Cyclic Optimization of Floating L Tones in Kikuyu *

Siri Gjersøe
Leipzig University

1. Introduction

This study discusses the puzzling pattern of downstep (↑) in Kikuyu (Bantu, E51). Kikuyu is a tone language with a /H L Ø/ tonal distinction which attests underlying floating L tones of lexical and phrasal nature. These two tones are domain-sensitive and their input-output derivation gives evidence for cyclicity. The domain of the floating tones is the p(honological)-phrase and downstep appears preferably at the right edge of a p-phrase. Interestingly, the positioning of downstep is also determined by surrounding tones as the sequence H↑L is banned. The puzzling part is that the phrasal floating L tone moves away from its underlying position towards its preferred realization site of a p-phrase edge and this happens even in contexts where the floating L tone can not be realized in this position due to markedness reasons. It can therefore end up triggering downstep in a p-phrase medial position which deviates from its underlying position. This pattern poses a challenge to standard monostatal parallel Optimality Theory and argues for a serial derivation. The proposal here is a Stratal OT analysis with two strata above the word level. The first stratum derives the positioning of the floating L tones according to the p-phrase edge. The second stratum derives an interaction between the floating L tones and High Tone Spreading (HTS). The analysis predicts that L tone deletion followed by unbounded HTS works as a repair mechanism which allows the floating L tone to move without undergoing tonal metathesis. The analysis is based on new data recorded in Berlin in 2014.

2. Domain of downstep

Firstly, the inspiration for this work comes from the excellent studies by Clements & Ford (1981) and Clements (1984) who propose a ruled-based analysis of downstep in Kikuyu. Secondly, this paper builds on Gjersøe (2016) who proposes an analysis of downstep in

---

*I would like to thank the two Kikuyu speakers I worked with: Anna Maria Nginah and Shaleen Mwangi. I am also grateful for feedback and valuable insights by Eva Zimmermann, for comments on earlier versions on this work by Hubert Truckenbrodt, and for useful remarks by the ROA staff.
Kikuyu within the end-based approach of the syntax-phonology interface (cf. Selkirk 1995, Truckenbrodt 1999, among others). The proposed domain of downstep in Kikuyu is the p-phrase (φ) which in the prosodic hierarchy corresponds to the maximal phrase (XP). The p-phrase in Kikuyu is determined by the ranking $\text{ALIGN}(\text{XP, R; \phi, R}) \gg *\text{P-PHRASE}$.

This ranking predicts that every maximal phrase of a lexical category triggers a p-phrase boundary. More concretely, a noun and an adjacent modifier, and a verb and a following object form one p-phrase, while a subject, a secondary object or an adjunct which follows a primary object form a separate p-phrase. In coordination, the conjunction triggers a p-phrase boundary.

Downstep is triggered by a floating L tone (L) which can either be lexical or phrasal. It can trigger downstep on both H and L tones and the three following configurations are attested: (i) Hφ H; (ii) Lφ H; (iii) Lφ L. The lexical floating L tone appears final in certain nouns as in mond`o (1). P-phrase-medial it gets deleted as in (1) where an adjective follows the noun. Downstep is triggered when L is positioned at the right-edge of a p-phrase. This is shown in (2) where L in mond`o triggers downstep on the initial L-toned syllable of the verb. Note that in (2), binary HTS applies from the verb onto the object. It is assumed that H, L and Ø tones are underlying specified in Kikuyu and underlying toneless syllables like the noun class prefix receive a default L on the surface (cf. Gjersøe 2015).

The example in (2) also shows another floating L tone marked in bold which follows the verb underlyingly. This is the phrasal L which appears final in verbs of assertions (cf. Clements (1984), Gjersøe (2015, 2016)). Just as the lexical L, the phrasal L can trigger downstep on a syllable to its right. The data in (3) shows that p-phrase-medial, L does not trigger downstep. Instead, downstep appears at the right edge of the p-phrase. In (3a), downstep appears on the secondary object ña. In (3b), the verb and the modified nominal object form one p-phrase. Downstep appears on the L-initial syllable of the adverb ro:stne`. In (3c), the object is a coordination where the first noun forms a p-phrase with the verb while the conjunction nà triggers a new p-phrase boundary. Downstep appears on nà.

