Revisiting Tones in Twic East Dinka

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Abstract

This work is based on data elicited from a native speaker of the Twic East variety of Dinka. It focuses on tones, and shows that tones in Dinka can alter syntactic categories and word meaning, mark direct objects, indicate whether objects are viewable/present and distinguish plurality.

1. Introduction

This paper investigates tones in Twic East Dinka (a variety of Dinka), a Western Nilotic language spoken in South Sudan. Some literature reports that Luanyjang (Remijsen and Ladd 2008), Nyarweng (Remijsen 2010) Dinka have four contrastive tones and that Agar Dinka has three (Andersen 1992-1994). I am not aware of any literature touching on the tonal system of Twic East Dinka or the interface between tone and other phonological phenomena, morphology, syntax and semantics, except for one study on Twic East Dinka syntax (Yuan 2013). Three research questions have motivated this study: (1) how many surface contrastive tones does Twic East Dinka have; (2) What functions do tones have in phonology, morphology, syntax and semantics and (3) What are the contexts of tone sandhi in Twic East Dinka?

In general, tone is unlike accent and intonation. Tone can distinguish words lexically or grammatically, and tonal information is present as part of lexical representation. Accent can distinguish words, and typically two components, 'tone' and 'no tone', form a lexical contrast. For instance, in certain languages, H tone (accented) is active in phonological systems, and L (unaccented and treated as 'no tone') is supplied to the rest of toneless syllables or vice versa. Intonation cannot distinguish words lexically or grammatically, but it can be used in phrasal level. For instance, it can express emphasis or make a distinction between interrogative sentences (i.e., yes-no questions) and declarative sentences (see more discussion about tone, intonation and accent in Inkelas and Zec 1988, and Yip, 2002).

The paper is organized as follows. Section 2 presents background information about the language consultant. Section 3 shows five contrastive tone groups with corresponding vocabulary and pitch values for each tone group. Section 4 introduces the five functions of tones in Twic East Dinka phonology, morphology, syntax or semantics. Section 5 explores the contexts of tone sandhi. Section 6 concludes this paper.

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2. Language consultant

The language consultant was born and raised in Southern Sudan, speaking the Twic East dialect of Dinka.

He came to Canada to obtain his bachelor's degree at the University of Toronto. He was 21 years old, a fourth-year undergraduate student, when the elicitation sessions were conducted September-December, 2011.

3. Five Surface Contrastive Tones

In Twic East Dinka, the writing system does not encode tones as tonal languages like Mandarin do. With this concern, careful elicitation is necessary in order to investigate the exact number of tone values in Twic East Dinka. Currently five citation tones have been found, as presented in Table 1.

(ˆ) (tone 21) (Figure 1)	(¯) (tone 1) (Figure 2)	(¯) (tone 2) (Figure 3)	(¯) (tone 3) (Figure 4)	(¯) (tone 4) (Figure 5)
(1) [die:r^{21}] 'below the knee'	(7) [ɣam^{1}] 'thigh'	(13) [tuɔŋ^{2}] 'egg'	(19) [nɔk^{3}] 'feather'	(25) [piu^{4}] 'water'
(2) [ruɔn^{21}] 'year'	(8) [die:r^{1}] 'worry'	(14) [t̪ɔk^{2}] 'end'	(20) [wɪn^{3}] 'cow'	(26) [ɲi:l^{4}] 'python'
(3) [mɪɛm^{21}] 'hair'	(9) [kɔ:r^{1}] 'elbow, tornado'	(15) [piɔ^{2}] 'heart'	(21) [ca^{3}] 'milk'	(27) [tɛɔl^{4}] 'rock'
(4) [t̪i:m^{21}] 'trees'	(10) [ri:ɔ:c^{1}] 'fear'	(16) [ku:r^{2}] 'stone'	(22) [diek^{3}] 'three'	(28)[tɛa^{4}] 'milk'
(5) [wa:r^{21}] 'shoe'	(11) [ra:n^{1}] 'person'	(17) [cɔ̰k^{2}] 'leg'	(23) [ɣɔɣ^{3}] 'cows'	(29) [tul^{4}] 'hole'
(6) [kuin^{21}] 'food'	(12) [kar] 'run'	(18) [da:r^{2}] 'tiredness'	(24) [gʌc^{3}] 'people'	(30) [t̪in^{4}] 'see'

Table 1: Five citation tones

In order to determine the exact tone values of the five tones and to check whether the five tones are falling, level, rising, or contour, this paper examines five different words with these five tones by using Praat (see Figure 1-5).

