.

There are however some exceptions where the high tone bridge rule is not applied in the context when it is expected (e.g. *húlàanê* 'a Fulbe person' + *yàxarê* 'woman' → *húlan-nàxarè* 'Fulbe woman', instead of **húlan-náxarè*), or it is applied in the context where it is not expected (*dèenâ* 'child' + *dùnbê* 'red' → *dèena-n-dúnbè* 'newly-born child', instead of **dèena-dùnbê*). In some rare cases, the tonal contour of the first component is not simplified (e.g.: *hàtê* 'skin' + *bìnnê* 'black' → *hàtá-n-bìnnê*). All these cases may be due to lexicalization.

4.5. Tones of suffixes

Suffixes in Eastern Soninke can be subdivided, according to their tonal behavior, into several types.

4.5.1. Disyllabic qusi-suffixes making tonal phrases with nominal stems

Soninke has a couple of disyllabic quasi-suffixes which manifest tonal behavior of the same type as final components of tonal phrases, see §4.4 (their difference from nominal and verbal stems consists in that they do not appear outside their tonal phrases): *-gùmê* 'owner', *-llénmà* 'partner, companion', *-nbálì* negative participle/adjective suffix (added to verbal stems), *-ntánɲè* privative suffix (with nominal stems). E.g.: *bìtígì-gùmê* 'shop keeper' (*bìtígì* 'shop'), *qálísí-gúmè* 'rich person' (*qálìsí* 'money').

4.5.2. H-tone suffixes making quasi-tonal phrases with nominal stems

Four following monosyllabic suffixes form tonal phrases with their stems:
-nké suffix of name of inhabitant or native of a place,
-ndí ordinal numeral suffix,
-nmá suffix of denominal adjective with ornative/comitative meaning,
-nné diminutive suffix.
The initial components of the stem (a noun or a numeral) appear in their non-autonomous forms, with a flattened tonal pattern (all-H or all-L, depending on the tone of its initial syllable), which is typical of tonal phrase. As for the suffix, it loses its tonal autonomy after a H-toned stem and merges with it:

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[6] Although they can alternatively appear with tones opposite to the tone of the first component, e.g. *yáaxè* 'eye' + ` jí 'water' → *yáxánjî ~ yáxánjì* 'tears (def.)'. In the latter form, *yáxánjì,* merger of tonal spans occurred, with subsequent docking of the fL of the definite article on the final syllable. It means that a tonal phrase can optionally merge and become a true compound word.

Gídinmàxá 'Gidimakha region' + *nké*

→ *Gídinmaxanké* (1st component tonal flattening)

→ *Gídinmaxanke* (merger of two H tonal spans)

→ *Gídinmaxankè* (docking of the fL article)

→ *Gídínmáxánkè* (surface tones) 'inhabitant of Gidimakha (def.)'

In a true tonal phrase, no merger of H tonal spans occurs, and one would expect the following tones: **Gídínmáxánkê*). Therefore, derivative forms with these suffixes manifest simultaneously characteristics of both prosodic words and tonal phrases.

Cf. however footnote 6 on optional variants of tonal phrases of the type *yáxánjî ~ yáxánjì* 'tears (def.)', where the second variant, *yáxánjì,* follows the same heterogeneous model.

If the initial component begins with a low tone, the tones of the derivative form are the same as those of a regular tonal phrase (however, if a merger into a true compound word would take place, tones would be the same):

Wàgádù 'Wagadu region' + *nké* → *Wàgadu-nkê* 'inhabitant of Wagadu'.

4.5.3. H-tone verb-to-noun suffixes

These suffixes are attached to verbal stems to derive nouns. The stems keep their lexical tonal patterns (*búnu* 'sting' → *búnundè* 'stinging', *gáagà* 'sell'→ *gáagàndê* 'selling'), the only exception results from the rule LHH → LLH (see §6.2), e.g. *bòosí* 'pull out' → *bòosindê* 'pulling out', *háasìdaaxú* 'be jealous' → *háasìdaaxundê* 'jealousy'. The latter tonal process is a proof that the underlying tone of the suffixes is H, and, at the same time, it is indicative of the fact that the forms derived by the suffixes of this type are prosodic words.

These suffixes are:

-*ndé* action noun suffix,

-*nté* deverbal adjective suffix,

-*rá* suffix of the name of place of action.

