Verbal Tone in Chizigula

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ABSTRACT
The tonal system of Chizigula (Bantu) includes both lexical and grammatical tone, which interact in complex ways when they co-occur on verbs. When a verb has two H tones, the final H surfaces on the penultimate syllable, while the initial H associates to the first stem syllable and spreads rightward. A L tone is inserted between two H's as a result of the OCP, and this L tone surfaces on the antepenult and blocks the spread of the first H; on trisyllabic stems, it cannot associate and instead causes downstep. The attraction to the penult is analyzed as a result of a Coincide constraint, and the spreading of the first H by means of two Alignment constraints.

1. Introduction

Chizigula, also known as Zigula or Zigua, is a Bantu language (G30 family) spoken by approximately 350,000 people in Tanzania (Gordon 2005). Like most Bantu languages, it has a highly agglutinating verbal morphology, an extensive noun class system, and complex tonal behavior.

Bantu tone commonly exhibits spreading, shifting, penult-phenomena, and the interaction of lexical and grammatical tone (Kisseberth and Odden 2003), and Chizigula is no exception. It shows complex tonal behavior in many lexical categories, but the scope of this paper is limited to some of the most basic aspects of the verbal tone system. The analysis given is based on the data presented by Kenstowicz and Kisseberth (1990) and draws heavily from their own analysis of the data in terms of autosegmental phonology. Many of the constraints referred to are taken from class handouts, and others are taken from Yip (2002) and Kager (1999).

2. Verb roots with H tone

Verb roots in Chizigula may belong to one of two tone classes. They are either underlyingly toneless, or they carry a lexical H tone. Toneless verbs surface with low pitch on all syllables, and H-toned verbs surface with the H on the penultimate syllable, which may be a part of the root or one of the derivational extensions that occur between the root and the final vowel.

(1) Toneless verbs:[1]
ku-damanya 'to do'
ku-damanyiza 'to do for'
(2) H-tone verbs:
ku-lombéza 'to ask'
ku-lombezéza 'to ask for'

There is more than one way to account for the attraction of the H tone to penultimate position. The analysis undertaken here will assume that this is an effect of stress. The penultimate syllable is stressed in many Bantu languages (Kisseberth and Odden 2003) and lengthening is very common on the phrase penult (Maddieson 2003), so the assignment of prominence to this position makes sense.

This can be done by constructing a single binary trochaic metrical foot at the right edge of the word. In order to do this, two constraints are needed. The first will be ALLFEETRIGHT (AFR), which crucially must outrank PARSE-SYL in order to ensure that iterative parsing is ruled out. The constraints are defined in (3) and (4); their crucial

[1]The final vowel *–a* of the verb serves a limited grammatical function in many Bantu languages as one of the indicators of indicative mood, and derivational suffixes are placed between the verb root and its final vowel. It is also often characterized as a 'default' vowel that is necessary for phonological reasons (Bantu roots end in consonants, but words must end in vowels). The final vowel is generally considered part of the stem, and so I have not marked it as a separate morpheme.

ranking and a tableau showing the effect of this ranking are given in (5). This pattern will be followed throughout the paper as new constraints and orderings are introduced.

(3) ALLFEETRIGHT (AFR): Align (Ft, right, PrWd, right). The right edge of every foot must be aligned with the right edge of some Prosodic Word.

(4) PARSE-SYL: Syllables are parsed by feet. (Kager 1999, 162)

(5) AFR >> PARSE-SYL

Input: /ku + lombeza, H/	AFR	PARSE-SYL
a. * ☞ * * (* *) ku-lombeza		**
b. * * (* *) (* *) ku-lombeza	*!*	

The single foot that is constructed must be trochaic. Therefore, TROCHAIC must outrank IAMBIC.

(6) TROCH: Feet are left-headed.

(7) IAMB: Feet are right-headed.

(8) TROCH >> IAMB

Input: /ku + lombeza, H/	TROCH	IAMB
a. * ☞ (* *) ku-lombeza		*
b. * (* *) ku-lombeza	*!	