Specially, the starting pitch value of Tone 21 is 125 Hz, the highest pitch value of Tone 21 is 150, and the ending pitch value of Tone 21 is 104, all of which show a falling curve. The average pitch values for Tone 2, Tone 3, and Tone 4 individually are: 124, 141, 163 and 173. After looking at the exact tonal values of these five tones, we know that only one tone is falling (ˆ), and the others are all level (¯) (see Yip (2002) and Hyman (2010) for the convention of tones). Based on the phonetic facts, this paper treats the five tones as Tone 21 (ˆ), Tone 1 (¯), Tone 2 (¯), Tone 3 (¯) and Tone 4 (¯) throughout. Interestingly, the number of vowels in the Tone 21 group is always greater than one.

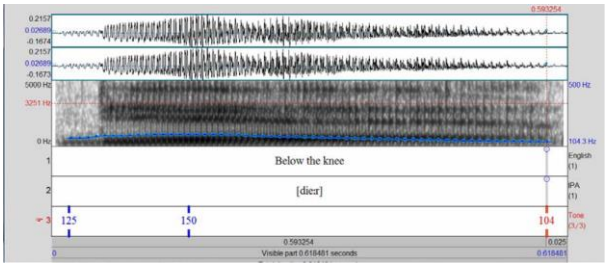

Figure 1 (Tone 21: beginning point = 125; highest point = 150 and end point = 104)

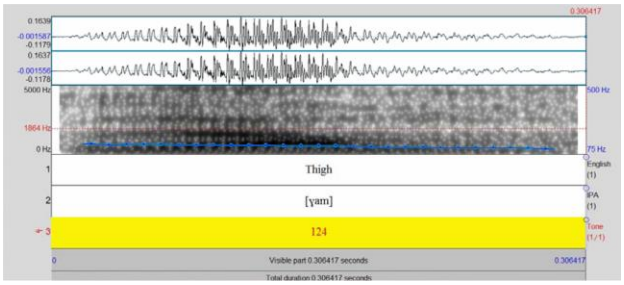

Figure 2 (Tone 1: average pitch value = 124)

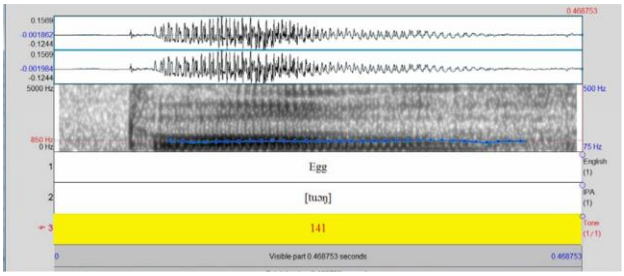

Figure 3 (Tone 2: average pitch value = 141)

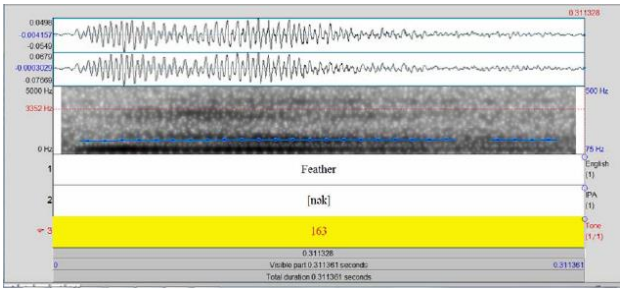

Figure 4 (Tone 3: average pitch value = 163)

