Repair by hopping: Glottal dissimilation in Mantauran (Rukai)

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Introduction: In this study, we investigate an unusual case of dissimilation in which the affected segment is *relocated* to a subsequent syllable, rather than undergoing more common processes such as feature change, deletion, or insertion of a segment with the opposite value (cf. [1], [2]). This phenomenon, known as 'glottal hopping' in the literature ([3]), offers valuable insights into the underlying mechanisms of dissimilation from a broader theoretical perspective. Our analysis focuses on two competing approaches to dissimilation in current phonological theory: the Obligatory Contour Principle (OCP) account, which posits a ban on identical adjacent elements at the melodic level (see [1] and references cited), and the Surface Correspondence Theory of Dissimilation (SCTD), as developed in [2] and subsequent works (e.g., [4]). By examining this rare process, we contribute to the ongoing evaluation of these analytical frameworks and their efficacy in explaining diverse dissimilatory phenomena (see, e.g., [5]). Our findings not only shed light on the nature of glottal hopping but also have implications for our understanding of long-distance interactions as well as the driving force of dissimilation.

Background: The data are taken from a reference grammar of Mantauran (Wànshān in Mandarin) [3], which is one of the six recognized varieties of Rukai, an Austronesian language indigenous to the central and southern regions of Taiwan. Rukai has a strict CV syllable structure, with four vowels {a, o, i, ə} and a phonemic vowel length contrast. Pertinent to the present study is its echo vowel phenomenon, which occurs when there is an underlyingly C-final stem, e.g., the Japanese loanword *shashin* 'picture' is adapted as *sasing**i*** (where ng=ŋ) in Rukai (see also (1a) below).

Glottal hopping: The glottal stop is phonemic in Mantauran, as evidenced by minimal pairs such as iaʔə 'yes' vs. iaə 'I.' Glottal hopping (with affected ʔ shown in red) occurs only in derived environments, as in (1b), but not in non-derived environments, as in (2).

(1) a. /iðiʔ/ → [iðiʔi] 'to stand' b. /ta-iðiʔ-aə/ → [ta-iði-aʔə] 'standing place'
(compare: *[ta-iðiʔi-aə] or *[ta-iðiʔ-aə])

(2) a. ʔiʔiasə 'bird's name,' aɭəʔəʔə 'nit,' ʔoʔo 'wash (one's) hair,' etc.

The data in (1b) demonstrate that the glottal stop migrates to the subsequent vowel, inserting itself into the affix *aə*, which constitutes part of the locative circumfix. Of particular note is the contrast presented in (3) (NB: the reduplicative forms in (3b, 4a-b) serve to denote plurality).

(3) a. [ʔaŋəʔaŋə] 'to hurt' → [ʔi-aŋəʔaŋə] 'get hurt' (*[ʔi-ʔaŋəʔaŋə)
b. [ʔaəɭəŋə] 'flower' → [ʔi-aʔəɭə-ʔəɭəŋə] 'pick up flowers' (*[ʔi-ʔaəɭə-ʔəɭəŋə])

(3a) exemplifies a case of dissimilation resolved through deletion, wherein the proximity of the glottal stops in the prefix ʔi and the stem ʔaŋə(*ʔaŋə*) triggers this alternation. Conversely, in (3b), under otherwise identical conditions, dissimilation is resolved via glottal hopping. It is also worth noting that glottal stops in adjacent syllables are permissible in non-derived environments, as previously illustrated in (2). The last, but perhaps most intriguing, observation is that glottal hopping can be conditioned by the presence of additional glottal stops in the stem. This phenomenon is clearly demonstrated by the contrast in (4). As a reminder, these stem-final vowels are also echo vowels (cf. (1a-b)).

(4) a. [ʔoɭaʔa] 'snake' → [ʔoɭaʔoɭaʔ-aə] 'snake area' (*[ʔoɭaʔoɭa-aʔə])
b. [ahaʔa] 'to cook' → [ta-ahaha-aʔə] 'kitchen' (*[ta-ahahaʔ-aə])

Glottal hopping is absent in (4a) but occurs in (4b), where the underlying contiguity of the affix *aə* is, once again, disrupted (cf. (1b)). Interestingly enough, this instance of glottal hopping in (4b) is not motivated by dissimilation (cf. (3b)); rather, it is tantalizingly blocked by the presence of multiple glottal stops within the stem (4a).

Analysis: Glottal hopping can be triggered by both dissimilatory and non-dissimilatory factors. We shall first examine the apparent dissimilatory instance in (5). To analyze this, we will employ Generalized OCP-cum-proximity hierarchy proposed by [1] and proximity-based correspondence limiter constraints introduced by [4], with slight modifications to accommodate the Mantauran data. Precisely, [ʔ][ʔ]-(μμ)ADJACENT is defined as "assess a violation for every correspondence pair (ʔ$_i$ . . . ʔ$_i$) if ʔ$_i$ . . . ʔ$_i$ are separated by two moras." Similarly, *ʔ-μμ-ʔ represents a ban against two glottal stops separated by two moras. As observed, both approaches yield the same prediction.