In order for a single H tone to surface on the penult, we need to specify a constraint to associate the H with a metrical head. For reasons to be discussed in Section 3.1, this must be a categorically assessed constraint and cannot be satisfied if the H in question is multiply-linked. The constraint to be used here will be COINCIDE, defined as follows:

(9) COINCIDE (H, LEFT, HEAD, LEFT): The left edge of every H tone must coincide with the left edge of some metrical head.

This constraint is satisfied when a single H is present, but it is often violated when more than one H is present in the input. The following section will address this situation in detail, but for now it will help to look ahead at one of these forms in order to establish some constraints that dominate COINCIDE.

When the prefix and the stem both contribute a H tone, both H's are allowed to surface. They must surface separately with a L tone between them (this is discussed further in Section 3.2). Since the first of the two tones violates COINCIDE, we can conclude that COINCIDE is outranked by at least three other constraints. MAX-TONE (H) prevents the first H tone from deleting, and NOFLOAT (H) keeps it from delinking; either of these strategies would allow the vacuous satisfaction of COINCIDE. The constraint NOFUSION disallows the merging of the two H's into a single H tone, and IDENT-T disallows the changing of the H into a L. All of these constraints thus outrank COINCIDE. The constraint definitions are adapted from Yip (2002, 83):

(10) MAX (H): A H tone in the input must have a corresponding tone in the output.

(11) NOFLOAT (H): A H tone must be associated with a TBU.

(12) NOFUSION: Separate underlying tones must stay separate.

(13) IDENT-T: Correspondent tones are the same.

(14) MAX (H), NOFLOAT (H), NOFUSION, IDENT-T >> COINCIDE

Input: /a, H_1 + hangalasanyiza, H_2/	MAX (H)	NOFLOAT (H)	NOFUSION	IDENT-T	COINCIDE
☞ a. H_1 L H_2 | | a-hangalasanyiza					*
b. H_2 | a-hangalasanyiza	*!				
c. (H_1) H_2 | a-hangalasanyiza		*!			
d. $H_{1,2}$ a-hangalasanyiza			*!		
a. L_1 H_2 a-hangalasanyiza				*!	

At this point, we have established the following constraint ranking:

(15) TROCH, AFR, MAX (H), NOFLOAT (H), NOFUSION, IDENT-T >> IAMB, PARSE-SYL, COINCIDE

3. H-toned subject prefixes

3.1 Alignment constraints

Two subject agreement prefixes, 3SG *a-* and 3PL *wa-*, carry a H tone. As with a root H, the H of a prefix surfaces on the penultimate syllable of the verb when it is the only H present. When both the subject prefix and the root are H and the stem has at least four syllables (including the final vowel), one H tone surfaces on the penult and the other associates with the first syllable of the stem and spreads rightward, leaving a single L syllable between its right edge and the penult.

(16) H subject prefix with toneless verb:
a-songolóza 'he is avoiding'
a-hugusahugúsa 'he shells repeatedly'

(17) H subject prefix with H-toned verb:
a-lúlugánya 'he takes advantage of'
a-hángálásanyíza 'he carries many things for'

The position of the rightmost H can be accounted for by the constraint COINCIDE. The first H behaves very differently, and seems to be 'pulled' in two different directions. First, it must be anchored to the first syllable of the stem. This effect is brought about by the constraint ALIGN-L, defined as follows:

(18) ALIGN-L: Align (H, left, Stem, left). The left edge of every H tone coincides with the left edge of some stem.

By looking back at the forms with a single H, we can see that ALIGN-L must be outranked by COINCIDE. Since these two constraints make competing demands about the position of the left edge of a tone, only one can be satisfied when a single H tone is present. It turns out that COINCIDE is satisfied at the expense of ALIGN-L, as shown by the following tableau.

(19) COINCIDE >> ALIGN-L

Input: /ku + lombeza, H/	COINCIDE	ALIGN-L
a. ☞ H | ku-lombeza		*
b. H | ku-lombeza	*!	
c. H ku-lombeza	*!	

When the rightmost H already occupies penult position, a preceding H cannot satisfy COINCIDE and instead comes under the influence of ALIGN-L. The following tableau illustrates the effect of ALIGN-L on specifying the position of the first of two H tones.