\[\text{(1) /mond`o} L \text{mok`or`o/} \quad \text{(2) /mond`o} L \text{`a-hir`e} L \text{biri`ri}/ \]
\[\quad \text{(m`o-nd`o m`o-k`or`o)} L \quad \text{(m`o-nd`o) L (a-h`e-ir`e) biri`ri)/} \]
\[\phi \quad \phi \quad \phi \quad \phi \quad \phi \]
\[1\text{-person} 1\text{-old} \quad 1\text{-person} \text{SM-give-PVF,FV} 10\text{.chillies} \]
\[\text{‘an old person’} \quad \text{‘A person gave chillies.’} \]

\[\text{(3) a. /a-hir`e} L \text{mwan`e} L \text{biri`ri}/ \quad \text{(a-h`e-ir`e mwan`e)} L \text{biri`ri)/} \]
\[\quad \text{SM-give-PVF,FV} \text{Mwan`i} 10\text{.chillies} \]
\[\quad \text{‘He gave Mwan`iki chillies.’} \]

---

1 A high ranking of $\text{ALIGN}(\text{XP, R})$ for Kikuyu downstep has also been suggested by Selkirk (2000).
2 The constraint $*\text{P-PHRASE}$ is taken from Truckenbrodt (1999) and bans the formation of p-phrases.
3 All examples without a reference are from own recordings. The underlying tones (H: ´V, L: `V or toneless V) are shown in the first line of the glossed example and surface tones are shown in the second line. The syllable is the TBU. Abbreviations for the glossings follow the Leipzig Glossing rules. Exception are: FV – final vowel, NPST – near past, and SM – subject marker.
Cyclic Optimization of floating L tones in Kikuyu

b. /ndɛ:nirɛ(Ł) morɛm(Ł) moriṭo Ł ro:sí:nɛ/
(nd-ɛ:m-irɛ mó-rɛmí mó-riṭo)φ (‘ròː-síːnɛ)φ
SM-see-PFV.FV 1-farmer 1-ugly 11-morning
‘I saw the ugly farmer this morning.’

c. /ndɛ:rɛ:nirɛ(Ł) mwanɛkî(Ł) nà nɔɔyɔnà(Ł)/
(ndɛ-rɛ:-rɔ-irɛ mwanɛki)φ (‘nà nɔɔyɔnà)φ
SM-NPST-watch-PFV.FV Mwanɛki and Njūguna
‘I watched Mwanekĩ and Njūguna.’

If the verb is the final item in a p-phrase, it will trigger downstep on the following word. This is shown in (4) where Ł triggers downstep on the subordinating conjunction ātɛ.

(4) /mwɔnɛki Ł ᵉ:sírə Ł ātɛ nɛ ndɛ:nirɛ Ł moyɛrəniâ ɗɛinɛ wá ƙɔmbɔ/
(mwanɛki)φ (‘ɛ:síːrɨ-ə)φ (‘āte nɛ ndɛ-ɛ:m-irɛ mó-yɛrəná)φ (‘ɗɛinɛ wá ƙɔmbɔ)φ
Mwaněki SM-think-FV that FM SM-see-PFV.FV 1-examiner inside of 9.house
‘Mwanëki thinks that I saw the examiner inside the house.’

(Clements & Ford 1981, 327)

The example in (4) also shows an important point regarding the source of the downstep. In (3), it is unclear whether it is the lexical floating tone or the phrasal one which triggers downstep. This is disambiguated in (4). The source of the downstep appearing on ɗɛinɛ in the embedded clause can only be the phrasal Ł because there is no adjacent lexical Ł that could trigger downstep in that position. This indicates that the phrasal Ł shifts from the underlying position to the surface position where it triggers downstep. Evidence for the noun not having an underlying lexical Ł is shown independently in (5) where moyɛrəniâ is the final word in the p-phrase. Downstep is not triggered on the H-toned copula nɛ. If a lexical floating L tone were present, it would trigger downstep as it does in (6).

(5) /mɔyɛrəniâ nɛ Ł mwɛɣá/ (6) /nɔɔyɔná Ł nɛ Ł mwɛɣá/
(mɔ-yɛrəná)φ (nɛ mwɛɣá)φ (nɔɔyɔná)φ (‘nɛ mwɛɣá)φ
1-examiner COP 2-good Njūguna COP 2-good
‘The examiner is good.’ ‘Njūguna is good.’

(Gjersøe 2016)

Another relevant tone rule is ‘Flattening’ which lowers an utterance-final H tone (Clements & Ford 1981). This applies to the final rising tones in (3b) and (4). If a floating L tone, however, is utterance-final, it blocks Flattening from applying to H tones or rising tones. This is the case for (3c), (5) and (6). In the two latter examples, the phrasal Ł has shifted to utterance-final position as also seen in (4). In this position, it blocks Flattening.

