Bidirectional Inwards Spread: Constraints vs. Iterative Rules

Main Claim: Tonal Overwriting has been a challenge to concatenative, modular phonology. I argue that the succesfull account in Trommer crucially relies on constraints (vs. rules) to trigger iterative spreading. Rule-based accounts fail to account for the observed properties.
Problem: Tonal Spreading is often thought of as an iterative process in rule-based autosegmental phonology (RBAP), at least parametrically (cf. Archangeli & Pulleyblank 1994). As noted by Trommer (2011), this notion becomes problematic for tonal overwriting. In these cases, tone is spread to all tone bearing units in a certain domain. Instead of adding to it or only associating to tonally underspecified nodes, the underlying tones of the morphological base are overwritten. This pattern is common in grammatical tone. Trommer terms it 'Erasure Problem'. As seen in example (1) in Jumjum (Nilotic, Sudan) the modified form of a noun is formed by erasing the underlying (high) tones and substituting them for a low tone. Similarly, in Hausa (Chadic, West Africa) imperative verbs (cf. (2)) the underlying tonal melody is overwritten by an low-high (LH) pattern. The overwriting melody can thus also be complex. As seen in the Hausa venitive forms in (3), this pattern can also lead to neutralization of a tonal contrast and cooccur with a segmental contrast.

(1)   Jumjum modified nouns
      (Andersen 2004:161)
      /líjʌ́ŋ-gʌ́/ → [lìjʌ̀ŋ-gʌ̀]
      H.H.H → L.L.L 'feathers'

(2)   Hausa imperative verbs
      (Newman 2000:262-263)
      /káràntáː/ → [kàràntá]
      H.L.H → L.L.H 'read!'

(3)   Hausa venitive verbs
      (Newman 2000:663)

      a.   /gángàrá/ → [gángár-óː]
           H.L.H → H.H.H 'roll down'

      b.   /tàimákàː/ → [táimák-óː]
           L.H.L → H.H.H 'help'

(4)   Hausa verbal nouns
      (Newman 2000:705)
      /káràntáː/ → /káràntâː-wáː/
      HLH → H.L.HL.H 'read'

Autosegmental Rule Account: In a RBAP account, these can be derived as one or multiple floating tones. Crucially, morpheme specific docking rules have to be specified for the different categories (cf. i.a. Odden 1990). These have to refer to the floating status of the tone as well as the specific morphological category. They also have to include iterativity and overwriting parameters, since not all grammatical tone in Hausa affects the whole morphological base. This is evident from the left edge in the verbal noun formation in (4). Only the right edge of the base is modified from a simple high tone (H) to a falling tone (HL). For example, we would thus need at least two morpheme specific autosegmental rules for the Hausa imperative verbs, as seen in (5). An iterative rule would dock the low tone to every TBU that is followed by some other TBU in imperative verbs and overwrite their underlying tones. A differnt non-iterative rule would link the floating H tone to the remaining word final TBU and delink its underlying tone. Such an approach usually still includes the floating tones as exponents of the morphemes..

(5)   Hausa Imperative Docking Rules
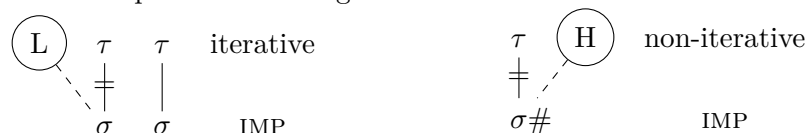
Under the assumption of a strictly modular grammar, i.e. no reference to morphosyntatic features in the phonology, such an approach is dispreffered. Additionally, the explicit reference to the floating status of a tone moves them closer to diacritic features, i.e. they only serve to mark the context for a morpheme specific rule (cf. Trommer 2011). Instead of a docking rule in a certain morphosyntactic context, one might as well posit a tone insertion rule or even a tone

change rule applying under the same condition — without altering the output significantly, as shown in (5). Additionally, one needs several rules to describe one and the same overwriting process. **Circumfix-Contiguity Approach:** Trommer (2011) instead proposes an OT account that is based on two main assumptions. First, a tonal circumfix is attached where we find overwriting patterns. Second, this overwriting is triggered by a Contiguity constraint. This constraint penalizes any intervening tones between the circumfix, i.e. it penalizes interveners at the tonal tier between two elements of the same morphological affiliation. It should be noted that this account does require neither morpheme-specific constraints nor any kind of iterativity parameter. Overwriting occurs whenever a circumfixal floating tone cooccurs in some language with a high ranking of a Contiguity account. **Hybrid Accounts?**: As noted by Yip (1988) so called edge-in association is complex in RBAP and cannot be implemented as a simple association or spreading rule. Yip argues therefore that association is universally edge-in, since association conventions in RBAP have been traditionally formulated in a more complex manner. One could still imagine a rule that spreads floating tones from a circumfix inwards until the two tones meet in the middle. For the Hausa venitive forms, the circumfix would consist of two high tones, cf. (6). α marks the identical morphological affiliation.

(6)   Potential Inward Spreading for Hausa venitive verbs
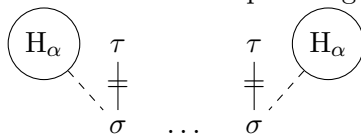
I argue that it is not possible to transfer Trommer's Circumfix-Contiguity approach into a RBAP framework without serious shortcomings. There are three especially severe concerns: iterativity, locality and rule order. Iterativity is an issue because the rules have to apply iteratively, until the two circumfix exponents meet each other in the middle. This would require establishing an ending point for the iteration of the two spreading rules. It is not trivial to formulate this and not possible without adding additional parameters to the rule. The locality issue stems from the Contiguity formulation in an OT system. In a constraint it is possible to ban interveners. This is local insofar as it requires locality between to exponents of the same morphological affiliation. In the RBAP approach however, a rule is formulated that affects one edge of the base if the other half of the circumfix is present at the other edge of the base. This is an extremly non-local context description. Rule order is another problem. The rule in (6) applies for different structural at once. Two of them delink the features that are to be overwritten and two of the dock the overwritten features. It is not clear in which order these apply. Splitting these up (a delinking rule before one or two spreading rules) would yield the unfortunate consequence of describing one and the same process as three rules. The two spreading rules also have to be ordered with respect to each other or apply in a loop. This is trivial in the case of Hausa venitive verbs, but becomes more complex with non-simplex grammatical tones. One could circumvent these issues by positing a feature change rule that applies to all interveners between the circumfix exponents (under the assumption that there is a possible local formulation to define these). This would get us back to an earlier concern: the tonal circumfix would not actually dock anywhere, it would only serve as a diacritic feature, i.e. an arbitrary trigger of a morpheme specific phonological process. Interestingly, these issues hinge on the disctinction between a rule and a constraint. Serial constraint-based models like Harmonic Serialism could still reduce the violations of Contiguity step-wise. **References:**
●Andersen, T. (2004). Jumjum phonology. *Studies in African Linguistics*, 33:133–162. ●Newman, P. (2000). The Hausa Language: An Encyclopedic Reference Grammar. New Haven: Yale University Press.●Odden, D. (1990). Tone in the Makombe dialects: Chimaraba. *Studies in African Linguistics*, 21(1):61–105.●Trommer, J. (2011). Phonological aspects of Western Nilotic mutation morphology. Leipzig: University of Leipzig dissertation. ●Trommer, J. (2012). Constraints on multiple-feature mutation. *Lingua* 122. 1182–1192. ●Yip, M. (1988). Template morphology and the direction of association. *NLLT* 6:551–557.