Input: /a, H + hangalasanyiza, H/	MAX (H)	NOFLOAT (H)	NO FUSION	IDENT-T	COINCIDE	ALIGN-L
a. ☞ H L H a-hangalasanyiza					*	
b. H L H a-hangalasanyiza					*	*!
c. H L H a-hangalasanyiza					*	*!

At the same time as the first of two H tones is anchored to the first stem syllable, it is drawn rightward toward the penult. This implies another Alignment constraint, which we can define in the following way:

(20) ALIGN-R (H, RIGHT, STEM, R): The right edge of every H tone coincides with the right edge of some stem.

This constraint is completely satisfied in forms with a single H surfacing on the penult. The first of two H's, however, will always incur some violation of ALIGN-R. This is a consequence of the fact that the optimal position for a H tone specified for this constraint is already occupied by the rightmost H. Therefore, ALIGN-R is minimally violated as necessary to ensure that the two H's both surface separately.

ALIGN-R must be a separate constraint from the one that is primarily responsible for placing a single H on the penult (COINCIDE). By itself, ALIGN-R would be unable to explain why a single H does not align with the left edge of the stem. One crucial difference between COINCIDE and ALIGN-R as defined here is that COINCIDE specifies the position of the left edge of the H tone, while ALIGN-R addresses the position of the right edge. If COINCIDE were to specify that the *right* edge of the H tone coincides with the metrical head, then it would still be satisfied when spread is present. All other things being equal, the pull of ALIGN-L would then cause the H tone to extend from the first stem syllable to the penult. Since this does not happen, we must assume that it is the left edge of the H that is specified in the COINCIDE constraint and that if it is not satisfied, it exerts no further influence. It therefore must be assessed categorically; if it were a gradiently assessed ALIGNMENT constraint, it would keep the left edge of every tone as close to the penult as possible. Since it outranks ALIGN-L, we would not expect to see the first of two H's associate with the first root syllable because this would needlessly incur more violations of the hypothetical ALIGN (H, LEFT, HD, LEFT).

ALIGN-R, like COINCIDE, must be outranked by MAX (H), NOFLOAT, NOFUSION, and IDENT-T. The tableau under (14) above, which demonstrates this crucial ranking for COINCIDE, would yield essentially the same result for ALIGN-R. The strategies of deleting, delinking, or fusing H's, or of changing one to a L tone, would be alternative ways to completely satisfy ALIGN-R, and none of these strategies are employed. Violations of ALIGN-R are allowed in order to satisfy these and other higher-ranked constraints, including the OCP discussed below.

(21) MAX (H), NOFLOAT (H), NOFUSION, IDENT-T >> ALIGN-R

Since the first of two H's spreads from the first syllable to the root rightward as close to the metrical head as possible, both ALIGN-R and ALIGN-L must outrank the constraint NOSPREAD. The following definition is from Yip 2002; she calls the corresponding constraint NOLONGT.

(22) NOSPREAD: A tone must be associated with at most one TBU.

(23) ALIGN-R, ALIGN-L >> NOSPREAD

The following tableau illustrates the effects of this ranking. The Alignment constraints are placed as high as possible in the ranking according to the results of the discussion so far.

Input: /a, H + hangalasanyiza, H/	MAX (H)	NOFLOAT (H)	NO FUSION	COINCIDE	ALIGN-R	ALIGN-L	NO SPREAD
☞ a. H L H a-hangalasanyiza				*	**	****	***
b. H L H a-hangalasanyiza				*	**	**, ***!*	
c. H L H a-hangalasanyiza				*	***!*	****	
d. H L H a-hangalasanyiza				*	***!	*, ****!	

Adding in the Alignment constraints and NOSPREAD, the following overall ranking has been established:

(24) TROCH, AFR, MAX (H), NOFLOAT (H), NOFUSION, IDENT-T >> IAMB, PARSE-SYL, COINCIDE, ALIGN-R >> ALIGN-L >> NOSPREAD

3.2 OCP effects

The first of two H tones extends from the first syllable of the stem toward the penultimate syllable. In words with stems that are four syllables or longer, this spreading stops two syllables from the penult, with a low-toned syllable between the two H's. This can be seen as an effect of the Obligatory Contour Principle (OCP). Since Downstep occurs in the corresponding disyllabic examples (see below), this can be explained most elegantly as the addition of a L tone between the two H's.

