Tone Mapping in African Languages

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Three independent factors are thought to govern tone mapping. The linking of tones to a string of tone-bearing units is determined partially by the tones' morphological category (i.e., prefix vs. suffix), partially by the quality of the tones themselves (i.e., H or L tone) and otherwise by a directional association specification (Williams 1976, Goldsmith 1976). However, rather than act as a restrictive and unifying principle, as it was intended, phonological directionality instead has spawned a variety of unrelated devices to accommodate non-conforming data. This paper provides evidence against a directional view of tone mapping, and offers an alternative approach (Optimal Tone Mapping (OTM)) whose predictions are more in line with the cross-linguistic distribution of tonal patterns. The new view of tone developed in this paper contributes to an emerging view of autosegmental association in which directionality plays only a limited role.

OTM is motivated by the empirical observation, illustrated by the chart in (1), that there is no correlation between restrictions on contour distribution and asymmetric spreading patterns. This fact contravenes the most basic prediction of an approach that features phonological directionality, where left-to-right mapping predicts both that contour tones will be final and that a melody-final tone will spread to fill otherwise empty tone-bearing units (i.e., HL → HLL and LH → LHH). That there are *no* cases that conform to this prediction removes the motivation for phonological directionality in mapping.

(1)	**Contours**	**Spreading of 2 tone melodies onto trisyllables**
Tangale (Chadic)	final	HHL, HLL, LHH, LLH
Etung (Bantu)	final	HHL, LHH, LLH
Kukuya (Bantu)	final	LLH, HLL

The central claim of OTM is that attested systematic gaps in a language's inventory of tone patterns result from the interaction of morphological directionality and tone-quality alone. In particular, the limited distribution of contour tones is shown to be a function of the licensing of marked structure (branching tones) in a restricted set of positions (Zoll 1996, Zhang 2001) while spreading patterns are primarily governed by surface markedness constraints that prefer either the spread of H or the spread of L. These quality based constraints can be overridden only by a morphological directionality imperative, which prefers suffixes to be right-edge oriented and prefixes to be left-edge oriented.

This view, implemented with Optimality Theory (Prince & Smolensky 1993) is superior to traditional approaches in that it: (i) eliminates arbitrarily directional stipulation for languages whose evidence for directional tone mapping is ambiguous; (ii) unifies the tonotactics of a language under a single set of constraints; (iii) correctly captures the fact that restrictions on contour placement can be independent of other ostensible diagnostics for directionality; and (iv) makes the following more restrictive typological predictions:

a. In a theory without phonological directionality, it is predicted that gaps in assimilation patterns of underived words will be subject only to quality-sensitive restrictions, since directionality only arises through affixation
b. Therefore, with respect to possible sub-patterns within and across languages, only derived contexts have the choice of either directional or quality-based restrictions on tone spread
c. With respect to the direction of mapping available to tonal affixes, no directional mismatch is possible. Prefixes that map directionally will link from left-to-right, suffixes from right-to-left.