To summarize this section, lexical and phrasal floating L tones trigger downstep in the configurations (i) Hφ↑H; (ii) Lφ↑H; (iii) Lφ↑L. They have two different strategies for this. While the lexical Ł gets deleted whenever it is p-phrase-medial, the phrasal Ł moves from the underlying position adjacent to the verb, to the right edge of the p-phrase where it triggers downstep.
3. Cyclicity and High Tone Spreading

If a floating L tone appears in the tone sequence /HφL/ (where ‘L’ can be either the phrasal or lexical tone), no downstep is triggered on the L tone regardless of it being positioned at the right edge of a p-phrase. Instead, the floating L tone will move to the right triggering downstep on the first H tone it encounters. HTS then applies to the L tones in this p-phrase which precedes the now downstepped H tone. This process changes a sequence like /HφLLH/ to [HφHH'T] as shown in (7). Note that /HφLØ/ and /HφL/ are treated here as the same because it is assumed that toneless syllables receive a default L tone. Downstep is triggered p-phrase-medially on the underlying H-toned syllable sít of the adverb rosíně (7a) and on the H-toned syllable yó of nzdýóná (7b). HTS applies on the preceding L-toned syllables. The two examples can be compared with (3b) and (3c) in section 2 where downstep is triggered on the right edge of the p-phrase because of the underlying tones being LφL.

(7) a. /ndɔ́ːmîrî(L) mjɔ́tá(L) rosíně/ (nd-ɔ́m-irɛ mjɔ́tató (rɔ́-tí símě))_
   SM-see-PFV.FV 9.star 11-morning
   ‘I saw a star this morning.’

b. /ndèrâːrîrî(L) jànjá nà nzó̀dýóná(L)/ (ndè-rà:-rîrîjànjá (ná nzó̀-dýóná))_
   SM-NPST-watch-PFV.FV Ng’ang’a and Njûgûna
   ‘I watched Ng’ang’a and Njûgûna.’ (Gjersøe 2016)

If no H tone follows, the floating L tone will simply move to utterance-final position and remain floating without lowering any tones. Unbounded HTS then applies to the L tones which precede the downstepped H tone. Evidence of the presence of the floating L tone is that Flattening does not apply. The sequence /H[L]φ L...L/ surfaces as [HφH...H[L]] (8). Crucially, unbounded HTS in Kikuyu only applies in correlation with a floating L tone and it opposes to binary HTS which applies between the verb and the object in (2), (3a), (3b), (4), and also (8). Because L tone is underlyingly specified in Kikuyu, I adopt the analysis of Philippson (1991) where unbounded HTS can apply because underlying L tones have been deleted. Without deletion, only binary HTS applies.

(8) /áhɛ́i(rî(L) keɲàmí bɛ́ríbírî/ (á-hɛ́-irɛ kɛ́-ɲɔ́mɪ (bɛ́ríbírî))_
   SM-give-PFV.FV 7-crocodile 10.chillies
   ‘He/she gave the crocodile chillies.’

The examples in (7) and (8) differ from the examples shown in section 2. In (8), the floating L tone of the verb would be expected to appear on its immediate p-phrase edge. Instead there is evidence of it appearing final in the utterance on the successive p-phrase edge. In (7) the floating L tones fail to appear at a p-phrase edge. The question is then, why does...
the phrasal \( \text{L} \) move in the first place towards the \( \text{H}\text{L} \) position, if it can not trigger downstep in its preferred position at the p-phrase edge? The fact that they are nevertheless realized in a position different from its underlying one is only predicted in a derivation with an intermediate step where the tone first shifts to the end of its immediate p-phrase. This is shown in (9). The floating L tone moves to the right edge of its immediate p-phrase. In this position, the surrounding tones determine whether it will trigger downstep. In \( \text{H}\text{L} \text{L}/ \), it will move further to the right in the successive p-phrase to avoid the sequence \( \text{H}\text{T}\text{L} \).

(9)  
\[
\text{a. (ndè-rà-rà-rà-írè \text{ ηàmà} \text{L} \text{nà \zòò́nà} \text{φ})} \\
\text{SM-NPST-watch-PFV.FV Ng’ang’a and Njúgúna}
\]

\[
\text{b. (á-hè-írè \text{ ké-ñàmí} \text{L} \text{bîrîbîrî} \text{φ})} \\
\text{SM-give-PFV.FV 7-crocodile 10.chillies}
\]

Evidence for the source of downstep in (7b) and (8) actually being the \( \text{L} \) which has moved rather than an adjacent lexical \( \text{L} \) is shown below. In (10) and (11), the nouns \( \text{ηàmà} \) and \( \text{ké-ñàmí} \) do not induce downstep on the following word although there is a p-phrase boundary. Thus, they do not have a lexical \( \text{L} \).

