

The cyclic nature of grammatical tone in Chichewa

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1. Introduction

- Chichewa, as in many other African languages, has grammatical tones (GTs), i.e., tones associated with specific grammatical constructions.
 - Descriptively, a morpheme may be responsible for a high tone or tone pattern realized at positions that are not local to that GT-introducing morpheme.
 - A construction may have more than one GT introducer, in which case the surface realization of GT in a construction becomes a complex process.
- The ‘outermost wins’ principle (1) has been considered by a number of researchers to be the unmarked way to decide the result of the competition between multiple dominant GT introducers (Hyman 2016, Inkelas 1998, 2018, McPherson & Heath 2016, Rolle 2018).
 - (1) The ‘outermost wins’ principle
The hierarchically outermost/highest c-commanding GT morpheme ‘wins.’ (see Downing 2021)
 - The idea is that GTs target the base they take morphosyntactic scope over.
 - The principle follows directly from a hierarchical, cyclic, derivational approach to GT assignment.
- However, Downing 2021 discusses a number of cases in Chichewa where (1) does not hold, based on which she argues for a non-cyclic, word and paradigm-based approach.
 - Section 2 reviews one particular argument (the most ‘fatal’ one) proposed by Downing 2021 (all data are from Downing & Mtenje 2017 and are on Ntcheu Chichewa) *against* the ‘outermost wins’ principle subsection 2.1. There are cases that seem to be problematic for the principle, or, more generally, for a cyclic, derivational approach to GT assignment subsection 2.2. Subsection 2.3 then briefly introduces Downing’s 2021 solution to the non-cyclic puzzles.
 - After discussing independently needed factors, i.e., (i) some regular tonal processes and (ii) the climbing of the negative clitic in Section 3, I provide a step-by-step analysis of the GT patterns of part of the paradigms, particularly the present habitual, which Downing 2021 argues supports a non-cyclic, word-and-paradigm approach to Chichewa GT.
 - Section 4 concludes.

2. The ‘outermost wins’ principle and (one of) its apparent failures

2.1. Background and the dominant patterns

- Chichewa verbs are highly agglutinative; a verb template is given in (2) (adapted from Downing & Mtenje 2017; c.f., Meeussen 1967 on Proto-Bantu):
 - (2) NEG₁= SM= TAM/NEG₂=_{[macro-stem} OM= _{[stem} Root-Extensions-FV]] =enclitic
 - Downing & Mtenje 2017 assume a more fine-grained Neg₂>Tense/Aspect>Modal, but the relations between Neg₂ and TAMs in Chichewa are not straightforward, because Neg₂ primarily occurs in non-finite clauses (while most TAMs are finite).
 - Mchombo 2004 suggests TAM/Neg₂/Mod₁>Conditional>Directional>Mod₂. Different TAM markers are shown to be located in different syntactic positions.

- An example:

(3) sí= mú= na= [macro-stem ndi= [stem on -éts -éé]] =nsó
 NEG1= 2P.PL= PST= 1P.SG= see -CAUS -FV =again
 'you(PL) have not shown me again'

- First, Chichewa verbal roots can be either H-toned or toneless:

(4) a. thandiiz-a 'help' (toneless root)
 b. thamaáng-á 'run' (H-toned root; H realized on FV, followed by final retraction)

- Second, TAM markers (among other things) can assign a GT pattern to the construction:

(5) a. tí= ma= tembenúuz-a [toneless root]
 1P.PL= PRES.HAB= turn.over-FV
 'we turn over'

b. tí= ma= tambaláal-a [H-toned root]
 1P.PL= PRES.HAB= stretch.legs-FV
 'we stretch legs'

- In (5), the present habitual *ma=* is associated with (i) an H to the preceding SM, without tone doubling, and (ii) an H to the penult. The H vs. ∅ contrast on root is neutralized in this context.
- Assuming that SM and FV are not GT introducers in (5), one can say that the 'outermost wins' principle (1) applies here—the present habitual GT is dominant.