The same tonal model is followed by the instrumental suffix –*aadé*, with one peculiarity: the stem-final vowel is replaced by a long *aa,* but its tone is retained, e.g.: *táaxu* 'sit down' → *táaxaadè* 'seat', *qàasá* 'to file' → *qàasaadê* 'a file' (tool).

To this group can be also classified the suffix of abstraction –*aaxú*; its peculiarity is that it is added to nominal autonomous stems: *súraqqè* 'Maure' → *súraqqaaxù* 'the culture of Maures' (rather than **súranaaxù*, the non-autonomous form of the stem being *súran-*).

4.5.4. Quasi-autonomous fLH-tone verbal suffixes `*yé* and -*aa`ná*

Suffix `*yé* derives names of actions from verbs. With respect to its tonal combinatorics, it behaves as if it were an autonomous word: the tone of the stem remains unchanged, and the surface tone of the suffix is opposite to the tone of the preceding syllable, e.g.:

bárá 'to refuse' → *báráyè* 'refusal',

dàgá 'to leave' → *dàgáyè* 'departure',

mòonákì 'have a pleasure' → *mòonákìyê* 'pleasure'.

In other words, the derivative forms with this suffix manifest tonal characteristics which are different from both prosodic words and tonal phrases.

The agent noun suffix -*aa`ná* behaves in a similar way, with the only difference that its initial vowel replaces the final vowel of the stem (while retaining its tone):

hàyí 'to steal' → *hàyáanà* 'thief',

dángì 'to pass' → *dángàaná* 'one who passes by'.

4.5.5. Linked H-tone causative suffix -*ndí*

The causative suffix -*ndí* appears always with high tone, it makes one prosodic word with the stem (i.e., the LHH → LLH rule is applied):

bònó 'to get spoilt' → *bònondí* 'to spoil'.

4.5.6. Linked fLH antipassive suffix `ndí

The tone of the antipassive suffix -`ndí is opposite to the tone of the final syllable of the stem, for which reason it is considered as belonging to the underlying tonal pattern fLH. What is peculiar about this suffix is that its attachment flattens the tone of the verbal stem (like in tonal phrase):

séllà 'to sweep' → *séllàndì* (instead of **séllàndì*),
dùgú 'to wait' → *dùgundí* (instead of **dùgúndì*),
tírìndí 'to ask' → *tírìndindì* (instead of **tírìndíndì*).

However, no flattening occurs in the LHL stems (*qùrúsì* 'to cut sbm.'s throat' → *qùrúsìndí*), and in the HLLH type, the initial syllable is not concerned by the flattening (*háasìdaaxú* 'to envy' → *háasìdaaxundí*).

5. Stress and tone; culminativity; prominence; obligatoriness

5.1. Culminativity

Eastern Soninke is not culminative: more than one toneme can be hosted by a word.

5.2. Stress

Eastern Soninke has no stress.

5.3. Positional prominence

There is no positional prominence in Eastern Soninke.

5.4. Obligatoriness of tone

Eastern Soninke is characterized by the obligatoriness of tone.

6. Tonal rules. Segmental rules which have incidence on tones

6.1. Tonal rules

6.1.1. Merger of H tonal spans

Within one word form, two H tone spans merger. E.g. *dúllu* 'be hungry' + *ndí* causative suffix → *dúllundi* 'make hungry'. This rule decreases the tonal density.

6.1.2. Avoidance of plurisyllabic H tonal span at the end of word

At the end of word, a H tonal span, if preceded by L tone, cannot be disyllabic or plurisyllabic. To avoid a disallowed combination, a tonal redistribution can be recurred to, LHH → LLH. E.g., *sìláamàaxú* 'convert to Islam' (intransitive) + *ndí* causative suffix → *sìláamàaxundí* 'convert smb. to Islam'. This rule does not influence the tonal density (if it were not applied, the sequence of two high tones would be merged into one tonal span anyway).

6.1.3. H tone bridge

The tonal bridge rule erases a L toneme (i.e., sequence of L tones) between two H tonemes: $HL^nH → HHH$. This rule acts in the following contexts:

- in a tonal phrase, if the first component is H-toned, and the second component begins with a L tone (see §4.5), e.g. *yáaxa-dóxotoorò* 'ophtalmologist' (*yáaxè* 'eye', *dòxotóorò* 'doctor');

- after a determinant *ké*: *ké dóroke* 'this clothes' (*dòroké* 'clothes'), *ké kítaabè* 'this book' (*kìtáabè* 'book'). In fact, this case can be assimilated to the preceding one, so that the combination of a determinant *ké* with the subsequent noun should be regarded as a variety of the tonal phrase.

