The Syntax-Prosody Interface of Downstep in Kikuyu: Evidence for a Stratal OT Account

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Introduction This study provides a prosodic account of downstep (1) in Kikuyu (Bantu, E51) within the syntax-phonology interface. The main claim is that downstep appears at the right edge of a phonological phrase (\(\phi\)). Interestingly, the positioning of downstep is in addition to \(\phi\) also determined by surrounding tones. Another proposed constraint \(\star \text{H}^\# \text{L}\) forces the source of downstep, a floating L tone (\(\bar{\text{L}}\)), to move into the next \(\phi\). In order to account for this intermediate step, a Stratal OT analysis is proposed where the strata are composed by prosodic domains rather than morphosyntactic ones (cf. Jones 2014). The analysis is based on new data recorded in Berlin (2014).

\(\phi\) and downstep Kikuyu is a tone language with a /H L O/ tonal distinction and domain-sensitive \(\bar{\text{L}}\)s. The proposed domain of downstep in Kikuyu is \(\phi\) which in the prosodic hierarchy corresponds to a syntactic phrase as part in the end-based approach (cf. Chen 1987, Selkirk 1986, 1995, Truckenbrodt 1995, 1999). \(\phi\) in Kikuyu is determined by a high ranking of ALIGN\((\text{XP}, \text{R}; \phi, \text{R})\).

Kikuyu attests a featural \(\bar{\text{L}}\) which appears final in verbs of assertions. It does not appear in other speech acts such as imperative sentences, polarity questions or in embedded clauses (cf. Clements 1984). \(\bar{\text{L}}\) can trigger downstep on a syllable to its right lowering both H and L tones. Data show that \(\bar{\text{L}}\) appears at the right edge of \(\phi\). In (1-a), the verb and the object, consisting of a noun and a modifier (\(\text{mō-rḗmì mō-rī́tō}\)), form one \(\phi\). In this position, the assertive \(\bar{\text{L}}\) triggers downstep lowering the L-initial syllable of the adverb. The proposed constraint for the distribution of downstep is ALIGN\((\text{DS, p(-phrase)}\): Align Downstep\((\text{DS})\) with a phonological phrase. If \(\bar{\text{L}}\) appears in the tone sequence; /\text{H}^\# \text{L} L/, no downstep is triggered on the L tone regardless of it being positioned at the right edge of \(\phi\). Instead, \(\bar{\text{L}}\) will move to the right deleting the L tones it crosses. It then triggers downstep on the first H tone it encounters. If no H tone follows, \(\bar{\text{L}}\) will simply be placed in utterance-end position. Unbounded HTS then applies to the L tones which have been deleted (cf. Philipsson 1991). The sequence /\text{H}^\# \text{L} \text{L} H/ will surface as [H\(\phi\) \text{HH}^\# H]. If the floating L tone does not encounter any H tone, it will move until clause-final position and remain there without lowering any tones. The tone sequence /\text{H} L \text{L} \text{L} L H/ will surface as [H\(\phi\) \text{HH}^\# \text{HH} H^\#]. It counts as a [\(\phi\)] because it counts as a phonological unit (Clements & Ford 1981). Even though it does not lower any tones here, it blocks other rules from applying. The proposed constraint for the tone pattern in (1-b) is \(\star \text{H}^\# \text{L}\). The motivation for this constraint is based on he 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.

\begin{align*}
(1) & \quad \text{a. (nd-\text{\textasciitilde}n-irḗ} \text{mō-rḗmī mō-rī́tō)}_{\phi} \text{m̱̃̄n-`ırı́} \text{mo-rḗmī mo-rī́tō/} & \text{nd-\text{\textasciitilde}n-irḗ} \text{mo-rḗmī mo-rī́tō/} & \text{SM1-see-PRF,FV} & \text{1-farmer} & \text{1-ugly} & \text{11-morning} \\
& \quad \text{‘I saw the ugly farmer this morning.’} \\
& \quad \text{b. (á-hē-irḗ} \text{m̱̃̄w-`ırı́hīp̱hā)}_{\phi} \text{ṉ̃̄w-`ırı́hīp̱hā} \text{ḇ̃̄ṉ̃̄íp̱ẖhī/} & \text{ṉ̃̄w-`ırı́hīp̱ẖhī/} & \text{SM3-give-PRF,FV} & \text{1-weakling} & \text{10.chillies} \\
& \quad \text{‘He gave the weakening chilies’} & \text{(Clements and Ford 1981: 315)}
\end{align*}

Problem The different positions of the assertive \(\bar{\text{L}}\) in (1-a) and (1-b) pose a challenge to Classic OT: In an assertive clause with the configuration H\(\phi\) L, the constraint \(\star \text{H}^\# \text{L}\) will force \(\phi\) to trigger downstep in a position that can deviate from what ALIGN\((\text{DS, P})\) predicts. Thus, \(\star \text{H}^\# \text{L}\) must be ranked higher than ALIGN\((\text{DS, P})\). If this is however the case, why is \(\bar{\text{L}}\) not simply placed directly in a position which doesn’t violate \(\star \text{H}^\# \text{L}\) to begin with? The tone interaction in (1-b) indicates an intermediate step in the derivation where the assertive \(\bar{\text{L}}\) is first positioned according to ALIGN\((\text{DS, P})\) and then subject to \(\star \text{H}^\# \text{L}\), moving \(\bar{\text{L}}\) to another position.