(6) a. tí= témbenuuz-a [toneless root]
 1P.PL= turn.over-FV
 'we will turn over soon'

b. tí= támbalaál-á [H-toned root]
 1P.PL= stretch.legs-FV
 'we will stretch legs soon'

- In (6), the near future, which crucially is not segmentally marked, introduces an H to the SM; this H undergoes tone doubling to the following syllable.
- Note that the H vs. ∅ contrast on root is not neutralized here.
- Third, the negative *sí=* can further attach to the near future, overwriting the GT pattern in (6):

(7) a. sí= tí= tembenúuz-a [toneless root]
 NEG1= 1P.PL= turn.over-FV
 'we will not turn over soon'

b. sí= tí= tambaláal-a [H-toned root]
 NEG1= 1P.PL= stretch.legs-FV
 'we will not stretch our legs soon'

- As in (7) (c.f., (6)), an H is assigned to the penult in the negative near future, regardless of the presence/absence of a root tone—neutralization happens.
- For pre-root elements, if we assume that an element on the left always scopes over an element on the right, (7) is expected in that the 'outermost' negative wins in GT assignment.
- Many GT patterns in Chichewa seem to obey the 'outermost wins' principle.

2.2. The failures of the ‘outmost wins’ principle: the case of the present habitual

- Recall from (5), repeated here as (8), that the present habitual has a dominant GT pattern: it neutralizes the H vs. ∅ contrast on root.

- (8) a. tembenuuz-a => tí=ma=tembenúuz-a [toneless root]
 b. tambalaál-á => tí=ma=tambaláal-a [H-toned root]

- However, when the negative *sí*= is attached, the GT pattern (9) does not even seem to be built on the affirmative (8):

- (9) a. sí= tí= má= tembenuuz-a [toneless root]
 NEG1= 1P.PL= PRES.HAB= turn.over-FV
 ‘we do not turn over’
 b. sí= tí= má= tambaláal-a [H-toned root]
 NEG1= 1P.PL= PRES.HAB= stretch.legs-FV
 ‘we do not stretch legs’

- In (9), an H occurs (i) on the negative and (ii) on the SM, respectively (the latter undergoes doubling). This is not the negative GT pattern that we find in other constructions (c.f., (7)).
- Importantly, (9) keeps the H vs. ∅ contrast on root. Because this contrast is *already* neutralized in the affirmative (8), it is unexpected why it re-emerges if the negative is directly built on the affirmative. Under a cyclic approach, we should not expect any GT difference between (9a) and (9b), if there is no difference between (8a) and (8b).
- Downing 2021: ‘the ‘outermost wins’ principle is not successful in predicting which morpheme’s GT will dominate in all Chichewa verb paradigms, due to (i) inconsistent dominance of some affixes, and (ii) inside-out dominance effects and cumulative dominance effects.

2.3. A non-cyclic approach: word-and-paradigm

- Downing 2021: ‘the GT associated with a particular verb depends on the paradigm/construction, as defined by a combination of morphemes, not just a single morpheme, the outermost one.’
- Downing 2021: ‘an analysis needs to be able to refer to the entire verb complex and associate it with a construction-specific GT melody.’
- Following Blevins et al. 2019, Bond 2016, Spencer 2004 and Stump 2016, Downing 2021 proposes that a verb complex like *sí=ndí=má=tambalal-iíts-á* ‘I do not stretch legs a lot’ can be defined by the following lexical and paradigmatic (i.e., GT-defining) properties:

- (10) <STRETCH.LEGS_H {Neg1, present habitual, intensive}>

- (10) introduces (i) segmental material and (ii) introduces a (co-)phonology defining the GT associated with the segmental material.
- GT realization in this way does not proceed cyclically, as it is not always uniquely determined by the hierarchically uppermost dominant morpheme. GT is assigned declaratively, to the entire verb complex.

