DOWNSTEP AND PHONOLOGICAL PHRASES IN NORTHERN KIKUYU

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OUTLINE

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- The tonal effects of downstep
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- (Tone and polarity focus)
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INTRODUCTION:
KIKUYU (GIKUYU, GEKOYO, GIGIKUYU)

- A Bantu language (E51)
- About 6.6 Million speakers
- Spoken in the central province of Kenya

5 Dialects:
- Southern-Kikuyu,
- Northern-Kikuyu,
- Gichugu, Mathira and Ndia

(Lewis, Paul et al. 2014)
INTRODUCTION:

Northern Kikuyu (N. Kikuyu):
- Spoken in Northern Murang’a, Nyeri

Ford (1976):
- Compares N. Kikuyu with:
  - Kikamba [E.55], Embu and Mbeere [E.52], Gichuka [E.541], Mwimbi-Muthambi [E.531], Imenti, Kitharaka [E.54] and Tigania.
- N.Kikuyu Language: The only attested dialect with a two-tone distinction and downstep
- ”The most conservative Kikuyu dialects, both tonally and segmentally, are in the northern area.“
- Benson (1964) lists forms specific for N. Kikuyu that are Maasai loanwords (Eastern Nilotic language)
  - Language contact with Masaai?
INTRODUCTION:

KIKUYU

Studies on:


However:

- Tone annotation is often absent in texts and studies on other topics than tone itself (exception: Morimoto 2014)
- No up-to-date studies on tone to my knowledge
INTRODUCTION

BASIC LANGUAGE FACTS

Syntax:
- SVO language
  - Modifiers follow the head

Phonology and Tone:
- Surface H(igh) [á] – L(ow) [à] tonal distinction
- Syllable is the Tone Bearing Unit (TBU)
  - V, CV, NCV, NCGV
  - VV can be monosyllabic [ɛí] or bisyllabic V.V [riá]
Introduction

Basic Language Facts

Tone:
- Contour tones: falling [â] and rising [ã]
- A number of complex tone rules:
  - Bounded High Tone Spreading (HTS) across word boundaries
  - Non finality (=Flattening C&F 1981)
  - Rising Tone Simplification
  - Word final H tone lowering (lexical restricted)
  - Floating H and L tones
  - ...
  - Downstep: triggered by floating L tones
A lowering mechanism triggered by a specific phonological tone, typically an L” (Yip 2002:262)

**Automatic downstep:** (=downdrift/declination)  
- Phonologically predictable  
- Is not indicated in phonetic transcription: H L H

**(Non-automatic) downstep:**
- Non-predictable  
- Indicated by ↓ or !

- Can lower adjacent H tones (= OCP phenomenon)  
  /HH/ → [H↓H] Typical case for Bantu languages (e.g. Shambaa, Pare, Namwanga, Nyore) Nurse & Philipsson (2003)

- Affects most commonly H tones but can also affect L tones  
- Can be triggered by a floating L tone (Bamileke, Kikuyu) (Gussenhoven 2003)
INTRODUCTION

DOWNSTEP

- The conditioning of downstep can be:
  - Purely phonological
  - Grammatical, lexical or **syntactic**

- Downstep applies across word boundaries within certain *domains* of the prosodic hierarchy (= Tone Sandhi)
INTRODUCTION

THE PROSODIC HIERARCHY

\[
\begin{align*}
\mathbf{U}: & \text{ utterance} \\
\mathbf{I}: & \text{ intonational phrase} \\
\varphi: & \text{ phonological phrase} \\
\omega: & \text{ p-word (aka phonological word, prosodic word)} \\
\mathbf{F}: & \text{ foot} \\
\sigma: & \text{ syllable} \\
\text{segment} & \\
\end{align*}
\]

Nesbor & Vogel & Vogel (1986), Selkirk (1984) and many others
INTRODUCTION

PROSODIC DOMAINS

Phonological-phrase $\varphi$: Corresponds to the syntactic phrase XP

Example: Liaison in French: applies across word boundaries within a phonological phrase (a)
Not across two phonological phrases (b)

a) Cette famille a (trois beaux _enfants)$\varphi$
   ’This family has three beautiful children’

b) Les enfants (sont allés)$\varphi$ à l’école
   ’The children went to school.’