The tonal bridge rule can be regarded as a leftward spread of a H toneme resulting in erasing a L toneme. With respect to the tonemic interpretation of the ensuing tonal pattern, a question arises: The resulting sequence of H-toned syllables, does it represent one tonal span (and, subsequently, one toneme) or several tonal spans (one span equals one syllable)?

The former (monotonemic) interpretation is much more in line with the logic of the Soninke tonal system, and there is at least one strong argument in its favor.

A noun or an adjective with the tonal structure /LH/ (i.e., LH, LLH or LLLH) in its definite form (i.e., when the fL tone of the definite article is docked on its final syllable) surfaces with a HL (falling) tone on its final syllable: *bìnnê* 'black', *dòròkê* 'clothes'. When such a word appears as the second component of a tonal phrase with a H-toned first component and undergoes the tonal bridge rule, the tone of its final syllable is L: *hó-bínnè* 'black thing', *yúgú-n-dórókè* 'man's clothes'. Therefore, following the logic applied in §4.1.1, the entire H-tone sequence of the second component belongs to one tonal span.[7]

6.2. Segmental rules affecting tonal density

Tonal elision: if an auxiliary word (predicative marker) precedes a pronoun beginning with a vowel, the final vowel of the auxiliary is elided, and both elements merge into one prosodic word. The toneme of the auxiliary is erased, and two syllables are merged into one.

7. Grammatical tones

7.1. List of grammatical tonal morphemes

7.1.1. Additive L tone morpheme: definite article

There is one additive tonal morpheme, the definite article. It has two allomorphs: if a noun appears before a pause (in particular, in isolation), the exponent of the article is a floating low tone (fL); otherwise, a syllable-final consonant *n* is suffixed to the noun, together with a fL. About realization of fL see §3.3.

7.1.2. Substitutive L tone morpheme on verbs

In certain syntactic contexts, lexical tones of verbs are erased and substituted by a L toneme, its span extends to the entire verbal form.[8] These contexts are the following:

1) In negative perfective and imperfective constructions (with predicative markers *má* and *ntá* respectively).

2) In the dependent conditional clause with combination of predicative markers *gà* (for subordination) and *ná* ("projective" marker).

3) In a clause where one of the arguments preceding the verb (i.e., the subject or the direct object) is focalized (by the means of the focalization particle *`yá*) or expressed by an interrogative pronoun.

7.1.3. Substitutive LH status constructus morpheme

In possessive nominal construction, the head noun (always following the dependent noun) loses its lexical tone and acquires instead a LH tonal contour, which can be regarded as a tonal morpheme, a status constructus marker: *kónpè* 'room' → *Dénbà kònpê* 'Demba's room (def.)'.

If the head noun counts more than two syllables, the LH tonal contour is mapped as follows: the final syllable is H-toned, and all the preceding syllables are L-toned, e.g.: *kìtáabè* 'book' → *Dénbà kìtàabê* 'Demba's book (def.)'.

If the head noun is monosyllabic, it acquires an underlying fLH contour which surfaces as a tone opposite to the preceding tone: *`sí* 'horse' → *Múusá sì* 'Musa's horse (def.)', *Dénbà sî* 'Demba's horse (def.)'.

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[7] At the same time, it should be kept in mind that the H-tone sequence of the first component of a tonal phrase and a H-tone sequence of its second component belong to different tonal spans: [H hó][H bín][L nè], [H yúgu-n][H dóro][L kè].

[8] As mentioned in §4.2, an original lexical tonal contour of a verb cannot be all-L. Therefore, the L-tone grammatical morpheme cannot be mixed up with anything else.

It is enticing to compare the contexts of the L-tone verbal morpheme in Soninke with the "conjoint" verbal construction in the South Mande language of Dan which is also used in connection with focalization and in dependent clauses.

The status constructus tonal morpheme extends over an entire tonal phrase, in which case the tonal phrase converts into a true compound word: *táxa-llénmà* 'neighbour' → *àlimaamin tàaxallenmán* 'imam's neighbor'.