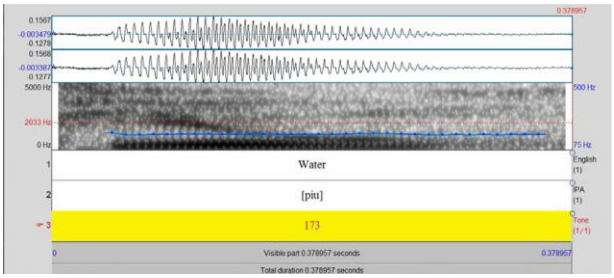

Figure 5 (Tone 4: average pitch value = 173)

In addition to the above discussion, two remaining issues need to be clarified. The first issue is that the language consultant said that sometimes it is harder to distinguish Tone 3 from Tone 4, because they sound very similar. It is also confirmed in my phonetic spectrograms that the tonal difference between Tone 3 'feather' (see Figure 4) and Tone 4 'water' (see Figure 5) is only 10 and that both of them are level instead of falling. Furthermore, it seems that we cannot distinguish or predict the contexts of Tone 3 and Tone 4. That is, words with these two tones individually could occur in syllables with short or long nuclei (i.e., one or two vowels). Therefore, if the tones are not perceptually distinct and their contexts of occurrence are quite similar, is it possible that Tone 3 and Tone 4 are actually one tone rather than two separate tones?

The other remaining issue is that someone may ask why Tone 21 and Tone 1 are not classified into the same contrast since the beginning pitch value of Tone 21 is roughly the same as the average pitch value of Tone 1 (125 vs. 124). However, I treat them as two different tone contrasts in terms of two reasons. First, in phonetic spectrograms, Tone 21 shows a falling curve, but Tone 1 shows a horizontal line. Second, in my current data, the contexts in which each tone occurs is not the same. Specifically, words with Tone 21 always have at least two vowels in the syllable, while the words with Tone 1 could have one, two, three or even four vowels in the syllable.

4. Five Functions of Tones in Phonology, Morphology and Syntax

In this section, the bulk of data will be presented and will show that Twic East Dinka tones bear five functions in phonology, morphology, syntax or semantics. First, tones can distinguish words lexically (see Table 2). For examples, (31) [akɔł^{2}] means 'sun', but if speakers pronounce this word with tone 1 (i.e., (32) [akɔł^{1}]) instead of tone 2, then the meaning will be 'day, afternoon'.

Tone 21 vs. Tone 1	Tone 2 vs. Tone 1	Tone 1 vs. Tone 4	Tone 4 vs. Tone 2
(1) [die:r^{21}] 'below the knee' (8) [die:r^{1}] 'worry'	(31) [akɔł^{2}] 'sun' (32) [akɔł^{1}] 'day, afternoon'	(35) [ki:r^{1}] 'Nile' (36) [ki:r^{4}] 'star'	(39) [t̪ɒn^{4}] 'thought' (40) [t̪ɒn^{2}] 'bull'
	(33) [cam^{4}] 'eat' (V) (34) [cam^{1}] 'left (side)	(37) [tɛʊm^{1}] 'special type of tree' (38) [tɛʊm^{3}] 'planting'	(41) [liep^{4}] 'tongue' (42) [liep2] 'tongues'

Table 2 Minimal pairs

Second, tones can distinguish singulars from plurals grammatically (See Table 3). That is, singulars are different from plurals only in tone values (cf. (43)-(52)). Moreover, plurals can be distinguished from singulars in two other ways: (i) the singular-plural contrast can be expressed by means of consonant or vowel mutation (in addition to potential tonal shift) (cf. (53)-(62)). Second, singular and plural can be distinguished by suppletion ((11) [ra:n^{1}] 'person' vs. (24) [gʌc^{3}] 'people').

