Non-metrical vowel optimization and iambic unevenness in Arabic

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In this paper, I propose a constraint-based analysis for three processes affecting short vowels: high vowel syncope, low vowel raising, and low vowel deletion in three dialects of Arabic. In the Zilfaawi, Negev, and Jordanian dialects, syncope targets the high vowels [i, u] in non-final open syllables, while raising targets the low vowel [a] in the same environment in Negev and Zilfaawi, but not in Jordanian. I analyze both deletion of high vowels and raising of [a] as a pressure to reduce the duration of short vowels in open syllables (Kirchner 1996, Kiparsky 2003). Zilfaawi also has deletion of [a], which only happens in the dependent syllable of an iamb, which I analyze as promoting the unevenness of the iamb (McCarthy, 2003).

Gouskova (2003) claims that vowel processes such as syncope and raising must be due to either metrical constraints (such as those that determine stress placement) or sonority constraints on nuclei and foot branches. Moreover, she argues that while the marked segment can be banned, the least marked segment cannot be. I will show that high vowel deletion and low vowel raising in these dialects of Arabic cannot be attributed to these constraints but rather must be attributed to a REDUCE constraint that minimizes all vowels duration in open syllables. This constraint requires both vowels [a] and [i] to undergo raising and syncope, respectively.

Non-metrical low vowel raising:
In Zilfaawi and Negev (but not Jordanian), low vowel raising takes place regardless of foot structure, even in the stressed syllable, e.g. /ga.mar/ → [(gi.må)ar] ‘moon’. This pattern cannot be captured with Gouskova’s (2003) sonority constraints such as *PEAKFOOT/i.u (no high vowels in the foot peak). The low vowel raises in the foot peak (as seen above), in the foot margin (e.g. /za.må:n/ → [(žà.må:n)] ‘era’), and in unfooted syllables (e.g. /mi.jtàarì/ → [(mi].tàarìll) ‘working’). So, I argue that raising is due to syllable structure rather than foot structure or sonority-related constraints, i.e. raising is triggered in open syllables, with the low vowel penalized by REDUCE.

Non-metrical high vowel deletion:
High vowel deletion (syncope) applies in all three dialects in non-final open syllables, as shown in (1).

(1) [ná:.gil] + [i:n] → [(na:ɡ).(li:n)]
   *[(na:).ɡ.(li:n)]

High vowel syncope in these dialects occurs in open syllables; it cannot be metrical because it targets vowels in positions where deletion does not improves foot structure. While high vowel deletion allows exhaustive parsing in the trochaic Jordanian dialect as seen in (1), it does not improve syllable parsing in the iambic Negev and Zilfaawi dialects, e.g. /kì:ta:b/ ‘a book’ → [(kì:ta:b)] or [(k.tà:b)]. In both of these iambic dialects, *[[(k.tà:b)]] would have been perfectly footable, and thus not capturable with Gouskova’s (2003) constraints such as PARSE-σ.

Low vowel deletion improves iambic unevenness
In Zilfaawi Arabic, low vowel deletion applies before a light syllable: (2a) in an open syllable followed by another non-final open syllable, or (2b) in an open syllable followed by a final CVC (where the word-final C is weightless). Deletion is blocked before a heavy syllable (2c). This deletion process is metrical, because low vowels delete to improve the duration contrast inside iambs, making the dependent syllable as short as possible, leaving the preceding consonant as a semi-syllable (following McCarthy 2003, Cho & King 2000).

(2) a. /la.ʃàb+a/at/  [(l.ʃà).bat] ‘she played’ *[(l.ʃà).bat]
b. /la.ʃàb/  [(l.ʃà)<b>] ‘he played’ *[(l.ʃà).b]
c. /la.ʃàb+na/  [(l.ʃàb).na] ‘we played’

While metrical, low vowel deletion cannot be captured by constraints such as WSP, which is irrelevant because deletion does not improve the weight of the stressed syllable, nor does deletion remove a PARSE-σ violation. Deletion does remove a violation of *MARGINFOOT/a, but this constraint cannot force deletion in this language, as seen in (2c).

Low vowel deletion in Zilfaawi is limited to verbs; placing stress on the final syllable in /la.ʃàb/ → [(l.ʃà)b] ‘he played’ creates an iamb that leads to deletion. In nouns, however, the iamb that is the environment for deletion is not created, because NonFinality makes a preference for a trochaic foot, as in /ga.mar/ → [(gi.må)r] ‘moon’ *[g.må)r].

Conclusions
I survey vowel alternation processes in three dialects of Arabic, analyzing them as either syllable-level (non-metrical) or foot-level (metrical) phenomena. Since these processes cannot be covered by the constraints proposed by Gouskova’s (2003) to unify all vowel alternations as either metrical or sonority constraints, I analyze the phenomena using two constraints: Reduce, which targets all vowels in open syllables, and GroupingHarmony, which target [a] in specific positions.