The same tonal morpheme LH appears on nouns when they are used with numerals beginning from 20 (and higher), e.g.: *kìtáabè* 'book' → *tánpíllé kìtàabé* '20 books'.

7.1.4. Substitutive LH morpheme of the predicative function of adjective

When an adjective is used in predicative function or in the function of secondary predicate, its lexical tonal contour is replaced by the grammatical morpheme LH (9).

(9) *Ké   wúlle   **qùllé-n**   nì.*
this   dog   white\STCONSTR-DEF   EQU
'This dog is white' (*qúllè* 'white').

7.1.5. Substitutive L tone in the distributive construction

A distributive construction is formed in Soninke through reduplication of a noun, so that the tone of the second reduplicant is replaced with a L tone (which can be regarded as a tonal morpheme); a construction marker *wó* is placed between the reduplicants (10).

(10) *yúgo   wó   yùgo*
man   DISTR   man\DISTR.L
'any man'

This construction is also available for verbs, in this case it expresses the concessive meaning (11).

(11) *Gàjánŋèn   gà   dàllá   wó   dàlla...*
conflict\DEF   SBD   last   DISTR   last\DISTR.L
'However long may last a conflict...'

7.1.6. Substitutive H tone morpheme for 3 pers. pronouns

The lexical tone of both 3 pers. pronouns is low: *à* 3SG, *ì* 3PL. However, in certain syntactic contexts, they appear with a H tone, which can be regarded as a tonal morpheme, marker of the syntactic status. These contexts are the following:

1) In the function of possessor in a possessive nominal construction.
2) As a subject of a predicative adjective.
3) As a dependent constituent of a disyllabic postpositon.
4) Before the preposition/conjunction `*dó* 'and, with'.
5) Before the focalization particle `*yá*.

7.1.7. Substitutive L tone morpheme on numerals

Numerals from 2 to 10, when alone, have lexical tonal contours H or LH and have a final vowel *–u* or *–o*. When they modify a noun (in which case a numeral follows the noun), the final vowel of the numeral is replaced by *–i*, and the numeral acquires L tone on all its syllables (while the noun keeps its lexical tone and has no definite article), e.g.: *kìtáabè* 'book', *ségu* 'eight' → *kìtáabù sègi* 'eight books'.

7.2. Tonal paradigms

There are no tonal paradigms in Eastern Soninke.

8. Tonal classes of words

8.1. Differentiation of parts of speech by tone

Tonal behavior of lexemes belonging to different parts of speech in Soninke is rather uniform, adjusted for the tonal morphology (which is specific to each part of speech). There are however two peculiarities to be mentioned:

- ideophonic adverbs have uniform H tone which is usually realized as extra-H, which can be explained by their expressive character (at the same time, there are also other adverbs which are characterized by various tonal types);

- post-subject monosyllabic predicative markers have three tonal types: apart from CV́ and `CV́ (also available in other parts of speech), there is also CV̀ type, with a constant low tone. Creissels (2016: 126–127) mentions six lexemes belonging to this type (or five, if the infinitive/subjunctive markers in transitive constructions *nà* and in intransitive constructions *nàn* are regarded as forms of one lexeme).

8.2. Tonal classes of words (not related to the part-of-speech attribution)

Not relevant.

9. Diachrony of tone

No tonal reconstruction of Soninke is available.

10. Tonal notation in the writing

In the orthographic systems used in Senegal, Mali and Mauritania tones are not marked. Besides (Creissels 2016), the tonal system is analyzed in (Diagana 1984; Diagana 1990; Diagana 1994; Diagana 1995), although in less structured ways. The only dictionary with tonal notation is (Diagana 2011); however, a considerable share of lexemes have no tonal notation (the dictionary was published posthumously).

11. Calculation of the Tonal Density Index

I have calculated the TDI on a sample text from the appendix to (Creissels 2016), a popular tale on a donkey and an imam. This text was translated into Soninke by Ismael Diawara.

The text is represented in three lines (with a free translation as the fourth line): a surface representation (tonal realizations are indicated on each syllable) in the first line, an underlying representation (tonal diacritics on the initial syllables of tonemes only; floating L is represented with a gravis accent without support; segmental morphemes within a word form are separated with dashes; components of tonal phrases are separated with an inversed slash) is given in the second line, and glosses are in the third lines (see list of conventional glosses before the References). After each phrase, the number of syllables and the number of tonemes are indicated, separated by a slash. E.g., 19/15 means that a phrase contains 19 syllables and 15 tonemes.