3. Defending a cyclic approach

3.1. Some issues of Chichewa GT and the non-cyclic approach

- First, TAMs sharing the same segmental elements are treated as totally different lexical entries, e.g., the present habitual $ma=$ (5) and the past habitual $ma=$ (11) are associated with different lexical statements that are unrelated to each other under the word-and-paradigm approach:

(11) a. $ti=$ $\boxed{ma=}$ $t\acute{e}mb\acute{e}nuuz-a$ [toneless root]
 1P.PL= PST.HAB = turn.over-FV
 ‘we used to turn over’

b. $ti=$ $\boxed{ma=}$ $t\acute{a}mb\acute{a}l\acute{a}l-\acute{a}$ [H-toned toot]
 1P.PL= PST.HAB= stretch.legs-FV
 ‘we used to stretch our legs’

- Also consider the two past tense in (12) (both with toneless root):

(12) a. $mu=$ $\boxed{na=}$ $t\acute{e}mb\acute{e}nuuz-a$ ‘you turned over’ [simple past]

b. $mu=$ $\boxed{na=}$ $t\acute{e}mb\acute{e}nuuz-a$ ‘you turned over (recently)’ [recent past]

- But do we want to say that such segmental similarity is just a coincidence? What if the GT patterns of the present habitual and the past habitual and their shared segmental element $ma=$ are (partially) dissociated? For example, it is possible (and economical) to have a single vocabulary insertion rule (13), with the different GT patterns being recruited solely for tense (present vs. past).

(13) [habitual] $\Leftrightarrow ma=$ (to be revised)

- Second, regardless of the multiple GT patterns associated with the negative $si=$, this element appears to be special in important ways.

- Recall from the template (2) that, like many other Bantu languages, Chichewa has two positions for the negative on verbs: Neg₁ (preceding SM) and Neg₂ (lower than SM).
- The Neg₁ $si=$ and the Neg₂ $sa=$ are in complementary distribution. Briefly speaking, Neg₁ occurs on finite verbs, while Neg₂ is used in non-finite contexts (imperative, infinitive, subjunctive, sequential perfective) (14). That is, the distribution of Neg₁ and Neg₂ is morpho-syntactically conditioned. Do we want to simply assume that $si=$ and $sa=$ are just two different lexical elements?

(14) a. $ku=$ $\boxed{sa=}$ $fotok\acute{o}oz-a$
 INF= NEG2= explain-FV
 ‘to not explain’

b. $ti=$ $\boxed{sa=}$ $fotok\acute{o}oz-e$
 1P.PL= NEG2= explain-SUBJV
 ‘we should not be explaining’

(This example also shows that $sa=$ is compatible with SM.)

- There is no semantico-syntactic evidence that the complex-initial Neg₁ $si=$ is indeed very high, i.e., it indeed scopes over SM and TAM.
- Third, tone doubling is a regular tonal process which doubles an H to the following syllable if the following syllable is not in phrase-penult or phrase-final position (Downing & Mtenje 2017) (15). However, as we have seen, not all Hs double in verb GT (c.f., (5), (9)). Under the non-cyclic word-and-paradigm approach, whether an H undergoes doubling is unpredicted lexical information that must be stated in the definition of particular morpheme combinations.

- Recall that there are two negative markers in Chichewa: the Neg₁ *si=*, which occurs clause initially, in finite clauses, and the Neg₂ *sa=*, which normally occurs after the SM, in non-finite environment.
- A hypothesis: *sa=* and *si=* involve the same lexical element. The negative clitic first merges in the midfield, below T (i.e., Neg₂), and as a last resort operation, it undergoes climbing if a finite T merges right above it, which requires affix-hopping to the verbal stem (see Ngonyani 2002, Chaperon 2023 for relevant ideas on other Bantu languages).

(22) a. $\boxed{si=}$ mú= na= méeny-e
 NEG₁= 2P.PL= PST= hit-SUBJV
 'you(PL) have not hit'

b. (ignoring GT for now)

Step 1: [_{NegP} $\boxed{sa=}$ [_{VP} méeny-e]]
 Step 2: [_{TP} mú= $\boxed{na=}$ [_{NegP} $\boxed{sa=}$ [_{VP} méeny-e]]]
 Step 3: [_{TP} $\boxed{si=}$ [_{TP} mú= $\boxed{na=}$ [_{NegP} $\boxed{sa=}$ [_{VP} méeny-e]]]

- In Step 1, *sa=* merges as Neg^o.
- In Step 2, TP is projected, with *na=* being in T^o and *mu=* being in SpecTP.
- In Step 3, because *na=* needs a host (i.e., the verbal stem), but the adjacency relation between *na=* and the stem is blocked by *sa=*, *sa=* climbs to a higher position, arguably adjoined to TP, where the negative realizes as *si=*.
- Possibilities for the segmental difference between *si=* vs. *sa=*: (i) this may simply be a case of contextual allomorphy, or (ii) *si=* is structurally more complicated; it may be underlyingly **sa=ndi=* 'Neg₁-Copula' (note that the negative form of the copula *ndi=* is indeed *si=*).

