Depressor Consonants Effects in Malawian CiTonga: Phonetic or Phonological?

CiTonga, a Malawian Bantu language, has a range of consonants which lower the pitch on a following vowel. The first effect is the blocking of a productive High Tone Doubling (HTD) process. This very general tone rule spreads a High tone from one mora onto the following one as seen in the singular/plural pair of nouns in (1) and infinitival verbs in (2). In these infinitives /ku-/ is the infinitival prefix and the verb roots are followed by optional derivational suffixes, ultimately followed by a neutral inflectional final vowel (/-a/). The H shown in the UR is a grammatical (melodic) High tone assigned to the first vowel in an otherwise toneless verb stem.

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| (1) | a. | kàpààlà | 'sp. fish (sg)' | /kapala/ |
| | b. | á-kápààlà | 'sp. fish (pl)' | /á-kapala/ |
| (2) | a. | kù-púm-á | 'to beat each other' | /ku-púm-a/ |
| | b. | kù-púm-àn-à | 'to beat each other' | /ku-púm-an-a/ |
| | c. | kù-púm-íl-àn-à | 'to beat for each other' | /ku-púm-il-an-a/ |

If, however, the High toned vowel is followed by one of a specific set of consonants, the HTD process is completely blocked, as illustrated in (3).

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| (3) | a. | kù-cóv-à | 'to gamble' | /ku-cóv-a/ |
| | b. | kù-ʋéɟ-à | 'to fish (with line and hook)' | /ku-ʋéɟ-a/ |
| | c. | kù-wót$^{h}$-à | 'to warm oneself' | /ku-wót$^{h}$-a/ |

As diagnosed by this blocking effect, the depressor consonants in CiTonga consist of 1) the voiced obstruents /b, d, ɟ, g, v, z/ and 2) the aspirates /h, p$^{h}$, t$^{h}$, c$^{h}$, k$^{h}$, mp$^{h}$, nt$^{h}$, ɲc$^{h}$, ŋk$^{h}$/. Consonants which do not block HTD are 1) the voiceless obstruents /p, t, c, k/, 2) the prenasalized voiced stops /mb, nd, ɲc, ŋg/, and 3) the sonorants /l, m, n, ɲ, ŋ, ʋ, j, w/. Typologically, this is unusual in at least two respects. First, aspirated consonants often have a raising, not lowering effect on the following vowel. And second, prenasalized voiced stops often have a lowering effect. For instance, in neighboring Chichewa, as described by Cibelli (2015), the voiceless aspirated stops have the greatest *raising* effect on the pitch, and pre-nasalized voiced stops have a *lowering* effect—nether of which is true of CiTonga.

Beyond the blocking of HTD, depressor consonants also lower the pitch on a following underived High-toned vowel (i.e. a vowel which is High-toned, not due to HTD). E.g., in verbal infinitives of the form /ku-$C_1$V$C_2$-a/, when $C_1$ is a depressor consonant, the pitch is significantly lower on the root vowel, as compared with forms where $C_1$ is a non-depressor. This naturally raises the issue as to whether this lowering effect is truly phonological (as is the case with the categorical effects described above in the blocking of HTD) or if it is phonetic (gradational). It turns out this is testable, as there is a general process of OCP-motivated H tone deletion in the language. In cases of verbal infinitives with H-toned roots, such as /nám/ 'lie', the grammatical H is assigned to the final V of the stem, as illustrated below.

(4) a. kù-nám-ís-àn-á ‘to cause each other to lie’ /ku-nám-is-an-á/
b. kù-nám-íl-ìs-àn-á ‘to cause to lie for each other’ /ku-nám-il-is-an-á/

In the event there are no inflectional suffixes, the two High tones will be on adjacent syllables—the stem-initial, and stem-final ones. In such cases, an OCP-motivated rule will apply to delete the first H. In Bantu circles this is referred to as Reverse Meeussen’s Rule (RMR).

(5) a. kù-nàm-á ‘to lie’ /ku-nám-á/
b. kù-mbwìt-á ‘to miss’ /ku-mbwít-á/

That this process is phonological can be seen in the minimal pairs in (6).

(6) a. kù-sít-á ‘to iron clothes’ /ku-sít-a/ (toneless root)
b. kù-sìt-á ‘to give money’ /ku-sít-á/ (H-toned root)

In (6a) HTD applies, and in (6d) RMR applies. Given these tonal processes, we can return to the question as to whether the lowering of a non-derived High by a depressor consonant is phonological or phonetic by examining the output of forms such as those below.

(7) a. /ku-p$^{h}$át-a/ ‘to prune’ (toneless)
b. /ku-p$^{h}$át-á/ ‘to get stuck’ (H-toned)

RMR will apply to (7b) rending it [kù-p$^{h}$àt-á]. The question then becomes whether the lowering of the vowel following the depressor consonant (in this case [p$^{h}$]) in (7a) neutralizes the two forms or not.

What we found in examining a range of different verbs was that in these contexts we have a mix of neutralizations and near-neutralizations. We will demonstrate this through providing a statistical analysis of the lowering effects, as well as the results of a perceptual discrimination test. We show that while the HTD blocking effects seen in (3) are the same, regardless of the depressor consonant involved, the lowering of underived High tones shows that some depressor consonants have a greater lowering effect than others. An ANOVA performed on the full set of depressor consonants indicates a significant difference ($p < .001$) in the lowering of underived High tones, with voiced obstruents inducing a lower F0 than aspirates. Thus CiTonga constitutes a typologically interesting case where some depressor effects are clearly phonological, while others are phonetic, though now bordering on the phonological.

References:

Cibelli, E. 2015. The phonetic basis of a phonological pattern: Depressor effects of prenasalized consonants. In J. Romero & M. Riera (Eds.), The Phonetics-Phonology Interface: Representations and methodologies (171-192). Amsterdam: John Benjamins.