Changing tones only	Changing tones and certain segments
(43) [kin^{4}] ‘hand’ [SG] (44) [kin^{1}] ‘hands’ [PL]	(53) [jɪ**t**^{4}] ‘ear’ [SG] (54) [jɪ**h**^{1}] ‘ears’ [PL]
(45) [ŋɪŋ^{1}] ‘eye’ [SG] (46) [ŋɪŋ^{2}] ‘eyes’ [PL]	(55) [**ɣ**um^{1}] ‘nose’ [SG] (56) [**uu**um^{2}] ‘noses’ [PL]
(47) [θɔk^{2}] ‘mouth’ [SG] (48) [θɔk^{1}] ‘mouths’ [PL]	(57) [riu**ö**^{2}] ‘nail’ [SG] (58) [riu:**p**^{1}] ‘nails’ [PL]
(49) [liep^{4}] ‘tongue’ [SG] (50) [liep^{2}] ‘tongues’ [PL]	(59) [a^{2}ma**l**^{1}] ‘sheep’ [SG] (60)[a^{2}m**e**l^{2}]
(51) [njul^{1}] ‘knee’ [SG] (52) [njul^{4}] ‘knees’ [PL]	(61) [bu^{2}r**o**^{1}] ‘cat’ [SG] (62) [bu^{1}r**a**^{1}] ‘cats’ [PL]

Table 3 Singular vs. plural

Third, words can change their syntactic category by alternating tonal values or segments (see Table 4). In Twic East Dinka, all verbs and adjectives should be inserted in sentences (cf. (70)-(76)). If you want to present these lexicon without putting into the sentences/phrases, they have to be presented in the form of nouns (cf. (63)-(69)).

Standing alone	In phrases or sentences
(63) [dɪr^{4}] ‘bigness’ [N]	(70) [dɪt^{1}] ‘big’ [Adj]
(64) [dɪ^{2}el^{1}] ‘red’ [N]	(71) [dɪl^{2}] ‘red’ [Adj]
(65) [lɔ^{21}] ‘go’ [N]	(72) [lɔ^{4}] ‘go’ [V]
(66) [cał^{1}] ‘walk’ [N]	(73)[cał^{2}] ‘walk’ [V]
(67) [bar^{4}] ‘come’ [N]	(74) [bar^{1}] ‘come’ [V]
(68) [biụ:k^{1}] ‘herd’ [N]	(75) [biụ:k^{2}] ‘herd’ [V]
(69) [pɪŋ^{4}] ‘hear, listen’ [N]	(76) [pɪŋ^{1}] ‘hear’ [V]

Table 4 Changing syntactic category

Fourth, tones seem to be able to encode the presence of a direct object (see Table 5). Specifically, when a direct object becomes explicit, the tonal value of the main verb changes and all breathy segments become non-breathy.

Implicit direct object	Explicit direct object
(77) du**ɔ̱**^{2}n**ɛ̱**^{1} c**a̱**m**^{1}** NEG.2SG 2SG.eat ‘Don’t eat’ (2rd sg)	(79) du**ɔ**^{2}n**ɛ**^{1} cam**^{4}** NEG.2SG.it 2SG.eat.**it** Don’t eat it (2rd sg)
(78) du**ɔ̱**^{2}k**ɛ̱**^{1} c**a̱**m**^{1}** NEG.2PL 2PL.eat Don’t eat (2rd pl)	(80) du**ɔ**^{2}k**ɛ**^{1} cam**^{4}** NEG.2PL.it 2PL.eat.**it** Don’t eat it (2rd pl)

Table 5 Direct object

Fifth, a suffix [ɛ] with two kinds of tones indicates whether objects are visible and can be pointed at (i.e., deixis, distance information) (see (81)-(84)). When a suffix -ɛ with Tone 1 is attached to an object noun, it means that people are able to point at this object (equal to the usage of ‘this’ in English) and that this object is visible (cf. (81) and (82)). However, when a suffix -ɛ with Tone 4 is attached to an object noun, it either means that people could point at that object or that the object is too far away to be pointed at (the general usage of ‘that’ in Dinka, cf. (83) and (84)). That is, the suffix -ɛ with Tone 4 is unspecified for proximal/distal, while the suffix -ɛ with Tone 1 is explicitly proximal. In addition to the suffix -ɛ, the demonstrative ti can be used to denote that object can be pointed at (specific usage of ‘that’ in Dinka) (cf. (85) and (86)).