(22') Step 3: [_{CopP} $\boxed{sa=}$ [_{CopP} *ndi=* [_{TP} mú= na= [_{NegP} $\boxed{sa=}$ [_{VP} méeny-e]]]]
 Step 4: [_{CopP} $\boxed{si=}$ [_{TP} mú= na= [_{NegP} ____ [_{VP} méeny-e]]] (*sa=ndi=* > *si=*)

- One can compare Chichewa Neg-climbing with *do*-support in English:

(23) Step 1: [_{NegP} not [_{VP} (he) complete this analysis]]
 Step 2: [_{TP} he -ed [_{NegP} not [_{VP} (he) complete this analysis]]]
 Step 3: [_{TP} he do-ed > \boxed{did} [_{NegP} not [_{VP} (he) complete this analysis]]]

- Both Chichewa and English require affix-hopping of T, a process that may be blocked by an intervening Neg. While in Chichewa, the troublemaker, which is a clitic, moves away, a (minimal) verbal element *do* is inserted as the new host in T in English.

3.4. Towards an analysis (of part of the paradigms)

- We are now ready to see that the apparent non-cyclic properties of Chichewa GT are in fact not problematic for a cyclic approach, if the above issues are taken into serious consideration.
- $\boxed{\text{present habitual}}$ vs. $\boxed{\text{past habitual}}$
 - It has been mentioned that the $\boxed{\text{present habitual}}$ and the $\boxed{\text{past habitual}}$ share the same segmental element *ma=* (and it is ideal if it involves a single vocabulary insertion rule; c.f., (13)), though their GT patterns are different:

(24) Past habitual
 a. ti= $\boxed{ma=}$ témbénuuza [toneless root]
 b. ti= $\boxed{ma=}$ támبالáálá [H-toned root]

(25) Present habitual
 a. tí= $\boxed{ma=}$ tembenúza [toneless root]
 b. tí= $\boxed{ma=}$ tambaláala [H-toned root]

- In (24), an H shows up on the syllable following *ma=* (and it undergoes tone doubling).
- In (25), an H shows up on SM, and it does *not* undergo tone doubling (an otherwise regular process); another H occurs on the penult, neutralizing the tone contrast on root.
- Now consider the negative:

(26) Past habitual

- a. $\underline{sí=}$ tí=ma=témbénuuza
 b. $\underline{sí=}$ tí=ma=támbálaálá

(27) Present habitual

- a. $\underline{sí=}$ tí=má=tembenuuza
 b. $\underline{sí=}$ tí=má=tambaláala

- The past habitual negative (26) involves the Neg₁ proclitic *sí=*, with the associated H undergoing tone doubling (c.f., the affirmative (24)).
- The GT of the present habitual negative (27), by contrast, does not seem to be directly built on (25). In addition, the tone contrast on root is kept.
- Since the past/present tense and the habitual aspect are two different notions, I propose that the shared item *ma=*, arguably in $\text{[Asp}^0\text{]}$, is only responsible for the habitual meaning, while tense is realized by different zero morphemes in $\text{[T}^0\text{]}$ with different GT patterns.

(28) $[\text{PST}]_{\text{T}^0} \Leftrightarrow \emptyset=$

(29) $[\text{HAB}]_{\text{Asp}^0} \Leftrightarrow \{\text{ma=}, [\text{H} >]\}$ ([H>] reads as ‘assign an H to my right.’)

