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Downdrift and Downstep in Luo

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1. Scope

Luo is a Nilotic language spoken principally in Western Kenya. It combines a rich and complex tonal system with an equally rich and complex intonational system. In this paper we can do no more than give bare mention to those aspects of tone, stress and intonation which are not relevant to downstep and downdrift. For a full analysis of Luo phonology and tonology the reader is referred to Tucker (forthcoming). The terminology presented here is also due to Tucker and is discussed in greater detail in Tucker (forthcoming).

In this paper we discuss in detail a new type of downdrift which operates in Luo along with other well-known tonal and intonational processes. Our auditory analysis has been supplemented by two kinds of instrumental data: tonometer readings (University of London) and pitchmeter readings (University of Toronto). As the former are presented in Tucker (forthcoming) we utilize here only the pitchmeter readings. Over four hundred words, phrases and sentences form the corpus for our report here, but the corpus is open-ended in that we are continually adding to it. On the basis of the instrumental evidence we will suggest an analysis of the interrelationships of the various phenomena comprised under the headings of downstep and downdrift.[1]

2. Definitions and notational conventions

In Tucker and Mpaayei (1955:170) downdrift was defined as "the gradual sinking of the voice as the sentence proceeds." An explanation of this definition immediately followed and characterized the context in which downdrift occurs in Maasai: "A safe rule to follow is: when a low tone occurs after a high tone, all subsequent high tones will be in a lower key." Downstep was characterized in the following way: "Normally two or more consecutive high tones have the same pitch... There are occasions, however, when a high tone, even when immediately following another high tone, is depressed, and may be said to 'step down' to mid" (1955:172).

In the present paper we wish to revise these definitions slightly in order to make provision for the new type of downdrift found in Luo. The kind of downdrift found in Maasai will be called explicit downstep. Further types of downstep and downdrift are characterized below (sections 5 and 6).

A modified form of the Westermann system is used for tone-marking (a̱ stands for any vowel): á̱ (high), ꜝá̱ (downstep), â̱ (high falling), a̱ (i.e., unmarked, low), ǎ̱ (rising), à̱ (low falling).

Stressed syllables (usually stem syllables) are pronounced with lengthening unless CV in word final position. This lengthening is indicated in transcription with a raised dot. Normally stress is greatly reduced in non-terminal position in an intonation group.

Pitchmeter readings are given in Herz (rounded to the nearest Hz). Initial voiced consonants have a pronounced depressing effect on pitch, and such pitch readings are distinguished by giving the appropriate consonant symbol in brackets following the pitch number. A discussion of the pitch perturbations caused by adjacent consonants is given in Léon and Martin (1972).[2]

3. A brief comparative overview

In many East African languages which we have studied, sequences of continuous high tones are of constant pitch. It would also appear (Schachter 1969) that many West African languages are of similar type. We give examples for Maasai and Nandi-Kipsigis:

(1) Maasai embúlótó 'piercing'
(2) Kipsigis ké·cí·rék 'sheep'
(3) Nandi ɑ́wé·ndí· 'I'm going'

In Nandi, low tone sequences are also of constant pitch:

(4) Nandi kɑ·ro·n 'morning'
(5) Nandi lagat 'evening'

In Kipsigis in a series of low tones (which conclude an utterance or constitute an utterance), the final low tone is lowered slightly:

(6) Kipsigis laŋat 'evening'

In Luo in a series of contiguous tones of the same type (high or low), pitch falls steadily throughout the utterance:

(7) Luo sígá·ná 'story'
(8) Luo rawɛ·ra 'boy'
(9) Luo pá·lá 'ochre'
(10) Luo pa·la 'knife'
(11) Luo mɔ́·n 'women'

It is towards a specification of the nature and scope of this phenomenon in Luo that our paper is directed.

4. Tonal processes

(The following discussion is of necessity highly incomplete.)