-ɛ: this (pointing)	-ɛ: that (pointing & unseen)	ti: that (pointing)
(81) jɛ θɔn.ɛ^{1} DEM. bull.this-proximal ‘this bull’	(83)) jɛ θɔn.ɛ^{4} DEM. bull.that-proximal-or-distal ‘that bull’	(85) jɛ θɔn ti DEM. bull that-proximal ‘that bull’
(82) jɛ a^{2}mal.ɛ^{1} DEM. sheep.this-proximal ‘this sheep’	(84) jɛ a^{2}mal.ɛ^{4} DEM. sheep.proximal-or-distal ‘that sheep’	(86) jɛ a^{2}mal ti DEM. sheep that-proximal ‘that sheep’

Table 6 Demonstratives

5. The Contexts of Tone Sandhi

According to my current data, tone sandhi is a mystery that needs further study. Here I present my observation rather than concrete explanation. One tone sandhi rule seems to be found in Twic East Dinka: Tone 4 will become Tone 3 when it precedes another Tone 4, as in (87). For example, when (88) [cɛ^{4}] 'past' and (25) [piu^{4}] 'water' are combined together in a sentence (as in 89), [cɛ^{4}] will become [cɛ^{3}]. This tone sandhi rule could also be applied to (91) (cɛ**^{4}** + tɔŋ^{4} → cɛ**^{3}** + tɔŋ^{4}). However, if Tone 4 precedes Tone 2, no tone sandhi will occur (cf. (90)). That is, that this tone sandhi rule would apply in (91) if it were not blocked by a following Tone 2. Given this, perhaps Twic East Dinka exhibits an OCP constraint (Obligatory Contour Principle) that prohibits two identical tones adjacent to each other (see OCP in Leben 1973, Goldsmith 1976, Kager 1999). Nevertheless, one caveat is warranted: (88)-(91) are all examples of one specific structure (PST + N). Therefore further studies should investigate other structures to see if the tone sandhi rule (87) applies throughout the phonology.

In fact, I did find one exception in an imperative structure as in (92). No tone sandhi happens even though two Tone 4 (i.e., dɪt^{4} + gʌc^{4}) syllables are put together. In my further studies, I will also look at whether other imperative sentences also exhibit this kind of phenomena.

(87) Tone 4→ Tone 3/ __ + Tone 4

(88) [cɛ**^{4}]** 'past', [jɔr^{3}] 'find' [N] (25) [piu^{4}] 'water'

(89) ɣɛn^{2} cɛ**^{3}** piu**^{4}** jɔr^{1}
I PST water find
'I have found water'

(90) [tɔŋ^{4}] 'eggs' [PL] (13) [tɯɔŋ^{2}] 'egg' [SG]

(90) ɣɛn^{2} cɛ**^{4}** tɯɔŋ**^{2}** ɣaːc
I PST egg buy
'I have bought an egg'

(91) ɣɛn^{2} cɛ**^{3}** tɔŋ**^{4}** ɣaːc
I PST eggs buy
'I have bought eggs'

(92) dɪt**^{4}** gʌc**^{4}**
wait people
'Wait for people' (imperative)

In (93)-(97) are shown examples of the same tonal value for the main verb (i.e., Tone 1), but different tonal values of the direct objects from Tone 21 to Tone 4. However, no tone sandhi occurs, which implies that these five combinations, (Tone 1 + Tone 21), (Tone 1 + Tone 1), (Tone 1 + Tone 2), (Tone 1 + Tone 3), and (Tone 1 + Tone 4), do not induce tone sandhi.

Crucially, it seems that the OCP does not constrain and affect (Tone 1 + Tone 1) like (Tone 4 + Tone 4)[1]. It might be interesting to examine the other three combinations (Tone 21 + Tone 21), (Tone 2 + Tone 2), and (Tone 3 + Tone 3) to see whether the OCP could be applied to these three combinations.