- (i) affirmative past habitual:

(30) a. ti= $\emptyset=$ ma= témbénuuz-a [toneless root]

1P.PL= PST= HAB= turn.over-FV

\emptyset \emptyset [H>] \emptyset - \emptyset

(first H undergoes doubling)

b. ti= $\emptyset=$ ma= támbálaál-á [H-toned root]

1P.PL= PST= HAB= stretch.legs-FV

\emptyset \emptyset [H>] [H]- \emptyset

([H] on root is realized on FV)

- (ii) negative past habitual:

(31) Step 1: $[\text{AspP ma=} [\text{vP témbenuza}]]$ (*ma=* assigns H to the following syllable)

Step 2: $[\text{NegP sá=} [\text{AspP ma=} [\text{vP témbenuza}]]]$

(tone shift does not happen across a phasal boundary)

Step 3: $[\text{TP ti= } \emptyset= [\text{NegP sá=} [\text{AspP ma=} [\text{vP témbenuza}]]]]$

($\emptyset=$ is a prefix that attaches to the (macro-)stem, i.e., νP)

Step 4: $[\text{TP sí=} [\text{TP tí= } \emptyset= [\text{NegP sá=} [\text{AspP ma=} [\text{vP témbenuza}]]]]]$

(The Neg climbs to the TP-edge and is realized as *sí=*, and the Hs double)

- (iii) affirmative present habitual:

(32) $[\text{NON.PST}]_{\text{T}^0} \Leftrightarrow \{\emptyset=, [\text{H}]\}$

(33) Step 1: $[\text{AspP ma=} [\text{vP témbenuza}]]$

Step 2: $[\text{TP tí= } \emptyset= [\text{AspP ma=} [\text{vP témbenuza}]]]$

Step 3: $[\text{TP tí= } \emptyset= [\text{AspP ma=} [\text{vP tembenúza}]]]$

- In step 2 in (33), because the silent $\emptyset=$ by itself cannot bear H, the H occurs on the SM.
- In step 3, the H on SM does not double, because *ma=* is itself a GT assigner. Consequently, tone shift applies, and the H (given by [H>] in (29)) is shifted to the penult. This crucially neutralizes the tone contrast on root.

- (iv) negative present habitual:
- (34) Step 1: [AspP ma= [vP témbenuza]]
 Step 2: [NegP sá= [AspP ma= [vP témbenuza]]] (c.f., (31))
 Step 3: [TP tí= Ø= [NegP sá= [AspP ma= [vP témbenuza]]]]
- In step 3 in (34), since the non-past Ø= is now a GT assigner (c.f., (31)), it will trigger the shift of the H on sá= to the penult. However, this shift cannot be successful, because it is blocked by ma=, another GT assigner.
 - As a result, (i) tone shift does not happen, and (ii) the [H>] associated with ma= is deleted.
- (34') Step 4: [TP tí= Ø= [NegP sá= [AspP ma= [vP témbenuza]]]]
 Step 5: [TP sí= [TP tí= Ø= [NegP ~~sá=~~ [AspP má= [vP témbenuza]]]]]
- In step 5, (i) the Neg climbs, as expected, and (ii) the H on SM (assigned by Ø=) doubles to ma=, essentially because at this point ma= is no longer associated with an H: the [H>] already gets deleted at step 4.
- Now we are able to resolve the non-cyclicity issue raised by Downing 2021.
 - In the affirmative form of the present habitual, the H vs. Ø contrast on root is neutralized, because the [H>] given by ma= is shifted to the penult, overriding all previous tonal information in the stem.
 - However, under negation, the [H>] does not shift—it simply gets deleted at the point TP is merged: the shifting H on negative sá= deletes this [H>].
 - That is, GT of both the affirmative and the negative of the present habitual can be derived cyclically, under several assumptions that are independently needed.
 - Other advantages:
 - A single element ma= is now considered to be consistently responsible for habitual.
 - Tone doubling is now viewed as a process that is *always* regular—it simply does not happen when the target is also a GT assigner.
 - The two negative proclitics are now related in a non-trivial way, a proposal by which many seemingly non-cyclic properties of Chichewa GT can be captured.

4. Conclusion

- By discussing Chichewa GT, I have shown that some arguments that are claimed to be in favor of a non-cyclic, realizational, word-and-paradigm approach to the phonology-morphology interface may cause no problems for a cyclic, derivational approach.
- Additionally, the cyclic approach can capture more generalizations and derive facts that would otherwise be considered coincidental.
- Though the current study does not aim to provide a thorough, systematic comparison between different models of the phonology-morphology interface (e.g., cyclic vs. non-cyclic). It modestly shows that a cyclic framework, having important advantages, can do things that it at first glance may not be able to do.

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