(5) (=3b)	/ ʔi-ʔaəɭəŋə, RED/	*ʔ-μ-ʔ	*ʔ-μμ-ʔ	[ʔ][ʔ]-(μ)ADJ	[ʔ][ʔ]-(μμ)ADJ
☞ a.	ʔi-aʔəɭə-ʔəɭəŋə		1		1
b.	ʔi-ʔaəɭə-ʔəɭəŋə	1!		1!	

However, despite this apparent convergence in predictions, our analysis reveals a crucial distinction. We propose that surface correspondence offers a more comprehensive explanatory framework than the OCP-based approach, successfully accounting for both dissimilatory and non-dissimilatory instances of glottal hopping. Our investigation begins by explaining the relocation of the glottal stop to the subsequent vowel in derived environments. The responsible constraint *ALIGN-(SUFFIX, L, ʔ, R) penalizes any instance where the left edge of a suffix (*aə*) coincides with the right edge of a glottal stop. Glottal hopping occurs to satisfy this anti-alignment constraint (6d).

(6) (=4b)	/ahaʔ/	NOCODA	DEP-V	/ta-ahaʔ-aə, RED/	*ALIGN-(SUFFIX, L, ʔ, R)
☞ a.	ahaʔa		1	c. ta-a.ha.ha.ʔ-a.ə	1!
b.	ahaʔ	1!		☞ d. ta-a.ha.ha-a.ʔə	

Next, the pivotal contrast is most clearly illustrated in (7). Specifically, the occurrence of glottal hopping in (7d) starkly contrasts with the ill-formedness in (7b). This discrepancy raises an intriguing theoretical challenge, particularly when viewed through the lens of the OCP, given that (7a) is expected to be always harmonically bounded by (7b) with respect to proximity.

(7) (=4a)	/ʔoɭaʔ-aə, RED/	*ʔ-μ-ʔ	*ʔ-μμ-ʔ	*ALN-(SFX, L, ʔ, R)	cf. /ta-ahaʔ-aə, RED/
☹ a.	ʔo.ɭa.ʔo.ɭa.ʔ-a.ə		2!	1	c. ta-a.ha.ha.ʔ-a.ə
!☞ b.	ʔo.ɭa.ʔo.ɭa-a.ʔə		1		☞ d. ta-a.ha.ha-a.ʔə

We propose that the contrast in (7) can be accounted for using proximity-based correspondence. Specifically, our analysis employs two key constraints: (i) [ʔ][ʔ]-EDGE-(AFFIX) dictates that every correspondence pair (ʔ$_i$…ʔ$_i$) incurs a violation if ʔ$_i$…ʔ$_i$ are separated by an edge of a suffix (=*aə* here) and (ii) CORR-[ʔ]:PWD:[ʔ] requires that all glottal stops within a prosodic word (PWD) to stand in correspondence. The contrast is well captured by this analysis, as illustrated in (8).

(8)	/ʔoɭaʔ-aə, RED/	[ʔ][ʔ]-EDGE-(AFX)	CORR-[ʔ]:PWD:[ʔ]	*ALN-(SFX, L, ʔ, R)
☞ a.	ʔ$_i$o.ɭa.ʔ$_i$o.ɭa.ʔ$_i$-a.ə			1
b.	ʔ$_i$o.ɭa.ʔ$_i$o.ɭa-a.ʔ$_i$ə	1!		
c.	ʔ$_i$o.ɭa.ʔ$_i$o.ɭa-a.ʔ$_j$ə		1!	
7c.	ta-a.ha.ha.ʔ-a.ə			1!
☞7d.	ta-a.ha.ha-a.ʔə			

Conclusion: This analysis demonstrates that both dissimilatory and non-dissimilatory instances of glottal hopping can be successfully explained by surface correspondence theory. In particular, the preference of local adjacent elements in (8a) is unexpected in any OCP-based account.

References: **[1]** Suzuki, K. 1998. *A Typological Investigation of Dissimilation*. AZ. **[2]** Bennett, W. 2015. *The Phonology of Consonants*. CUP. **[3]** Zeitoun, E. 2007. *A Grammar of Mantauran (Rukai)*. **[4]** Shih, S & S. Inkelas. 2019. *Autosegmental aims in surface-optimizing phonology*. *LI*. **[5]** Stanton, J. 2020. Aggressive reduplication and dissimilation in Sundanese. *Phon Data Analysis*.