(93) ɣɛn^{2} tar^{1} kuin^{21} I cook.PST prepared.food 'I am cooking the prepared food'	(96) ɣɛn^{2} tar^{1} wɪn^{3} I cook.PST cow 'I am cooking a cow'
(94) ɣɛn^{2} tar^{1} mɪɬ^{1} I cook.PST general food 'I am cooking the general food'	(97) ɣɛn^{2} tar^{1} dɪt^{4} I cook.PST bird 'I am cooking a bird'
(95) ɣɛn^{2} tar^{1} tuɔŋ^{2} I cook.PST egg 'I am cooking an egg'	

I also found a complex tonal change in one specific structure, N1 of N2─ possessive structure. In (104), Tone 4 ([dɪt^{4}] 'bird') will become Tone 21 when following a word starting with Tone 1 ([dɛ^{1}] 'of') (i.e., Tone 4→ Tone 21/ Tone 1+ __). It looks like Twic East Dinka will try to decrease the perceptual difference of tones when two adjacent

[1] Yip (2002) said that in African languages, sometimes OCP can be violated to satisfy other higher ranked OT constraints.

tones sound distinct (Tone 1 + Tone 4: Tone 2 and Tone 3 lies between them). It might be worthy to see whether the combinations of (Tone 21 + Tone 4) or (Tone 2 + Tone 4) also induce any tone sandhi that could make the tonal values of two adjacent tones become closer to each other.

In (105), Tone 3 ([nar^{1}] 'fathers') becomes Tone 2 when *preceding* Tone 2 (i.e., Tone 3→ Tone 2/ __ + Tone 2). In (112), Tone 3 (gʌc^{3}) becomes Tone 2 when *following* Tone 2 (i.e., Tone 3→ Tone 2/ Tone 2 + __). Surprisingly, both tone sandhi phenomena will make two adjacent tones identical, which contradicts what the OCP proposes. More data like (105) and (112) need to be collected to figure out this puzzle.

In (110), Tone 1 ([ra:n^{1}] 'person') becomes Tone 3 when following a word starting with Tone 1 ([dɛ^{1}] 'of') (i.e., Tone 1→ Tone 3/ Tone 1 __). However, in (111), Tone 1 does not become Tone 3, even though it follows another Tone 1. Is this tone sandhi random or predicable? If it is predicable, perhaps it is possible that this tone sandhi rule interacts with plurality. That is, this tone sandhi happens only when both N1 and N2 are singular. If either N is plural (i.e., [kɛ^{2}] 'of' gets involved), then no tone sandhi will happen. In order to figure out whether this tone sandhi is predicable, any further study should look at more tonal examples about 'N1 of N2' like (110) and (111).

(98) [dɪt^{4}] 'bird'
(19) [nɔ**k**^{3}] 'feather'
(101) [bu^{2}ro^{1}] 'cat'
(53) [jɪ**t**^{4}] 'ear'
(11) [ra:n^{1}] 'person'
(7) [ɣam^{1}] 'thigh'

(99) [dier^{1}] 'birds'
(100) [nar^{1}] 'fathers'
(102) [bu^{1}ra^{1}] 'cats'
(54) [jɪh^{1}] 'ears'
(24) [gʌc^{3}] 'people'
(103) [rɔ:m^{1}] 'thighs'

(104) nɔ**n**^{3} dɛ^{1} dɪt^{21}
feather of bird
'bird's feather'

(105) nar^{2} kɛ^{2} dɪt^{4}
feathers of bird
'bird's feathers'

(106) nar^{1} kɛ^{2} dier^{1}
feathers of birds
'birds' feathers'

(107) jɪ**n**^{4} dɛ^{1} bu^{2}ro^{1}
ear of cat
'cat's ear'

(108) jɪh^{1} kɛ^{2} bu^{2}ro^{1}
ears of cat
'cat's ears'

(109) jɪh^{1} kɛ^{2} bu^{1}ra^{1}
ears of cats
'cats' ears'

(110) ɣa**m**^{1} dɛ^{1} ra:n^{3}
thigh of person
'person's thigh'

(111) rɔ:m^{1} gɛ^{1} ra:n^{1}
thighs of person
'person's thighs'

(112) rɔ:m^{1} kɛ^{2} gʌc^{2}
thighs of people
'people's thighs'

In addition to tone sandhi, I also found an interesting phenomenon regarding nasalization. Regarding (104), (107) and (110), it is possible that a floating feature [nasal] is on an initial consonant [d] of the word ([dɛ^{1}]). When word A precedes [d] of [dɛ^{1}], that floating feature [nasal] will be specified and linked to that final oral consonant of word A. If that final consonant of the word is a nasal, then no nasalization will occur. Note that this could not be explained by [+anterior] assimilation. If this is [+anterior] assimilation, a final consonant [m] of [ɣa**m]** in (110) should become [n], since [n] shares a feature [+anterior] with [d] of [dɛ^{1}]. However, in (110), [m] of [ɣa**m]** does not change into [n].

