An autosegmental analysis of tone in four Tibetan languages

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0. Introduction. This paper applies an autosegmental analysis to tone in four Tibetan languages: Lhasa Tibetan (LS), Gar Tibetan (GR), Gérzé Tibetan (GZ), and Zedang Tibetan (ZD). I will discuss the representations of underlying tones on monosyllables, and the derivation of tonal patterns in multisyllabic expressions. Our discussion is intended to make three points. First, autosegmental phonology can be successfully applied to Tibetan tone. Second, an autosegmental analysis is superior to a non-autosegmental approach. Third, an autosegmental analysis brings out important similarities between Tibetan tone and tone in other parts of the world, such as Africa and east China, while the traditional approach misses these similarities. In addition, we will discuss what Tibetan tone tells us about the generality of the Association Conventions, rules that govern the linking between tones and segments.

This paper is organized as follows. In Section I, I provide a background for the autosegmental phonology of tone. In Section II, I analyze LS, GR, GZ, and ZD respectively in an autosegmental framework, drawing data mostly from recent publications that appeared in the People's Republic of China in the past decade. In Section III, I compare the proposed analysis with the non-autosegmental approach. In Section IV, I make a few concluding remarks.

1. Background. Autosegmental phonology, which first appeared in the early 1970s, has led to many fruitful results. Of interest to the present discussion are two insights (Williams 1971/6, Yip 1980):

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* A draft of this paper was written in 1989. Since then I have benefited from discussions with M. Halle, Z. M. Bao, and S. Meredith.
1 I follow the tradition of using the name of a place for the language spoken in that place. In addition, many of the names will be spelled in the Pinyin system.
2 Tone in Tibetan languages is a recent phenomenon. In the seventh century, when Tibetan orthography was created, there was no marking for tone. In addition, one of the three modern Tibetan dialect families is still toneless (Hu 1980, Qu 1981, Zhang 1981). The emergence of tone in Tibetan is a result of the loss of contrasts in the consonants surrounding the vowel. Typically, a historical contrast in onset voicing is replaced by a contrast in tone. Thus, historical [kʰo] 'he' and [gə] 'hear', which were both toneless, have respectively become [kʰo] with a high tone and [kʰo] with a low rise in Lhasa Tibetan. This process, or tonogenesis, to borrow a term from Matslsoff (1973), is widely observed in Southeast Asia. For an analysis of tonogenesis in a distinctive feature theory, cf. Duanmu 1991a.
(1) Tones lie on a tier separate from other segmental features, and may freely spread across segments.  

(2) Contour tones are composed of clusters of level tones. For example, a rising tone is made up of LH (i.e., a low tone L followed by a high tone H), a falling tone is made up of HL, a fall-rise is made up of HHLH, and so on. 

For illustration, consider some classic examples from the African language Margi (Williams 1971/6, Hoffman 1963; ` = rising tone, ` = low tone, ` = high tone):

(3) a. vēl b. ani c. vēlānī
    to jump  causative to make jump

In isolation, the morpheme vel shows a rising tone. The morpheme ani has no tone. When the two morphemes are put together, the three syllables are respectively L, H, and H. Intuitively, we feel that the rising contour on vel in (3a) matches the overall rising contour on velani in (3c). In other words, the tones in velani must have come from the root vel. Specifically, the rising contour on vel must have split into a L on the first syllable and a H on the second and third syllables in velani. However, this intuitive relation cannot be captured in the framework of Chomsky & Halle (1968), since in that framework, there is no easy way to allow distinctive features to freely move from one syllable to another. In addition, if 'rise' is a single feature, how can it split into two? And if 'rise' is made of two features, how can they both stay on the same vowel in vel in (3a) (assuming that tone is carried by the vowel)?

To solve the problem, Williams makes three proposals. First, a contour tone is composed of level tones, following the idea of Woo (1969). Second, tones lie on a special tier, separate from the segments. Third, the relation between tones and segments are governed by a set of Mapping Rules. Below is Williams' analysis:

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3 In the theory of feature geometry, a segment has the structure of a tree, with nodes and branches. Features generally lie on terminal nodes. Each node is on an independent tier, with its own path of spreading. In this view, tone features should also lie on terminal nodes, just as other features do, as suggested by Clements (1985:247). For exposition, we continue to use the notations of Williams, where tones are drawn away from segments.