4.1. High tone spreading (this term is from Hyman and Schuh 1973). A high tone raises a following low tone:

> (12) rị·ŋó 'meat' + bɛ·r 'good' rịŋó bɛ̂·r 'meat is good'

4.2. Rising tone simplification. A rising tone becomes a low tone before a following syllable which is itself raised if it is low:

> (13) ɔ̌·k 'not' + aŋệ·yo 'I know' ɔk áŋệ·yo 'I don't know'
> (14) sǎ 'watch' + mábɛ̂·r 'which is good' sa mábɛ̂·r 'watch which is good'

As a rising tone is readily analysed as a sequence of L + H, rising tone simplification is simply a case of high tone spreading.

4.3. Falling tone simplification. Basically a falling tone on a non-stressed (short) vowel commutes to a high tone, but there are three distinct subprocesses:

I. A falling tone plus a high or high falling tone commutes to a high tone plus a downstep (implicit downstep):

> (15) ɲá·kɔ̂ 'girl' + mɔ́·rɔ̂ 'some' ɲákɔ́ mɔ̄́·rɔ̂ 'some girl'

II. A falling tone which is preceded by a high tone commutes to a high tone, and a following low tone is heard as a low falling tone. Monosyllabic CV stems must be analysed as CV́^ (H + F) although they are phonetically CV̂ (H + L):

> (16) lệ 'animal' + bɛ·r 'good' lẹ́ bɛ̀·r 'the animal is good'
> (17) ɲá·kɔ̂ 'girl' + bɛ·r 'good' ɲákɔ́ bɛ̀·r 'the girl is good'

III. Elsewhere a falling tone followed by a low tone commutes to a high tone without altering the following low:

> (18) rawẹ·rê 'boys' + bɛ·yo 'good' rawẹré bɛ·yo 'the boys are good'

5. Downstep

5.1. Explicit downstep. A low following a high tone results in a change of 'key' with the new 'key' being lower than the former 'key'. All subsequent high or falling tones will be in this lower key. A high falling tone also results in a new key for following tones and hence may be analysed as a sequence of High + Low.

> (19) gị́ nɩ kɛ̂θɔ́ mọ̄́·n,... 'this thing affects women,...'
> 166 128 142 103-117

This example also contains an instance of implicit downstep: kɛ́θɔ̂ mɔ̀·n.

(20) mɔ̱́n ówɩtɔ náŋgá mɔ́rɔ̂ ɔ·- kɔ́
155 128 133 135 128-105 110-108 'the women have thrown the other cloth away'

5.2. Implicit downstep. As noted above (4.3) the commutation of a falling tone in non-final position to a high tone also entails the lowering of a following high or falling tone. Note that the degree of lowering is exactly the same as when an intervening low is present (explicit downstep). Evidently explicit and implicit downstep may be considered to be the same process from a phonetic point of view.

(21) ɟi lʊ́ɔ́ŋgó mɔ̱̀·n
122 136-51 129-112 'the people are calling the women' (lʊ́ɔ̱́·ŋgô 'are calling')

(22) ɲa- θɩ́ kẹ̀·tó pɔ́kɔ̂ mɔ́rɔ̂ pɩ̀·ɲ
122 160 148 137 132-26 110-101 'the child is putting the other gourd down' (ɲaθɩ̂ 'child', kẹ́tô 'is putting', pɔ̂·kɔ̂ 'gourd', mɔ̂·rɔ̂ 'other', pɩ̂·ɲ 'down')

5.3. Grammatical downstep. High tones in a number of grammatically defined contexts are lowered (downstepped) following high tones:

(a) The high tone stem of verbs in the Imperfect Aspect:

(23) wá-nɩ̀ndɔ̂ ka̋ 'we sleep here' (nɩ́·ndɔ̂ 'sleep')
145 130 125 113-103

(b) The suffix of the verb in Qualitative forms:

(24) bɩ̧́·ló 'to do tasting or dipping'
110(b) 135 110

(25) ɲa-θɩ́ bɩ̀· - ró 'the child is coming'
115 143 135 110

This example also contains an instance of implicit downstep: ɲaθɩ̂ + bɩ́·ró ɲaθɩ́ bɩ̀·ró

5.4. Lexical downstep. Many words contain built-in (unpredictable) downstep (see Fromkin 1972 for a general discussion of this phenomenon):

(26) ŋɩ́ẹ́· - ló
125-138 115-108 'python'

(27) ndẹ́· - dẹ́
113(nd)138 118-110 'purse'

It is clear that 5.1-4 all embrace the same phenomenon from a phonetic standpoint.

6. Downdrift

The essential characteristics of downdrift are that it is (1) a gentle pitch fall, i.e., the rate of fall is much less than with a falling tone, (2) a constant fall, i.e., the rate of fall remains constant, again unlike a falling tone or the transition between two tones in the absence of downdrift, (3) a continuous fall (consonantal environment permitting, i.e., a fall which operates within syllables and across syllables (and words) in essentially the same fashion. In Luo under certain conditions downdrift operates unimpeded, while in others its operation is attenuated or suspended. We note, however, that unlike Hausa (Schachter 1965, cited in Hombert 1974), downdrift operates both in declarative and interrogative utterances. Interrogatives in Luo are characterized by an initial placement of pitch which is much higher than with declarative utterances (some data on this is presented in Creider 1975).

6.1. Unimpeded downdrift.

(a) of low tones

A sequence of low tones (including utterances of a single syllable) is affected by downdrift. In addition low tones preceding a high falling tone on a non-stem syllable are subject to downdrift.

(28)	pι·θ 118-103	'wealth in cattle'
(29)	pa·la 110-95	'knife'
(30)	pɛ 123-98	'hailstone'
(31)	gwɛ· - nɔ 105(g)115-90	'chicken'
(32)	kιɛ·wɔ 120-95	'to paint, paddle'
(33)	ra-wɛ· - ra 113 113-103 95	'boy'
(34)	pala bɛ·r 125 - 93	'the knife is good'
(35)	ɟI okẹ - lo pa·la 133 128-120 115-103	'the people have brought a knife'
(36)	ryọ - θ ɔnɛnɔ rawɛ·ra 128(r)133-125 125- 98	'the chief has seen the boy'

(b) of high tones

Similarly any sequence of high tones (including utterances of a single syllable) ending in a high tone or (on a non-stem syllable) a high falling tone is subject to downdrift.

(37)	mộ́·n 138-123	'women'
(38)	gʊ́ẹ́·n 121-112	'chickens'

(39) sɪ́ 'pullet'
139-125
(40) a - gʊ́· -lʊ́ 'pot'
118 130-123-115
(41) mɔ̧́n nɪ́gɪ́ ná̧ló mɔ́·kɔ́ 'the women have some wire'
135 - 103 (continuous fall)
(42) ɟi nɪ́-gɪ́ sɪ́ 'the people have a pullet'
118 123 118 113
(43) pɪ́ɲ nɪ́gɪ́ lȩ̂ 'the country has game'
125 113-110

6.2. Attenuated downdrift

(a) of low tones

Downdrift of low tones is partially or completely suspended by a following high or (stem syllables only) high falling tone. Under certain conditions upsweep is found also (see below section 7).

(44) rʊo̧θ ɔ-nɛ- nɔ sɪ́ 'the chief has seen the
125 123 120 123-110 130-118 pullet'
(45) ɟi o - ke - lo pa - la má-bɛ̂·r
133 125 123 123 118 125 125 130-113 'the people
have brought a good knife'

(b) of high tones

If a high tone sequence ends in a low tone, a downstepped high tone or a high falling tone (stem syllables only), downdrift may be wholly or partially halted. Again upsweep is sometimes found.