This nasalization also occurs in another structure as shown in (113). In (113), when (98) [dɪt^{4}] 'bird' and (57) [dɪt^{1}] 'big' are combined together, [dɪt^{4}] 'bird' will change into [dɪn^{4}]. Interestingly, even if a phrase (115) 'big singing' is made up, nasalization still occurs.

(98) [dɪ**t**^{4}] 'bird' [N] (63) [dɪr^{4}] 'bigness'

(113) dɪ**n**^{4}] dɪt^{1}]
bird big
'big bird'

(114) [kɛ**t**^{4}] 'singing' [N]

(115) kɛ**n**^{4} dɪt^{1}
singing big
'big singing'

6. Conclusion

Twic East Dinka, a tonal language, has abundant morphophonological alterations and complex tone sandhi. My current study tried to answer three research questions, namely (1) how many surface

contrastive tones does Twic East Dinka have; (2) What functions do tones have in phonology, morphology, syntax or semantics and (3) What are the contexts of tone sandhi in Twic East Dinka? For question (1), I propose that there are five tones: Tone 21, Tone 1, Tone 2, Tone 3 and Tone 4. Note that these five tones are named after their contours, and not named in sequence like Mandarin tones are. For question (2), five functions of tones are found: (a) tones can distinguish words lexically; (b) tones can distinguish plurality grammatically; (c) tones can alter syntactic categories; (d) tones can mark the presence of a direct object and (e) tones can offer information whether objects are visible to present observers. For question (3), the tone sandhi phenomena are too complex to get a clear picture. Sometimes tone sandhi makes two adjacent identical tones become different, sometimes tone sandhi make two adjacent different tones become the same, and sometimes tone sandhi makes two adjacent different tonal values become closer. For the moment, only one clear tone sandhi rule is found in Twic East Dinka: Tone 4→ Tone 3/ __ + Tone 4. However, this rule might be exclusive to one specific structure (PST + N). More data need to be collected in order to figure out when and where tone sandhi will occur, and what kinds of tone sandhi there are.

References

Andersen, Torben. 1992-1994. Morphological stratification in Dinka: On the alternations of voice quality, vowel length and tone in the morphology of transitive, verbal roots in a monosyllabic language. Studies in African Linguistics, 23, 1-63.

Goldsmith, John. 1976. Autosegmental Phonology. PhD Dissertation, MIT (Published 1979, New York: Garland).

Hyman, Larry. 2010. How to Study a Tone Language, with Exemplification from Oku (Grassfields Bantu, Cameroon). UC Berkeley Phonology Lab Annual Report.

Inkelas, Sharon and Draga Zec. 1988. Serbo-Croatian pitch accent: the interaction of tone, stress, and intonation, Language, Vol. 64(, No. 2), 227-248.

Kager, René. 1999. Optimality Theory. Cambridge: Cambridge University Press.

Leben, William. 1973. Suprasegmental Phonology. PhD Dissertation, MIT.

Proceedings of the 2013 annual conference of the Canadian Linguistic Association.

Remijsen, Bert and Robert Ladd. 2008. The tone system of Luanyjang Dinka. Journal of African Languages and Linguistics, 29(2), 149-189.

Remijsen, Bert. 2010. Tone systems of Dinka dialects. Paper presented at the Fourth European Conference on Tone and Intonation (TIE4), Stockholm University, September 9-11, 2010.

Yip, Moira. 2002. Tone. Cambridge: Cambridge University Press.

Yuan, Michelle. 2013. Ā-fronting in Dinka (Twic East): Evidence for a left-peripheral domain below CP.