(10)  
\[
/\text{ηàmà nà \zòò́nà} \text{L}/ \\
(\text{ηàmà} \text{φ} \text{nà \zòò́nà} \text{φ}) \\
\text{Ng’ang’a and Njúgúna}
\]

\[
/\text{ke-ñàmí ke-ñíní} \text{L}/ \\
(\text{ké-ñàmí} \text{φ} \text{ke-ñíní} \text{φ}) \\
\text{7-crocodile SM-see-PFV.FV}
\]

\‘Ng’ang’a and Njúgúna’

\‘The crocodile saw.’

(Gjersøe 2016)  

(Clements & Ford 1981, 321)

The example in (10) also forms a minimal pair with (7b) in terms of binary vs. unbounded HTS. It is concluded that the latter applies whenever there is an underlying floating L tone: \( /\text{H}\text{L} \text{L} \ldots / \rightarrow [\text{H}\text{L} \text{L} \ldots \text{L}] \). Otherwise, binary HTS applies: \( /\text{H}\# \text{LL} / \rightarrow [\text{H}\# \text{L}] \).

4. Proposal

The proposed analysis for floating L tones in Kikuyu is a Stratal OT analysis (Bermúdez-Otero 1999, Kiparsky 2000). Following Jones (2014), the strata exceed the canonical three stem - word - phrase levels and are composed by prosodic domains. In Kikuyu, two cyclic evaluations are necessary at the postlexical level. The first stratum is the p-phrase and the second is the i(ntonation)-phrase (i). Each stratum has a different constraint ranking. The idea is that the p-phrase stratum derives the positioning of the floating L tone which is preferred at the right edge of a p-phrase. In the i-phrase stratum, the marked configuration \( \text{H}\text{T}\text{L} \) might be expected at the boundary between two p-phrases. Because this position is impossible, the floating L tone will move into the next p-phrase to the right.

The proposed constraint for the tone pattern in cases like (7) and (8) is \( *\text{H}\text{T}\text{L} \) (12). This constraint is based on Gussenhoven (2004) who suggests that \( \text{H}\text{L} \text{L} \) in Kikuyu is banned. The motivation for this constraint is based on the p-maps of Steriade (2001). Since there is lowering between an adjacent H and L, an additional lowering due to downstep would be
particularly difficult to perceive. The proposed constraint \textsc{align(DS,R,P,R)} (abbreviated \textsc{align(DS,R)}) in (13) prefers candidates with downstep at the right edge of a p-phrase. This is a constraint where a violation mark is assigned for every syllable that intervenes between the downstep and a right p-phrase edge. The faithfulness constraint \textsc{linearity-t} (\textsc{lin-t}) in (14), based on McCarthy & Prince (1995), bans tone metathesis. It is also gradient and applies for both floating and associated tones. This means that a violation mark occurs whenever a floating tone undergoes metathesis with other tones. Crucially, if the tones which are crossed by the floating L tone are deleted, \textsc{lin-t} is not violated because there are no tones to undergo metathesis with. The constraint \textsc{realize morpheme} (\textsc{rm}) (Kurisu 2001) demands that distinct morphological forms should differ phonologically. \textsc{rm} will be violated if the phrasal L gets deleted, because as mentioned in section 2, L marks assertion. Deletion would therefore result in an assertive verb form having the same phonological form as a non-assertive verb form. The markedness constraint \textsc{have-tone} assigns a violation mark to toneless syllables on the surface. Finally, the three faithfulness constraints \textsc{max|}, \textsc{max-l} and \textsc{max-h} ban deletion of an association line, and deletion of H and L tones respectively which were in the input. The constraint rankings for both strata are shown in (16) and (17).