Proposal First, a high ranking of the constraint REALIZE MORPHEME (Oostendorp 2005) accounts for why \(\bar{\text{L}}\) is not simply deleted. The rationale is this: If an assertive \(\bar{\text{L}}\) were to be deleted, then this morpheme would have no visible realization. Deletion is therefore avoided. The assertive \(\bar{\text{L}}\) is positioned according to ALIGN\((\text{DS, P})\). If this position has the tone sequence; H\(\phi\) L, \(\bar{\text{L}}\) will be forced into the following \(\phi\) by the constraint \(\star \text{H}^\# \text{L}\) as shown in (1-b). This data can be captured with a Stratal OT analysis (cf. Bermúdez-Otero 1999, Kiparsky 2000) with cyclic evaluation of the prosodic domain \(\phi\) and the higher prosodic domain \(\tau\) following Jones (2014). In the \(\phi\) evaluation, the faithfulness constraint LIN\((\text{EARITY})(\tau \tau\tau)\) (Yip 2002, Jones 2014) is used which penalizes tonal metathesis between I/O.
\( \text{LIN}(\tau, \tau) \) is ranked low in the \( \phi \) cycle but will be ranked higher in the \( \tau \) cycle. It applies to tones rather to segments and assigns a violation mark to every instance of tone metathesis. The linear order of \( \phi \) and the surrounding tones in the input needs to be preserved in the output (where \( \phi \) is realized as \([\text{1}]\)). The constraint ranking for patterns such as (1-a) is in (2).

\[
\begin{array}{|c|c|c|c|}
\hline
\phi & \text{LIN}(\tau, \tau) & \phi \text{L} & \text{A(DES,P)} \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\end{array}
\]

Cycle 1: Evaluation of the p-phrase (\( \phi \))

In the \( \phi \) cycle, candidate (a) is first ruled out because it violates RM as assertive \( \text{L} \) has been deleted. In candidate (a), \( \text{L} \) triggers downstep in the input position satisfying the lower ranked \( \text{LIN}(\tau, \tau) \) but fatally violating \( \text{ALIGN} \) as it is \( \phi \)-medial. (c) is the remaining winner as \( \text{L} \) triggers downstep at the right edge of \( \phi \) satisfying the two highest ranked constraints RM and \( \text{ALIGN} \). \( \text{LIN}(\tau, \tau) \) assigns four violation marks as the order of the tones of four syllables deviate from the input: \( \text{L} \text{LHLH} \rightarrow \text{LHLH} \). The output of the \( \phi \) cycle, candidate (c), is now the input of the \( \tau \) cycle. Here, another \( \phi \) has been added which forms a \( \tau \) corresponding to the root clause. There is a re-ranking of the constraints: \( *\text{H}^4\text{L} \) is now undominated and \( \text{LIN}(\tau, \tau) \) is higher ranked than \( \text{A(DES,P)}. \)

\[
\begin{array}{|c|c|c|c|}
\hline
\phi & \text{LIN}(\tau, \tau) & \phi \text{L} & \text{A(DES,P)} \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\text{(a-h-r̂-r̂ mwàŷ-áĥ-ńa)} & \text{L} & * & \\
\hline
\end{array}
\]

Cycle 2: Evaluation of the i-phrase (\( \iota \))

In the input of the \( \tau \) cycle, downstep is positioned at the right edge of \( \phi \) in the sequence \( \text{H}^4\text{L} \). Candidate (b) has this exact output which violates the undominated constraint \( *\text{H}^4\text{L} \). Candidate (a) violates both \( \text{H}^4\text{L} \) and \( \text{LIN}(\tau, \tau) \) and is also ruled out. Candidate (c) is now rejected as \( \phi \) has been deleted violating RM. \( \text{LIN}(\tau, \tau) \) is now high ranked and will regulate the I/O-order of downstep and the surrounding tones. In both candidate (d) and (c), downstep has moved to a clause-final position which neither violate \( *\text{H}^4\text{L} \) nor \( \text{ALIGN} \) as it is aligned with a \( \phi \). However, there is a crucial difference between them regarding the I/O order of the tones: In (d), \( \text{LIN}(\tau, \tau) \) is violated because the order of the tones deviate from the input. In (c) on the other hand, the tones which downstep has shifted across are now \( \text{H} \) instead of \( \text{L} \). The determining point is that \( \text{LIN}(\tau, \tau) \) is not violated by (c) when downstep shifts across \( \text{Biri} \text{firi} \) iff these tones are different from the input. That is, in the output the tones are now \( \text{H} \) and downstep only change order with tones which are not in the input. Unbounded HTS is thus a repair strategy of downstep in order to avoid violating \( *\text{H}^4\text{L} \) but satisfying \( \text{LIN}(\tau, \tau) \).

In sum, the interaction between \( \text{L} \) and HTS in Kikuyu can be accounted for by a Stratal OT analysis with prosodic domains as strata. Cycle 1 derives the syntactic motivated positioning of \( \text{L} \) while cycle 2 derives its tonal-motivated positioning and accounts for the application of unbounded HTS. This follows the analysis of Jones (2014) for Kinande with the possibility of cyclic evaluation within the syntax-phonology interface.

**Selected references.**


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