(46) pá-lá bɛ̂·r 'ochre is good'
138 140 135-110
(47) pɪ́ɲ nɪ́gɪ́ lȩ́ mə̀-θó̧̂θ 'the country has much
140 140 140-153 135 110-105 game'
(48) wɟ-wá pók ó - wɟ·l· 'we have not forgotten'
128 140 145 150 112-107 (lit. our heads have
not yet been twisted)

7. Upsweep

A very interesting intonational phenomenon in Luo is that of upsweep--a relatively rapid rise in pitch which may extend over several syllables. A partial and incomplete generalization which may be made is that upsweep occurs in those environments in which downdrift is attenuated. Upsweep is not an inverse of downdrift, however. It is a more localized phenomenon, being most noticeable in the syllable immediately preceding a tonal change. Thus it is regularly found within single words of the H + D, H + L, H + F (where the F is on a stem syllable), L + H, L + F (where the F is on a stem syllable).

(49) ndȩ̂·- dè 'purse'
125-145 108
(50) pɛ́· - nɔ̀ 'that hail'
143-150 150-103

(51) ŋgʊ̨́·r - mè 'pig'
128-140 100
(52) gɩ́ - mɩ́ɛ·l 'they have danced'
135-150 158-100
(53) r - ɟ - ŋɔ́ bɛ̂·r 'the meat is good'
113(r) 124-132-145 155-105

Upsweep is also found in longer sequences where the conditioning tone is in a following word. Even here, however, it rarely extends more than a few syllables back from the conditioning syllable.

(54) ɔr kę́-lɔ́ gꜜʊ̨ę́·n 'the brother-in-law brings
123-130 140-148 118-113 chickens'
(55) ɟi nɛ́ - nɔ́ lʊ̨̏·m 'the people see the grass'
113(ɟ)125 135 145 100
(56) bɩ̂- m kꜜɔ̨́ - c cɔ̏·θ 'the baboon is very
95(ɓ)138-155 138-140 130-97.5 cruel'

8. Discussion

A recent paper by Hombert (1974) constitutes the point of departure for our discussion of downstep and downdrift in Luo. We would like to acknowledge the stimulation of this paper, and also to indicate that we are in complete agreement with Hombert's principle thesis that tone (i.e., lexical and grammatical tone) and downdrift interact with one another in important ways.

Hombert proposes an ingenious perceptual explanation for the occurrence of downdrift over consecutive high tones: such downdrift is found just in those languages where there is no mid tone or downstepped high to create a perceptual confusion in that position. We see immediately that Luo is a language which at first examination appears to be a counter-example to Hombert's hypothesis since in Luo downstepped high tones are of frequent occurrence. However, closer examination shows that since sequences of high followed by D are characterized by upsweep, the need to avoid the fall (due to downdrift) of consecutive high tones is obviated. That is, upsweep may be seen to be an alternative to suspension of downdrift which is available to languages with downstep (and perhaps mid tones).

In our discussion of downdrift and downstep in Luo we have differed with Hombert in one important terminological respect: for Hombert downdrift is "the lowering of like tones (consecutive or not) (1974:172)." Throughout this paper we have been careful to distinguish downdrift from (explicit) downstep. At this point we may summarize our reasons for so doing. While downdrift and downstep are both intonational phenomena in the sense of operating across word boundaries (Lehiste 1970:54) we feel that downstep is more nearly a tonal process than downdrift (which is purely intonational) and that in sum there are sufficient differences between the two processes to warrant their being distinguished terminologically. Some of the differences which have led us to this conclusion are the following:

(1) Explicit downstep is readily convertible, via sound change, into grammatically significant downstep. We have no evidence that suggests that downdrift may be similarly 'grammaticized'.

(2) The domain of downdrift is both greater and smaller than that of downstep in the sense that downdrift operates within a single syllable and across stretches of many syllables. The operation of downstep is always specifiable in terms of an interaction between two adjacent syllables.