Nesbor & Vogel (1986)
**INTRODUCTION**

**DOWNSTEP**

**Downstep most commonly applies within a domain** (Yip 2002)
- Downstep is interrupted and pitch resets at the start of a new domain

*Downstep domains:*
- The intermediate-phrase: Japanese and Basque (Pierrhumbert & Beckman 1988, Elordieta 1997)
- The intonational phrase (English, French and Dutch) (Gussenhoven 2004)
Downstep domains in Bantu languages:

- **Within the prosodic word PW:** Bamileke-Dschang (Hyman 1985)

- **Within phonological phrase (?):**
  Setswana: Downstep between H-final subject noun and H-initial transitive verb: H # H → [H #↓ H] (Creissels 1998)

- **Within the IP:** Chichewa (Kanerva 1990)
INTRODUCTION

DOWNSTEP IN NORTHERN KIKUYU

Downstep appears to be specific to N. Kikuyu
• All studies are on this dialect C & F (1981)
• Own data from Southern Kikuyu speaker did not attest downstep

○ Floating L tone → Downstep [↓]
  • Belongs to the tonal pattern of certain nouns, modifiers and the affirmative verb (exception: imperative and conditional mode)
  • C& F 1984b: The floating tones derive diacronically from Tone shift: each original tone has moved one syllable to the right:

○ Kikamba: ā ā ā Kikuyu: ā ā ā↓

C & F (1979): The extra L tone in Kikamba [E55] corresponds to downstep in Kikuyu

○ N. Kikuyu could have developed downstep through language contact with Maasai: a two-level tone language with downstep (Ford 1976)
INTRODUCTION

N. KIKUYU DOWNSTEP

- Detailed and accurate work from:
  - C & F (1981)

N. Kikuyu downstep:
  (i) Interacts with other tone rules
  (ii) Is sensitive to syntactic structures

- Many rules introduced to account for (i) and (ii) in Clements & Ford (1981)
INTRODUCTION

THE MANY RULES OF DOWNSTEP IN KIKUYU

Five downstep rules for a surface representation:

KU-1 Downstep permutes to the right of the first constituent of the verb
KU-4 Deletion of downstep between a noun and a complement
KU-6 Downstep degemination $\downarrow \downarrow \rightarrow \downarrow$
KU-7 Downstep displacement
KU-12 Double downstep deletion $\downarrow \downarrow \rightarrow \emptyset$

Clements & Ford (1981)
1. Reproduction of data with pitch tracks + new data
2. Simplification of the rules
Introduction

Data collection

- Data from two native speakers of Kikuyu (female):
  - A southern Kikuyu speaker (Preparatory work)
  - A northern Kikuyu speaker (Main study)

- Microphone: Sennheiser ME 64 and MKH 20-P48, Beyerdynamic Opus 54.16
- Sampling rate: 44.1 kHz (16-bit)

- Context setting question for each target sentence
- Three repetitions each
TONAL EFFECTS OF DOWNSTEP
TONAL EFFECTS OF DOWNSTEP

PITCH LOWERING

/...H↓H(...)/ /...L↓H(...)/:

- The downstepped H is realized with same pitch as a L tone /↓H(...)/ → [L]

/...L↓L(...)/

- The downstepped L tone is realized with a lower pitch than the preceeding L tone

C & F (1981)
TONAL EFFECTS OF DOWNSTEP

PITCH LOWERING

/...H ↓ H(...) /

Noun with a downstep:

a) ndʒòyóná ↓ né moèyá
N. ID good
‘Njūgūna is good’

Noun without a downstep

b) ṭàŋá né moèyá
N. ID good
‘Ng‘ang‘a is good’

C & F (1981)
Tonal effects of downstep

Pitch lowering

/...L ↓ L(...)/

[↓ L] is 27 Hz lower than the preceding L tone
TONAL EFFECTS OF DOWNSTEP

DOWNSTEP AND HIGH TONE SPREADING

*H#↓L is not attested in Kikuyu

Downstep interacts with HTS:

*↓L is raised to [H] in

/H#↓L(L...)H/ → [H # H(H...) ↓H]