Kòotá   *yògó,*   *dèbé-n`*        *ŋàlimaamí-n`*
[L kòo][H .tá]   [L yò][H .gó] [L dè][H .bé-n] <[L ŋà.lì.màa][H .mí-n]>
day   certain   village-DEF   imam\STCONSTR-DEF

tàaxa-llenmán`*              *dàgá*        *búgu*       *à*       *`yí.
<[L tàa.xà-.llèn][.má-n]>   [L dà][H .gá] [H bú.g+]   [L à]   [H yí]
sit-recp\STCONSTR-DEF   go   exit   3SG   for
One day, a neighbour of an imam of a village went to visit him.

Táaxa-llenmà-n`*                     *gà*      *kúuɲi-ndì,*         *àlimáamì-n`
{[H táa.xá][H -.llén][L .mà-n]}   [L gà]   [H kúu.ɲí.][L -.ndí] [L à.li][H .máa][L .mì-n]
sit-recp-DEF   SBD   greet-ANTIP   imam-DEF

d'à   *bísimillà.*
[L d-à]   [H bí.sí.míl][L .là]

TRANS-3SG welcome

When the neighbor came with a visit, the imam invited him to come in.

Kúuɲi-`ndé-n`   pàllé,   táaxa-llenmà-n`   dà
[H kúu.ɲí][L -.ndè-n] [L pàl][H .lé] {[H táa.xá][H -.llén][L .mà-n]} [L dà]
greet-NMLZ-DEF   after   sit-recp-DEF   TRANS

àlimáamì-n`   tírìndí :
[L à.lì][H .máa][L .mì-n] [H tí][L .rìn][H .dí]
imam-DEF   ask

After the greetings, the neighbor asked the imam :

"Án   là   wá   án   pàré-n`              lóxono        ín      `ŋá   `bá?
[H án]   [L là] [H w+   án]   [L pà][H .ré-][L n`] [H ló.xó-.n+] [H ín] [L ŋà] [H bá]
2SG   pot   IPFV   2SG   donkey-DEF   lend-GER   1SG   to   Q

"Will you lend me your donkey?

Yòkkú   wá ín   màxá,   ń   ŋ à   mùndá
[L yòk][H .kú] [H w-ín]   [L mà][H .xá] [H ń]   [L ŋ-à]   [L mùn][H .dá]
marchandise\PL COPLOC=1SG   POSS   1SG   IPFV-3SG   want.GER

nà ì   gàná   dàga-ná   dèbi   xòoré-n`              `dí".
[L n-ì]   [L gà][H .ná] [L dà.gà][H -.ná] {[L dè.bì] [L xòo][H .ré-n]}   [L dì]
INF-3PL   transport   go-GER   village   big-DEF   in

I have some good that I want to bring to the town."

Àlimáamì-n`               má        `ɲì à   mùndá   nà   í
[L à.lì][H .máa][L .mì-n] [H má]   [L ɲ-à]   [L mùn][H .dá] [H n+ í]
imam-DEF   PFV.NEG   PST-3SG   want.GER   INF   REFL

hàré-n`                    lóxo        à       `yí.
<[L hà][H .ré-]>[L n`]   [H ló.x+]   [L à]   [H yí]
donkey\STCONSTR\DEF   lend   3SG   for

The imam did not want to lend him his donkey.

À   gà   má   `ɲí à          mùndá          nà      táaxa\llénmà-n`
                                                        [L   {[H táa.xá][H -.llén][L .mà-
[L à] [L gà] [H má]   [L ɲ-à]   [L mùn][H .dá] nà]   n]}
3SG   SBD   PFV.NEG   PST-3SG   want   INF   sit\RECP-DEF

ɲàagu-ndí,   à   dà   à   jáabì,
[L ɲàa.gùn][H -.ndí]   [L à]   [L d+   à]   [H jáa][L .bì]
be.ashamed-CAUS   3SG   TRANS   3SG   answer

He did not want to irritate the neighbor, and he answered:

Hàrén   gà   `ɲí      yèré,          ń       `ɲí à   à   lóxo-no
[L hà][H .ré-n] [L gà] [H ɲí]   [L yè][H .ré] [H ń]   [L ɲ-à]   à]   [H ló.xó-n+]
donkey-DEF   SBD   find   here   1SG   PST-3SG   3SG   lend-GER

án   `ŋá,    qà ín      dà à          lóxo        sèré        tàná            `yí".

