What can a tonal template do for phonetics?

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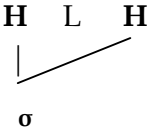
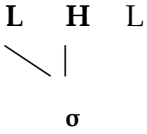
The issue: Contour tones are said to be phonetically more difficult and time-consuming to produce than level tones (Yip 2002, Zhang 2002). However, if African tonal languages do confirm this assumption, Chinese languages show two surprising characteristics. On the one hand, there is no system with only level tones in Chinese, while there is no system with only contour tones in African tonal languages. Now, this runs counter to the claims of markedness theory, according to which the presence of any single marked element without its unmarked counterpart is ruled out in phonological systems (Jakobson 1969, Clements 2005, 2007). On the other hand, the high level tone is not shorter than the falling contour tone in Mandarin (Kratochvil 1968, Xu 2004).

The analysis: The goal of this research aims at answering the above paradoxes: why is there no system with only level tones in Chinese? Why are level tones not shorter than contour tones in Chinese? We work under the assumption of a universal tonal periodic skeleton HLHL postulated by Carvalho (2002), analogous to the syllabic skeleton CVCV proposed by Lowenstamm (1996). We conjecture that Chinese tones are constrained by a portion of this skeleton: a tonal template HLHL. The four citation tones in Mandarin can be represented as follows (the vertical link indicates the tonal head). The register is low if and only if the head is low; it is high if and only if the head is high.

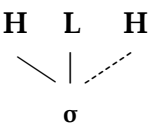
(1) a. Tone 1: level tone (55)



b. Tone 2: rising tone (35)



c. Tone 3: falling-rising tone (21[4])



d. Tone 4: falling tone (51)

If the analogy syllable/tone is on the right lines, it follows from (1a-d) that tonal markedness can be deduced from the hypothesis of a tonal skeleton within a 'strict HL' approach:

(2) a. Just as CV is unmarked compared with .VC. within a 'strict CV' approach, the falling tone HL is unmarked by comparison with the rising tone LH, because the latter supposes two empty positions on its right and left sides.

b. Just as geminate consonants (CC) are marked compared with CV, level tones are more marked than contour tones since their lexical representations involve not only two empty tones just as the rising tone, but also a median empty tone.

Our predictions are supported by the typology and language acquisition. In a statistics on 187 tonal languages, Zhang (2002) noticed that 37 languages have a falling tone without a rising one. Only three languages have a rising tone without a falling one: Margi, Lealao Chinantec and Zengcheng. The marked status of the rising tone compared with the falling contour is also supported by a study on language acquisition of a Cantonese-speaking child (A. Tse 1992): the low falling tone is acquired by 2;9, whereas the low rising tone is learned by 3 years old. That level tones are marked *vis-à-vis* contour tones is also supported by empirical facts, since a language can have only contour tones without level tones in Chinese, as in Chengtu, Shanghai, Zhenhai, Pingyao and Wuxi. On the contrary, there is no dialect with only level

tones in Chinese. Furthermore, it follows from the present model that level tones are necessarily long in vertue of the template satisfaction condition (McCarthy & Prince 1986).

Theoretical implications: The role of purely phonetic factors in shaping phonological systems has to be reassessed since they do not explain (i) why there are systems with only contour tones in Chinese; (ii) why level tones are long in Chinese. Actually, contrary to African tonal langages, tones might be positional objects in Chinese. This conjecture is justified by evidence from reduplication in Chinese secret languages and tonal compensatory lengthening in Yue dialects (Liu 2007, 2008). Last but not least, the hypothesis of a tonal template raises an important issue on cognitive grounds. Just as English and French-speaking children who use fixed templates, an abstract phonological object that is emergent and available very early on, to build their phonology (Vihman 2001, Wauquier 2005), the tonal template might have the same function in Chinese. This conjecture is confirmed by Li & Thompson (1977) and Clumeck (1980), whose studies show that Mandarin-speaking children acquire tones before the acquisition of segments. J. Tse (1978), working on the language acquisition of a Cantonese-speaking child, confirms as well that tones are acquired before segments. In other words, Chinese-speaking children might use the tonal template to build their phonology, consonants and vowels being inserted to the template progressively.

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