- The H to the right is downstepped and the intervening L tones will be raised to H

*Absence of H tone following the downstep: → all L will be raised to H:

/H#↓L(L...) / → [H # H(H...) ]

There is no trace of the downstep other than the raising.
TONAL EFFECTS OF DOWNSTEP

DOWNSTEP AND HIGH TONE SPREADING

*H#↓L is not attested in Kikuyu
Referred to as downstep displacement
=KU-7 Downstep displacement: Downstep raises L tones to H
(C & F 1981)

- Philippson 1992: The downstep deletes the L tones and the H tone spreads to the empty TBUs

- Gussenhoven 2003: *H#↓L: The H occupies the empty syllables squeezing downstep between it and the next H or the utterence end
**Tonal effects of downstep**

**Downstep and High Tone Spreading**

**a) Downstep with pitch lowering:**

\[ \text{nd-ɔ:n-iré' bikiririri ↓ rò:ʃînë} \]

1.SM-see-RC.PST chillies 11.morning

'I saw the chillies this morning'

\[ L \downarrow \text{LH.LH} \]

\[ [↓ \text{rò:ʃînë}] \]

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**b) Downstep + HTS**

\[ \text{nd-ɔ:n-iré' yuòk' yòakë' ↓ rò:ʃînë} \]

1.SM-see-RC.PST 15.arm 15.his 11.morning

'I saw his arm this morning'

\[ /H \downarrow L \text{ H.LH/} \]

\[ [H \downarrow \text{H.LH}] \]

\[ [↓ \text{rò:ʃînë}] \]
TONAL EFFECTS OF DOWNSTEP

DOWNSTEP AND HTS

a) Downstep with pitch lowering:

à-he-iřé moânèki ↓biriβiri
1.SM-give-RC.PST M. chillies
‘He gave Mwaniki chillies’

a) Pitch lowering of /biriβiri/

b) Downstep + HTS

à-he-iřé kẽnâŋi biriβiri
1.SM-give-RC.PST 7.crocodile chillies
‘He gave the crocodile chillies’ C&F (1981)

b) Raising of L to H tone of /biriβiri/

1.SM-give-RC.PST 7.crocodile chillies
‘He gave the crocodile chillies’ C&F (1981)
Evidence of downstep:

1. Pitch lowering
2. Unbounded HTS

/\biri\biri/ → [biri\biri]
DOMAIN OF DOWNSTEP
**Domain of Kikuyu Downstep**

C & F (1981) show following data with downstep:

\[(S) \downarrow (V \ O_1) \downarrow (O_2) /V\downarrow O \downarrow /\]
\[(S) \downarrow (V \ O) \downarrow (Adv)\]
\[(N \ Mod)\]

KU-1 Downstep permutes to the right of the first constituent of the verb
KU-4 Deletion of downstep between a noun and a complement
(+ KU1, KU6, KU7, KU12 to derive a surface structure to an underlying structures)
**DOMAIN OF KIKUYU DOWNSTEP**

**VERB OBJECT ↓ ADVERB**

a) nd-ɔ̀:n-ìrɛ  mòrɛmì ↓ rò:jìnɛ
   1.SM-see-RC.PST 1.farmer 11.morning
   ‘I saw the farmer this morning’

b) nd-ɔ̀:n-ìrɛ  mòrɛmì  morito ↓ rò:jìnɛ
   1.SM-see-RC.PST 1.farmer 1.ugly 11.morning
   ‘I saw the ugly farmer this morning’

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**Adjective unaffected by downstep**

a) ndò:irɛ ↓ /mòrɛmì↓/

b) /ndò:irɛ ↓ /mòrɛmì↓/

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**Diagram of pitch analysis**

- **Pitch (Hz):**
  - 130
  - 150
  - 170
  - 190
  - 210
  - 230
  - 250
  - 270
  - 290
  - 310

- **Phonation Types:**
  - L
  - H
  - [H]
  - L
  - [L]

- **Words:**
  - 1.SM-saw-C.PST
  - 1-farmer
  - 11-morning

- **Phonation Changes:**
  - nd ɔ́ n ɨ rɛ m ɭ rɛ m i r ɔ́ j ṭ i n e
  - nd ɔ́ n ɨ rɛ m ɭ rɛ m i r ɔ́ m o r i t o j ṭ i n e