15

[H án] [L ŋà] [H q-ín] [L d-à]   [H ló.xó] [L sè][H .ré] [L tà][H .ná] [L yì]
2SG   to   but-1SG   TRANS-3SG lend   human   other   for
"If the donkey were here, I would lend it to you, but I have lent it to another person'.

Ké-n   *dà à*   `ní,      *hàré-n*          *cìiti-nté-n*`   *ŋá*
[H ké-n]   [L d-à]   [H ɲí]   [L hà][H .ré-n]   <[L cìi.tì][H -.ntê-]>[L n`]   [H ŋá]
dem-SBJ   TRANS-3SG   find   donkey-DEF   tie-RES\ADJPRED-DEF   COPLOC

hállè ;   *à*   *qúsà*   *nàn*   *qáarù ?*
[hál][.lè]   [L à]   [qú][.sà]   [L nàn]   [H qáa][.rù]
behind   3SG   begin   INF   bray

It turned out that the donkey who was attached behind (the house) began to bray.

Táaxa\llénmà-n   *gódò."*   *Án*   *tì*   *màní ?*
{[H táa.xá][H -.llén][L .mà-n]}   [H gó][L .dò]   [H án]   [L tì]   [L mà][H .ní]
sit\RECP-DEF   exclaim   2SG   say   what?

Thei neighbour exclaimed: "What do you say?

Ń   *ɲìnmé,*   *ń*   *tàró-n*`   *ŋá*
[H Ń]   [L ɲìn][H .mé]   [H ń]   [L tà][H .ró-][L n`]   [H ŋá]
1SG   self   1SG   ear-DEF   COPLOC

hàré-n`          *qàaru-xanné-n*`   `*ŋá*   *ká-n*`   *pàllé!*
[L hà][H .ré-n]   <[L qàa.rù-.xàn][H .né-n]>   [L ŋà] [H ká-n]   [L pàl][H .lé]
donkey-DEF   cry-voice\STCONSTR-DEF   to   house-DEF   behind

I hear by myself the braying of a donkey behind the house!"

Àlimáamì-n`   *qá*   *bùtu-ntê-n*   *gódò,*
[L à.lì][H .máa][L .mì-n]   [H qá]   <[L bù.tù][H -.nté-]>[L n`]   [H gó][L .dò]
imam-DEF   also   get.angry-RES\ADJPRED-DEF   exclaim

"Án   ntá   yàagu-nu?
[H án]   [H ntá]   <[L yàa.gù-.nù]>
2SG   IPFV.NEG   be.ashamed-GER\L

An the imam exclaimed angrily: "Have you no shame?

Án   *cáqqa*   *hàré-n*   *ɲà*   *dìgan*   *qànné-n*`                  `*ŋá*
[H án]   [H cáq.qá]   [L hà][H .ré-n]   [L ɲà]   {[L dì.gàn]   [L qàn][H .né-n]}   [L ŋà]
2SG   believe.GER   donkey-DEF   foc   speech   voice-DEF   to

`

díinà   *àlimáamì-n*   `*ŋá*   `*bá?* "
[H díi.nà]   [L à.lì][H .máa][L .mì-n]   [H ŋá] [L bà]
rather   imam-DEF   to   Q

Do you believe donkey's words more than imam's?"

Glosses

ANTIP   antipassive marker

COPLOC	locative copula
DEF	definite article
DISTR	distributive construction marker *wó*
DISTR.L	low tone morpheme for the distributive construction
EQU	equative copula
FOC	focalisation marker
GER	gerund
IPFV	imperfective
INF	infinitive
L	L tone morpheme on verbs in negative, conditional constructions and after focalizer
NEG	negative
NMLZ	nominization
PFV	perfective
PL	plural
POSS	possessive postposition
POT	potential
ADJPRED	predicative function of adjective (LH tonal morpheme)
PST	past
Q	interrogative particle
RECP	suffix of the name of partner
REFL	reflexive pronoun
RES	resultative
SBD	subordination marker
SBJ	subject marker
SG	singulat
STCONSTR	status constructus
TRANS	marker of transitivity

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