\begin{align*}
(12) & \quad *H^4L \\
& \quad \text{Assign a violation mark to the sequence } H^4L. \\
(13) & \quad \textsc{align(DS,R,P,R)} \\
& \quad \text{Align Downstep (DS) with the right edge of a p-phrase.} \\
(14) & \quad \textsc{linearity-t} \text{ (Akinlabi & Liberman 2006)} \\
& \quad \text{Preserve the underlying linear order of tones (i.e. Do not metathesize tones).} \\
(15) & \quad \textsc{have-tone} \text{ (McCarthy et al. 2012)} \\
& \quad \text{Assign a violation mark for every tone that is not associated with a syllable.} \\
(16) & \quad \text{Eval of p-phrase} \\
& \quad *H^4L, \textsc{rm}, \text{\textsc{have(t)}}, \textsc{max-h}, \textsc{align(DS,R)}, \textsc{max|} \gg \textsc{lin-t} \gg \textsc{max-l} \\
(17) & \quad \text{Eval of i-phrase} \\
& \quad *H^4L, \textsc{rm}, \text{\textsc{have(t)}}, \textsc{lin-t}, \textsc{max-h} \gg \textsc{align(DS,R)}, \textsc{max|}, \textsc{max-l}
\end{align*}

The challenge for a parallel OT approach is that, on the one hand, there is evidence for the phrasal L moving to the p-phrase edge according to \textsc{align(DS,R)}; on the other hand, if it moves to the configuration H)\_\phi L, the constraint *H^4L will force L to trigger downstep in a position that can violate \textsc{align(DS,R)}. Thus, *H^4L must be ranked higher than \textsc{align(DS,R)}. If this is the case, the crucial question is why L is not simply placed directly in a position which does not violate *H^4L to begin with. The central idea of the analysis is that in the first cycle, the position of the floating L tones is mainly determined by \textsc{align(DS,R)}. The constraint ranking will generate a winner where the lexical L has been deleted if it occurs p-phrase-medially in the underlying form. The phrasal L can not be deleted because \textsc{rm} is high ranked. Thus, the winner will be the candidate where L has shifted to the right edge of the p-phrase in order to satisfy \textsc{align(DS,R)}. This is tone metathesis but because \textsc{lin-t} is low ranked, it will be the winning pattern. Having
the ranking of $\text{MAX}| \gg \text{LIN-T} \gg \text{MAX-L}$ is necessary to generate the correct winner for the lexical $\underline{\text{L}}$ because deletion of associated tones is worse than deletion of a floating L tone. It is assumed here that $\text{RM}$ does not penalize deletion of the lexical floating L tone because nouns with and without this tone are part of the same morphosyntactic category.

In tableau (18), the input has a lexical $\underline{\text{L}}$ positioned p-phrase-medially between the noun and its modifier. If it remains in this position (triggering downstep), $\text{ALIGN(DP,R)}$ is violated (candidate (b)). If the floating tone moves to the right edge of the p-phrase across the lexical tones, it will violate $\text{LIN-T}$ (candidate (d)). This constraint will not be violated if the lexical tones which $\underline{\text{L}}$ crosses are deleted as in candidate (a) and (c). This however violates $\text{MAX}$ three times. Candidate (a) is worse than (c) because the syllables remain toneless violating $\text{HAVE-T}$ while in candidate (c), they get a tone through L tone spreading. The winner is candidate (e) which only violates the low-ranked $\text{MAX-L}$. The constraint $\text{RM}$ is not violated here because it is a lexical floating tone (see definition of $\text{RM}$ above). Deleting the lexical floating L tone is therefore better than realizing it in a p-phrase-medial position, or moving it to a p-phrase-final position by crossing either associated or deleted lexical tones. Note that the constraint $^*\text{H}^L$ will rule out any candidate where $\underline{\text{L}}$ intervenes between a $\text{H}$ and a $\text{L}$ tone (e.g. if the noun would be H-final).

In tableau (19), the input has a phrasal $\underline{\text{L}}$ positioned p-phrase-medially. If this tone is deleted, the high-ranked constraint $\text{RM}$ is violated (candidate (a)). If it remains in this po-
sition (triggering downstep), ALIGN(DP,R) is violated (candidate (d)). In candidates (b) and (c), the H tones of the object have been deleted. This avoids violating ALIGN(DP,R) and the lower-ranked constraint LIN-T. However, these candidates are ruled out because they both violate MAX-H (and MAX[L]), and candidate (c) violates HAVE-T. The winner is candidate (e) where the floating L tone has undergone tonal metathesis in order to be at the right edge of the p-phrase. This violates LIN-T but it is low ranked in cycle one so the violation is not fatal. Note again that the constraint *H Ł will rule out any candidate where Ł intervenes between a H and a L tone.