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**Diagrams showing pitch patterns for sentences a) and b) above.**

**Notes:**
- The downstep phenomenon is evident in the pitch pattern changes for sentences a) and b).
- The pitch values and phonation types are clearly marked for each word and phrase.
Domain of Kikuyu Downstep

Verb Object$_1$ ↓ Object$_2$

a. yɔrɛrɛ mɔrɛmɪ ↓ mɔɣɛká moɛɣá
   IMP: buy 1.farmer 3.rug 3.good
   ‘Buy the farmer a good rug’

b. yɔrɛrɛ mɔrɛmɪ mɔrɪtɔ ↓ mɔɣɛká moɛɣá
   IMP: buy 1.farmer 1.ugly 3.rug 3.good
   ‘Buy the ugly farmer a good rug’

Adjective unaffected by downstep
Domain of Kikuyu downstep

Subject ↓ Verb

- Downstep from the subject noun affects the verb
- No downstep displacement between the subject and verb

\[ \text{ndʒọyóná} \downarrow / \]

a) ndʒọyóná ↓ né moèɣá
N. COP good
‘Njūgūna is good‘
C & F (1981)
Domain of Kikuyu Downstep

Subject ↓ Verb

Downstepless subject noun

a) wàmòyó átémíré mòtě
   W. 1.SM-cut-PST 3.tree
   ’W. cut a tree’

Subject noun with downstep

b) mòrèmì ↓ àtémíré mòtě
   1.farmer 1.SM-cut-PST 3.tree
   ’The farmer cut a tree’

C & F (1981)
- The application of downstep is not arbitrary
- Interacts with the syntax
Attested downstep:

(S) ↓ (V O₁ Adj) ↓ (O₂)
(S) ↓ (V O) ↓ (Adv)

[XP] [V [XP]] [XP] [V [N [AP]NP]]

- Downstep is sensitive to syntactic structures
- Surfaces at the edge of a phonological phrase
- The right edge of a syntactic phrase triggers this p-phrase boundary in Kikuyu
  - No right edge between a head and a complement:
    (S)φ (V O₁ Adj) φ (O₂)φ
    (S)φ (V O) φ (Adv) φ
**Domain of Kikuyu Downstep**

**Downstep and Adjectives**

(N Adj) φ  ↓ Conj N
ηɔmbɛ nditɔ↓ nà īrīā
9. cattle  9. heavy and  5. milk
‘A heavy cattle and milk’

(N Adj) φ  ↓(Adj) φ
ηɔmbɛ nditɔ↓ hɔ:rerì
9. cattle  9. heavy  9. gentle
‘A gentle, heavy cattle’

/nɔmbɛ↓/

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DOMAIN OF KIKUYU DOWNSTEP

DOWNSTEP ADJECTIVES

Subject
(N Poss Adj)φ V...

a) njòmbè yàkè hórèrì ere theínè oà njòmbà
9.cattle 9.his 9.gentle COP inside of house
‘His gentle cattle is inside the house’

No downstep: /hórèrì/ [hórèrì]

Object
(V N Poss) φ (Adj)φ

b) ndònirè njòmbè yàkè hórèrì
1SM.see-RC.PST 9.cattle 9.his 9.gentle
‘I saw his gentle cattle’

Downstep+HTS /hórèrì/ [hórèrì]
DOMAIN OF KIKUYU DOWNSTEP
DOWNSTEP ADJECTIVES

Prosodic binarity at play?

