Teochow Tone Sandhi and the Representation of Tone*

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1. The Issue

In his definitive work on tone, Pike (1948) recognizes two tonal systems as typologically distinct: contour tone system typical of Asian languages and terraced-level tone system typical of African languages. Although Pike's typological distinction is descriptively uncontroversial, the phonological representation of tone remains a controversial issue in phonological theorizing. At the core of the controversy is the theoretical status of tonal contour, on which there are roughly two views: the Aficanist position treats contour as derivative, and the Asianist position treats contour as basic. This controversy precedes the development of autosegmental phonology. In the spirit of distinctive feature theories, Wang (1967) postulates contour features such as [rise] and [fall] as primitives in his feature system, whereas Woo (1969) recognizes only level features such as [high] and [low], and deriyes contour tones through the concatenation of level tones.

Early development of autosegmental phonology is largely motivated by tonal facts from African languages (Williams 1971/1976, Leben 1973, Goldsmith 1976), with the notable exception of Yip (1980). As is typical of African languages, tonal

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shape of words can be characterized in terms of H, M, and L,[1] and contour tones are mere concatenation of level tones, as exemplified by the data from Margi (Williams 1971/1976:464):

(1) a. bdle + na → bdlè-ná 'to forget'

b. bdle + na → bdle + na
   ∧ | |
   L H L H

The verb *bdle* surfaces with the rising tone in isolation; when it is suffixed with the toneless suffix *na*, *bdle* surfaces with the low tone, and *na* with the high tone. This kind of behavior can be understood if the rising tone is concatenated of L and H, as shown in (1b). It is clear from the autosegmental analysis of many African tonal systems that tonal contour is an epiphenomenon. Like the rising tone of Margi, contour tones are represented as concatenations of level tones, and there is no theoretical significance whatsoever to tonal contour. This is the central thesis of the Africanist viewpoint.

The phonological behavior of contour tones in Asian languages is, however, markedly different from that shown in (1), so is the Asianist position on the representation of tonal contour. Most linguists in traditional Chinese linguistics circle recognize register and contour as two essential components of tone (cf. Luo and Wang 1957, Wu 1984), either implicitly or explicitly. In fact, traditional notions such as *yin* and *yang*, and tone labels such as *ping* 'even', *shang* 'rising', *qu* 'departing' and *ru* 'entering', are related to register and contour. The exact meanings of the tone labels *ping*, *shang*, *qu* and *ru* are obscure, and modern dialect data are not illuminating in this respect; but almost certainly the tones are labeled in accordance with their contour (Wang 1980:102). Our knowledge of *yin* and *yang*

[1] In accordance with common practice, I use H for high tone, M for mid tone and L for low tone.

is more certain. Simplifying matters somewhat, *yin* tones, which are high-registered, co-occur with voiceless consonants, whereas *yang* tones, which are low-registered, co-occur with voiced consonants. Due to historical change modern Chinese dialects show varied tone-consonant correspondence, but in some Wu dialects where voicing is contrastive among consonants, the correspondence is quite good, as is dramatically demonstrated by the tone inventory of Songjiang, near Shanghai (*Jiangsu...* 1960):[2]

(2)

	ping	*shang*	*qu*	*ru*
a. with voiceless initials	53	44	35	5
b. with voiced initials	31	22	13	3

Examples:

53	ti	low	31	di	lift
	t'i	ladder			
44	ti	bottom	22	di	brother
	t'i	body			
35	ti	emperor	13	di	field
	t'i	tear			
5	pa?	hundred	3	ba?	white
	p'a?	tap			

The interaction between tones and consonants in syllable-initial position illustrated in (2) can be understood in physiological terms. It plays an important role in tonogenesis in languages such as Vietnamese (Haudricourt 1954, Halle and Stevens 1973, Matisoff 1973).

With respect to tone sandhi, Margi-type tonal alternation, though common in African languages, is not widely attested among Chinese dialects (cf. Hyman and Schuh 1974, Yip 1989, Bao 1992, Chen 1992, Duanmu 1995, among others). A

[2] The numbers represent pitch height, with 5 being the highest, 1 the lowest. Contour is indicated by the two numbers: 44 is a high level tone; 53 is a high falling tone, and so on.

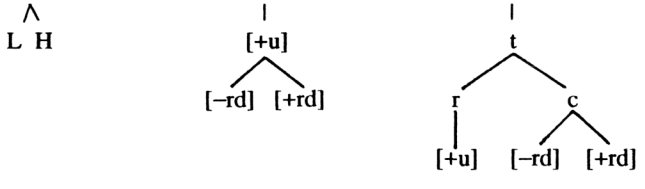
common tone sandhi process is the famous Tone 3 Rule of Mandarin, exemplified in (3) (Cheng 1973):

(3) mai ma 'to buy horses'
315 315 → 35 315

As shown above, the tone 315, classified as Tone 3 in the *Pinyin* system, changes to 35 (Tone 2) if followed by another 315. This type of tone sandhi is typical of Chinese, but not of African languages. [3]

The descriptive difference in tonal behavior between the Africanist tone system and the Asianist tone system is pretty well established, and serves as the empirical source for the analytical controversy surrounding the representation of contour. This controversy assumes a peculiar form in recent phonological research. With a richer representational repertoire than is available under classical, *SPE*-compatible phonological theories, nonlinear phonology allows more possibilities in representing tonal contour. A high rising tone, for instance, can be represented as follows (tbu: tone-bearing unit; u: upper; rd: raised; t: tone; r: register; c: contour):

(4) a. tbu b. tbu c. tbu



[3] The distinction between Africanist and Asianist tone systems is a descriptive convenience, and there is bound to be some overlap between the two systems. Upon careful analysis Margi-type tone sandhi can be found in some Wu dialects such as Shanghai (Zee and Maddieson 1979, Selkirk and Shen 1990), and Tibetan dialects as well (Hu 1982, Duanmu 1992, Edmondson *et al* 1995, and references cited therein). Among African languages there are sandhi processes which crucially depend on tonal contour, see Newman (1986).