(3) Although we are not able at this point to provide instrumental evidence for our conjecture, it seems to us that the notion of a 'change of key' in downstep is a valid one and that tonal relationships are preserved unaltered after a change of key. Downdrift is inherently 'atonal' and neither produces a change of key or is localizable in a key. (In partial support for this claim we may note that Luo speakers are readily able to assign tonic sol-fa values to Luo utterances (including instances of explicit downstep), but cannot handle downdrift in this fashion.)

(4) It is possible to see downstep (including explicit downstep) operating when the operation of downdrift is suspended. Examples:

(57) ɔmák(ɔ) alʊ́rʊ́ kǫ̍ró nɪ̂ 'he has just caught a quail'

(here the final word suspends downdrift on kǫro but does not prevent downstep from operating).

(5) Most importantly, downdrift and downstep are not in complimentary distribution: it is readily possible to see downdrift superimposed on downstep. Examples:

(58) rawɛr(a) ɔmak(ɔ) alʊ́rʊ́ kǫ̍·rô 'the boy has caught a quail now'

(with both downstep and downdrift on the final word)

(59) wɩɲɔ́ wɛ̍̂r 'the bird sings'

(downstep and downdrift)

(60) wɩɲɔ́ wɛ̍r ahɪ́·ɲâ 'the bird sings much'

(downstep, both explicit and implicit; downdrift only on last word).

9. <u>Summary</u>

In this paper we have tried to accomplish three objectives: (1) present a relatively thorough documentation of the operation of a type of downdrift which is not widely known. (2) report on the existence of a new intonational phenomenon, upsweep. (3) present a terminology which is geared to the requirements of Luo, but which may readily be utilized with other tonal languages. In connection with this we have tried to show how phonetic data support our terminological suggestions.

We believe that in Luo downdrift and downstep (as we have defined them) are integrated parts of an intonational system. We would, however, suggest that it will be more profitable, in the search for cross-language explanations of these phenomena, to consider the possibility that the two phenomena will have explanations which differ in at least some important respects.

Footnotes

[1]The Luo utterances analysed with the pitchmeter were first recorded on a Nagra 4.2 and then fed into the pitchmeter. The pitchmeter output is recorded on light-sensitive paper and numerical readings may be obtained from this paper output. The accuracy of the pitchmeter is about one per cent. At 100 Hz (which is approximately the base line of the Luo speaker who was recorded) this amounts to 1 Hz. Most of the pitch phenomena we discuss are spread out over a range of at least 10 Hz. The operation of the pitchmeter is discussed in Léon and Martin (1972). We would like to thank Professors Léon and Martin for their kindness in allowing us to use the pitchmeter, and also to thank Professor Malcah Yaeger for her persistence in encouraging us to use it.

[2]Explanation of non-tonal notation: θ and ð are dental explosives; the cedilla is used to mark inherently close vowels. The quality of such vowels is in some instances quite distinct from that of vowels which are close due to vowel harmony processes. Compare ðo̧·gí̧ 'your cattle', ðó·gi̧ 'your mouth' (ðo̧·k 'cattle', ðɔ·k 'mouth); kȩlû̧·rú 'bring (pl.)!', kelû̧·rú 'plant apart (pl.)'. (kȩ·lo 'to bring', kɛ·lɔ 'to plant apart').

Tone is highly functional in Luo both grammatically and lexically. Minimal pairs abound: ki̧·c 'orphan', kí̧·c 'bee'; ɔlá·ŋ 'bell', ɔlâ·ŋ 'black ant'; kȩ·ndo 'hearthstone', kȩ·ndó 'again', kȩ́·ndȯ 'marriage'; amô̧·so (ɟi̧) 'I greeted (the people)', ámȯ̧·só(ɟi̧) 'I am greeting (the people)'; ámȯ̧·sȯ 'I am greeting', etc.

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