(19)  **Cycle 1: Evaluation of the p-phrase (φ):** he-saw a.star (example (7a) above)

<table>
<thead>
<tr>
<th></th>
<th>φ₁</th>
<th>φ₂</th>
<th>φ₃</th>
<th>φ₄</th>
<th>φ₅</th>
<th>φ₆</th>
<th>φ₇</th>
<th>φ₈</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>(ndɔ:nirɛ nɔjata)φ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>(ndɔ:nirɛ nɔjata)φ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>L</td>
<td>L</td>
<td>H</td>
<td>Ł</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>(ndɔ:nirɛ nɔjata)φ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>L</td>
<td>L</td>
<td>H</td>
<td>Ł</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>(ndɔ:nirɛ nɔjata)φ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>L</td>
<td>L</td>
<td>H</td>
<td>Ł</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>(ndɔ:nirɛ nɔjata)φ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>Ł</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>(ndɔ:nirɛ nɔjata)φ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the second cycle, the positioning of the floating L tone depends to a higher degree on the surrounding tones and LIN-T is high ranked. *H Ł remains the undominated constraint. If the phrasal Ł has shifted to the configuration H)φ L, it will be forced into the following p-phrase to avoid violating *H Ł. This violates LIN-T unless the tones that the floating L tone crosses are deleted. Deletion followed by HTS is therefore considered a repair mechanism to avoid violating LIN-T and at the same time allowing Ł to move away from a H)φ L sequence. In tableau (20), the input is the winner (e) from the first cycle which has the phrasal Ł positioned in the sequence H)φ L. If Ł stays here, *H Ł is violated (candidate (a)). If it is deleted, RM is violated (candidate (b)). If it shifts across the tones as in candidate (d) and (e), this violates LIN-T. Candidates (c,f,g) do not violate this constraint because Ł crosses tones which have been deleted. Candidate (f) is conform with A(DS,R) but
Cyclic Optimization of floating L tones in Kikuyu

violates the higher-ranked MAX-H by deleting H tones. The winner is candidate (g) where only a L tone has been deleted. Contrary to candidate (c), this does not violate HAVE-T because HTS has applied. Note that the prefix is underlyingly toneless but is assumed to receive a default L tone in earlier strata at the lexical level.

(20)  Cycle 2 : Evaluation of the i-phrase: he-saw the.star this.morning (example (7a) above)

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The same mechanism applies in tableau (21), which shows the second cycle of the derivation. The input has an all L-toned noun which forms a separate p-phrase. The phrasal L cannot stay in the input position because it violates *HŤ (candidate (a)). Deletion of L is ruled out because of RM (candidate (b)). Moving across the L tones violate LIN-T (candidate (d)). Deleting the L tones of biribi is the solution (candidate (c,e)) but the four syllables cannot remain toneless. Deletion followed by HTS is therefore the optimal output.
Gjersøe

(candidate (e)). The evidence of (L) actually being positioned in this i-phrase-final position is that it protects the H tones from being lowered thus preventing the rule Flattening from applying.

(21) Cycle 2: Evaluation of the i-phrase: he-gave a.star chillies (hypothetical example with same tone pattern as in (8) above)

<table>
<thead>
<tr>
<th>L</th>
<th>L</th>
<th>H</th>
<th>H</th>
<th>L</th>
<th>L</th>
<th>L</th>
<th>L</th>
<th>L</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>((nd:nire n3ata)φ (βiri βi ri)φ),</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>a.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>((nd:nire n3ata)φ (βiri βi ri)φ),</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>((nd:nire n3ata)φ (βiri βi ri)φ),</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>((nd:nire n3ata)φ (βiri βi ri)φ),</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>((nd:nire n3ata)φ (βiri βi ri)φ),</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>((nd:nire n3ata)φ (βiri βi ri)φ),</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Summary

This paper argued for the cyclic nature of floating L tones in Kikuyu. The proposal was a Stratal OT analysis with prosodic domains as strata. In Kikuyu, two post-lexical strata are needed. First, the domain-sensitivity of the floating L tones was derived in the p-phrase cycle. Second, the i-phrase cycle derived their tonal-motivated positioning. In this analysis, L tone deletion followed by unbounded HTS applies as a repair strategy which allows a floating L tone to move away from a banned tone sequence without undergoing metathesis.

Siri Gjersøe
siri_moen.gjersoe@uni-leipzig.de
Cyclic Optimization of floating L tones in Kikuyu

References


Steriade, Donca. 2001. The phonology of perceptability effects: the P-map and its consequences for constraint organization. Ms, UCLA.