The insertion of the buffer L tone shows that the OCP outranks the constraint DEP-TONE (L). The intervening L syllable also shows that the OCP outranks ALIGN-R. The first of two H's stops short of the antepenultimate syllable, whereas we would expect it to extend to the antepenult if the L inserted to satisfy the OCP did not block its spread. The constraint ranking in (26) is demonstrated in the tableau for *alúlugánya*.

(25) OCP: No adjacent identical elements. (Yip 2002, 80)

(26) OCP >> DEP (L), ALIGN-R

Input: /a, H + luluganya, H/	OCP	DEP (L)	ALIGN-R
a. H L H ☞ | | | a-luluganya		*	**
b. H H \ | a-luluganya	*!		*

Another way of satisfying the OCP while still maximally respecting ALIGN-R would be to allow the inserted L to float; the first of the two H's could then extend to the antepenult. This is not what happens in stems of three or more syllables, so we can establish that NOFLOAT (L) outranks ALIGN-R.

(27) NOFLOAT (L): A L tone must be associated with a TBU. (adapted from Yip 2002, 82)

(28) NOFLOAT (L) >> ALIGN-R

Input: /a, H + luluganya, H/	NOFLOAT	ALIGN-R
a. H L H ☞ | | | a-luluganya		**
a. H (L) H \ | a-luluganya	*!	*

However, there is a situation in which the inserted tone is allowed to float. This happens when the stem has only two syllables. The first H then surfaces on the first syllable of the stem, the second H surfaces on the other stem syllable, the penult, and the inserted L does not surface but causes downstep of the second H.

This shows that the OCP still has the effect of inserting a L tone even when that L cannot associate to a syllable. Since NOFLOAT (L) is violated in order to satisfy the OCP, the latter must outrank the former.

(29) OCP >> NOFLOAT (L)

Input: /a, H + lombeza, H/	OCP	NOFLOAT (L)
a. H (L) H ☞ | / a-lombeza		*
b. H H | | a-lombeza	*!	

One way of avoiding the need for a floating L would be to allow the first H tone to surface on the prefix from which it originated, incurring a violation of ALIGN-L. The avoidance of this strategy shows that ALIGN-L is more highly ranked than NOFLOAT (L).

(30) ALIGN-L >> NOFLOAT (L)

Input: /a, H + lombeza, H/	ALIGN-L	NOFLOAT (L)
a. ☞ H (L) H | | / a-lombeza		*
a. H L H | | | a-lombeza	*!	

4. Conclusion

The Chizigula verbal system is characterized by shifting and spreading of lexical and grammatical H tones from their corresponding segmental morphemes. One of the primary features of the verbal tone behavior is attraction of the rightmost H tone to the penultimate stressed syllable. This was analyzed as an effect of a COINCIDE constraint that exerts pressure to align the left edge of a H tone with the metrical head of the word. Due to two lower-ranked Alignment constraints, when a word contains both a prefix H and a root H, the leftmost H associates to the first syllable of the stem and spreads rightward toward the stressed penult, but is blocked from reaching it by the OCP.

The above discussion has arrived at the following partial ranking of constraints for Chizigula based on the behavior of the verb patterns under discussion:

(31) TROCH, AFR, MAX (H), NOFLOAT (H), NOFUSION, OCP >> IAMB, PARSE-SYL, COINCIDE, DEP (L) >> ALIGN-L >> NOFLOAT (L) >> ALIGN-R >> NOSPREAD

A number of other interesting tonal phenomena are found operating in Chizigula verbs for inputs that have not been discussed, such as when an object prefix contributes a H tone or when the verb root is monosyllabic. These would provide plenty of fuel for further analysis, as would the behavior of nominal and adjectival tone, which involve a more elaborate system of lexical tonal contrast.

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