(4) The Mapping Rules:  
   a. Associate tones to syllables one-to-one, from left to right  
   b. If there are more syllables, spread the last tone to excess syllables  
   c. If there are more tones, link excess tones to the last syllable.

(5)  
   a. vel --> vel --> vel  
      \   \  
      LH LH LH  : **segmental tier**

   b. vel + ani --> velani --> velani  
      \   \     \   \ 
      LH LH LH   LH   LH  : **tonal tier**

(6)  
   a. fî 'to swell'  
   b. fyâni 'to make swell'

The morpheme fî has a rising tone in isolation. When the toneless suffix ani is added, [1] in fî becomes [y]. At the same time, the rising tone of fî appears as L and H on ani. The derivation can be accounted for if we assume that the Mapping Rules apply after [1]-->[y], as shown below:

(7)  
   a. fî --> fî --> fî  
      \ \  \  
      LH LH LH  

   b. fî + ani --> fyâni --> fyâni
      \ \    \ \  
      LH LH LH   LH   LH   LH   LH

As Williams argues, if the rising tones in (3a) and (6a) are an unanalyzable unit, then it is hard to account for the above patterns. Similarly, if tones do not lie on a separate tier, it is hard to explain how they

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5 There is evidence that tones are associated with segments in the rime, instead of the syllable as a whole. For exposition, however, we will follow Williams in assuming that tones are associated with syllables.
can move across segments, e.g., how H from ʃi can move all the way to the last vowel in ənt.

Autosegmental phonology has been successfully applied to many African tone languages. The Mapping Rules, however, may differ in each language. For example, in Tiv, (4c) does not apply, and excess toneless syllables will take on L as the default tone (Pulleyblank 1986). Autosegmental phonology has also been applied to Chinese languages, especially to the Wu dialect family, spoken in east China. For illustration, let us consider some data in New Shanghai, spoken by the younger generation in Shanghai City. Like many other Wu languages, New Shanghai has what may be called initial prominence, by which in a multisyllabic domain, the pitch pattern of the domain is solely determined by the tones from the initial syllable.\(^6\) Consider

\[(8)\]  
\[
\begin{array}{cccc}
\text{MH} & \text{HL} & \text{LH} & \text{LH} \\
\text{small} & \text{fresh} & \text{yellow} & \text{big} \\
\text{vā} & \text{du} & \text{ŋ}
\end{array}
\]

(9)  
\[
\begin{align*}
\text{a. } \text{cō} & + \text{ŋ} \rightarrow \text{cō} + \text{ŋ} \\
\text{MH} & \text{HL} & \text{M} & \text{H} \\
\text{'small fish'} \\
\text{b. } \text{cī} & + \text{ŋ} \rightarrow \text{cī} + \text{ŋ} \\
\text{HL} & \text{LH} & \text{H} & \text{L} \\
\text{'fresh fish'} \\
\text{c. } \text{vā} & + \text{ŋ} \rightarrow \text{vā} + \text{ŋ} \\
\text{LH} & \text{LH} & \text{L} & \text{H} \\
\text{'yellow fish'}
\end{align*}
\]

(10)  
\[
\begin{align*}
\text{a. } \text{cō} & + \text{vā} + \text{ŋ} \rightarrow \text{cō} + \text{vā} + \text{ŋ} \\
\text{MH} & \text{LH} & \text{LH} & \text{M} & \text{H} & \text{L} \\
\text{'small yellow fish'} \\
\text{b. } \text{du} & + \text{vā} + \text{ŋ} \rightarrow \text{du} + \text{vā} + \text{ŋ} \\
\text{LH} & \text{LH} & \text{LH} & \text{L} & \text{H} & \text{L} \\
\text{'big yellow fish'} \\
\text{c. } \text{cī} & + \text{vā} + \text{ŋ} \rightarrow \text{cī} + \text{vā} + \text{ŋ} \\
\text{HL} & \text{LH} & \text{LH} & \text{H} & \text{L} & \text{L} \\
\text{'fresh yellow fish'}
\end{align*}
\]

According to Selkirk & Shen (1990), New Shanghai has three syllable tones,\(^7\) HL, MH, and LH\(^8\), which surface as fall, high-rise, and low-rise.

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\(^7\) Since Chinese is a monosyllabic language, a syllable tone may also be considered a morpheme tone, in line with African tonology.

\(^8\) For exposition, I will follow Selkirk & Shen and omit the discussion of 'register' in New Shanghai.