- BinMax: P-phrases consists of maximally two prosodic words (Selkirk 2011, Truckenbrodt 2007)
  - Speaker shows variation and more testing is necessary
Diacronic motivation of Kikuyu downstep

- Downstep is a rule that typically applies within a domain (Yip 2002)
- N. Kikuyu downstep is atypical
  - Domain: Similar to an edge-marking tone
  - Form: Typical of downstep

- C & F (1979): The extra L tone in Kikamba [E55] corresponds to downstep in Kikuyu
DIACRONIC MOTIVATION OF KIKUYU DOWNSTEP

- Kikamba: The extra L tone = a boundary tone
  - Marks the right edge of a phonological phrase (Odden, David & R. Ruth Roberts-Kohno 1999)

- N. Kikuyu Downstep: Properties of both

- Maasai: A 2-level tone language with downstep
  - Ford (1976): N.Kiuyu can have developed downstep through language contact
POLAR QUESTIONS
POLAR QUESTIONS (YES/NO QUESTIONS)

Formed by prosodic means:
- Raising the pitch
- Lowering the sentence final syllable
- Deleting the downstep

= KU-5 Downstep deletion in polar questions C&F (1981)
**POLAR QUESTIONS AND DOWNSTEP**

**Assertive sentence: Downstep**

a) áhēiré moánèkì ↓ njátá
1.SM.give.PST M. 9.star

‘He gave Mwanīki a star’ /njátá/

**Polar Question: No downstep**

b) áhēiré moánèkì njátá?
Did he give Mwanīki a star?

---

**Pitch (Hz)**

<table>
<thead>
<tr>
<th>L</th>
<th>H</th>
<th>↓</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td>200</td>
<td>250</td>
<td>280</td>
</tr>
</tbody>
</table>

**Time (ms)**

<table>
<thead>
<tr>
<th>L</th>
<th>H</th>
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<td>280</td>
</tr>
</tbody>
</table>
**Polar Questions and Downstep**

**Assertive sentence: Downstep**

\[ \text{nd-ɔ:n-ire} \quad \beta\text{iriβiri} \quad \text{↓ rò:ʃině} \]

1. SM-see-RC.PST chillies 11.morning

’I saw the chillies this morning’

\[ [↓ \text{rò:ʃině}] \]

**Polar Question: No downstep**

\[ \text{nd-ɔ:n-ire} \quad \beta\text{iriβiri} \quad \text{rò:ʃině} \]

’Did I see the chillies this morning’

\[ [\text{rò:ʃině}] \]
Focus
DOWNSTEP AND IN-SITU FOCUS

- In-situ adverbial focus and object focus allowed in Kikuyu (Schwarz 2003, Morimoto 2014)

- No difference attested in downstep BUT changes of verb final tone
**DOWNSTEP AND IN-SITU FOCUS**

**Assertive Focus**
When did you see the chillies?

\[\text{nd-ɔ:n-irɛ́} \quad \text{βiriβiri} \downarrow \text{rɔ:ʃinɛ́}\]
1.SM-see-RC.PST chillies 11.morning
'I saw the chillies this morning'

/nd-ɔ:n-irɛ́/.

**Contrastive Focus:**
You saw the chillies yesterday.

Aca. nd-ɔ:n-irɛ́ βiriβiri \downarrow rɔ:ʃinɛ́
No, I saw the chillies this morning\_Contr.F

[I saw the chillies this morning]
**POLARITY FOCUS**

**Polarity focus:**
- Narrow scope over the truth-value of the utterance (Güldemann 2009)

In Kiuyu:
- The proclitic /né/ preceedes the V(O) structure (Morimoto 2014)
POLARITY FOCUS

Q. What happened?
A. ndè-rà:-ròr-ìrè kè-ŋàŋí V: LLHLL
   1.SM-PST-watch-PST 7-crocodile
   ’I watched a crocodile’

Polarity Focus

Q. Did you watch the crocodile?
A. ee nè ndè-rà:-ròr-ìrè kè-ŋàŋí V: HHHLL
   yes FM 1.SM-PST-watch-PST 7-crocodile
   ’Yes, I did watch the crocodile’

Similar to the tonal reduction that distinguishes the CJ/DJ form in Haya? (Hyman 1999, Morimoto 2014)?
SUMMARY

- Acoustic evidence of downstep in N. Kikuyu

N. Kikuyu Downstep:

- Lowers the pitch or interacts with HTS
- Marks the right edge of a phonological phrase
- The place of application is similar to a boundary tone
  - Possible explanation:
    Diachronic relation to the extra L tone in Kikamba

- Phrasing patterns may also be subject to BinMax

- In-situ focus and polarity focus:
  - Preliminary conclusion: No changes in downstep but a tonal change at the verb
Thank you!
REFERENCES


