

## Tone does not trigger epenthesis: evidence from Arapaho

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**Main claim:** According to Blumenfeld (2006) (floating) tones should not be able to induce epenthesis. However in Arapaho epenthetic vowels show only up if they can attract an underlying floating high tone. I argue that this apparent violation of Blumenfeld's generalisation should be better analysed as an opaque interaction of epenthesis due to general syllable-shape constraints, tone assignment and deletion. Such an interaction is an instance of an Duke-of-York (DoY) Phenomenon, a type of opacity that proves especially problematic for Optimality Theory (OT). In derivational terms, they are defined as a sequence of processes, in which the second process reverses the changes effectuated by the first process ( $A \rightarrow B \rightarrow A$ ). McCarthy (2003) claims, that apparent DoY should be re-analysed and that real DoY patterns (defined as  $A \rightarrow B \rightarrow B' \rightarrow A'$ ) do not exist. Unlike other phenomena discussed in the literature (e.g. Kager (1999)), the DoY in Arapaho makes no reference to feet or stress. I claim that the best analysis lies in the adoption of Stratal OT (Kiparsky, 2000; Bermúdez-Otero, 2011). Epenthesis applies in a first stratum, and deletion, triggered by a ganging up of several constraints against low-sonorous nuclei, on a higher stratum. I show that alternative approaches in parallel OT and serial versions without re-ranking (HS, McCarthy (2000, 2010)) fail to account for the same data.

**Data:** Arapaho (Plains Algonquin, (Cowell & Moss, 2008)) is a polysynthetic language with a comparatively small phoneme inventory and two tones, H (=v) and L (=v). It displays an intriguing pattern of interactions between epenthesis, place- and manner assimilation, floating tones and tone-sensitive vowel deletion. Epenthesis is employed to re-syllabify coda consonants due to a constraint against place features in codas. (1).

- (1) a. /béteen-<sup>H</sup>too-noo/ → béteenítoonoo 'I'm worshipping'  
b. /oow-<sup>H</sup>see/ → hoowúsee 'to walk down'

The epenthetic vowel is a high vowel, in most contexts [i] but in phonologically predictable cases – preceded by /o/ and a velar consonant or /θ/ – [u]. If it is [i], it triggers the same segmental changes on preceding consonants as underlying /i/ does: de-larisation of velar consonants (/k,x,w/ → [tʃ,s,b], see (2-a)) (this is also triggered by the non-high vowel /e/) and a noise-augmenting chain shift in coronal obstruents (/t/ → [θ], /θ/ → [s] see (2-b)). Unlike de-larisation, the chain shift is a derived environment effect and is sometimes lexically blocked (3-c).

- (2) a. /nóóhow-éθen/ → nonóóhobéθen 'I see you'  
b. /toot-ííhi?/ → tooθííhi? 'nearby'

Epenthetic vowels are the preferred hosts for floating high tones (<sup>H</sup>) (3-a). If there is no epenthetic vowel, the floating tone replaces adjacent stem tones (3-b). If the epenthetic vowel is preceded by a high tone, the latter shifts obeying a strong OCP on high tones in the language (3-c)

- (3) a. /tfew-<sup>H</sup>-see/ → tfebísee 'to walk along'  
b. /ne-<sup>H</sup>woʔéín/ → nónoʔéín 'my necklace'  
c. /oséit-<sup>H</sup>see-noo/ → hooséitíseenoo 'I'm walking backwards'

If there is no floating high tone available, epenthetic vowels are low-toned by default. A final relevant process is (optional) deletion of monomoraic high vowels in word medial position – unless they bear a high tone, in which case they never delete (1). For epenthetic vowels, this

deletion is obligatory. In consequence, epenthetic vowels are only realised on the surface if they were able to attract a floating high tone, see (4) for a case without epenthesis.

(4) *wóxhoox*, \**wóxuhoox* ‘horse’

Crucially, if an epenthetic vowel is expected after a consonant that undergoes consonantal changes, these changes surface even though the epenthetic vowel does not surface (5).

(5) /*nih-bebíθ-tii-t*/ → *nihbebíistiit* ‘she fixed it’

Derivationally, epenthesis thus applied, triggered the change and then deleted, which is exactly the A→B→B’→A’ pattern.

**Analysis:** Parallel approaches cannot derive this pattern, because they cannot refer to a necessary intermediate step. An alternative parallel analysis, assuming that the real trigger of epenthesis is the floating tone itself, fails to derive the over-application of consonantal changes and predicts incorrect tonal melodies: The constraint that forces epenthesis with floating tones must protect tonal identity, favouring a violation of DEP instead. The same constraint should block epenthesis if the base ends in a high toned syllable blocking thus the OCP induced high-tone shift. HS can derive the absence of tone triggered epenthesis naturally, because epenthesis without tonal association is not a harmonically improving step. The hurdles for HS are that even though it is inherently based on intermediate steps, re-ranking is impossible and DoY phenomena thus ruled out. The solution for this puzzle lies in the adoption of Stratal OT. Stratal OT assumes different levels or strata, normally 3, in which different morphophonological layers are computed. In between the strata, a re-ranking of constraints is possible. I assume that epenthesis, consonantal change and tone assignment all apply on a lower stratum, the stem level (6), while deletion of low-toned vowels of low sonority, happens on a later stratum, the word level (7). There is no independent evidence from affixation for the strata. Between strata, constraints are re-ranked and formerly high ranked NOCODA which penalises coda consonants is now dominated by the constraint against low-sonorous nuclei. Vowel deletion is enforced by the constraint SYNCOPE and the somewhat mysterious consonantal changes by the ad hoc constraint C-CHANGE.

(6) Stem level

input: <i>bebíθ-tii</i>	NOCODA	MAX-T	*FLOAT	DEP-V	C-CHANGE	SYNCOPE	IDENT-T	IDENT-C
a. <i>bebíθtii</i>	*!							
b. <i>bebísitii</i>				*		*		*
c. <i>bebíθitii</i>				*	*!	*		

(7) Word level

input: <i>bebísitii</i>	SYNCOPE	MAX-T	*FLOAT	DEP-V	C-CHANGE	NOCODA	IDENT-T	IDENT-C
a. <i>bebístitii</i>						*		
b. <i>bebísitii</i>	*!							

**Summary and further implications:** This talk contributes to the empirical discussion on the relationship between tone, epenthesis and deletion. The data and analysis are in accordance with Blumenfeld’s (2006) claim that tone is never a trigger for epenthesis. On the other hand, it shows that tone may very well influence vowel deletion, in contrary to claims by de Lacy (2006). While Harmonic Serialism has accounts naturally for this property of floating tones, it cannot derive the DoY pattern of Arapaho.