

A HANDY-DANDY APPROACH TO MANDARIN THIRD TONE SANDHI

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1 Introduction

Mandarin third tone sandhi applies across the word boundary, given (1)

- (1) a Wo zhao Xiao Mei ‘I looked for Xiao Mei ’
 I look for X M
 3 3 3 3 Underlying Tone
 2 3 2 3 Surface Tone 1
 2 2 2 3 Surface Tone 2
- b Ma hen-shao hou ‘Horses seldom roar ’
 horses seldom roar
 3 3 3 3 Underlying Tone
 3 2 2 3 Surface Tone 1
 2 2 2 3 Surface Tone 2
 * 2 3 2 3
- c Ma wang bei zou ‘Horses walked toward the north ’
 horses toward north walk
 3 3 3 3 Underlying Tone
 2 3 2 3 Surface Tone 1
 2 2 2 3 Surface Tone 2
 3 2 2 3 Surface Tone 3
- d Xiao lao-hu pao le ‘The small tiger ran away ’
 small tiger run ASP
 3 3 3 3 Neutral Underlying Tone
 3 2 2 3 N Surface Tone 1
 2 2 2 3 N Surface Tone 2
 2 2 3 3 N Surface Tone 3
 3 2 3 3 N Surface Tone 4
- e Lao L₁ mai hao jiu ‘Old L₁ bought good wine ’
 Old L₁ buy good wine
 3 3 3 3 3 Underlying Tone
 2 3 2 2 3 Surface Tone 1
 2 3 3 2 3 Surface Tone 2
 2 2 3 2 3 Surface Tone 3
 2 2 2 2 3 Surface Tone 4

The OCP-type of tone sandhi rule disallows two consecutive third tones in Mandarin. The first third tone (T3) of the consecutive third tones changes to the second tone (T2). Thus the expected surface tone is 23 for two consecutive third tones, 223 for three, and 2223 for four consecutive third tones. However, the well-formed surface tonal patterns in fact are more than one, as shown in the above examples. These examples have shown the basic problems with the consecutive T3. First, it is obvious that not all the third tones in a consecutive environment change to the second tone, and that some of the third tones seem to retain in some environment. The next problem naturally follows the first: what is the environment for the tone sandhi rule to apply? Previous approaches have not provided a satisfactory account for the variable tonal patterns, which will be discussed later in the paper. The current research looks into prosody which constrains the application of the tone sandhi and the overlapping of prosody in relation to morphology and syntax.

The paper is organized as follows. Section 2 outlines the theoretical background for the theory proposed here. In section 3, the outstanding cases of consecutive third tone patterns are investigated. The paper concludes in Section 4.

2 Foot Formation and Word Formation in Mandarin

Assuming that the Mandarin prosodic foot consists of maximally three syllables and minimally two as Chinese linguists agreed (Chen 1979, Shih 1997), Feng (1995, 1997a) further explores the direction of the foot formation. He argues that Mandarin foot is formed from left to right by default, and that the standard foot is disyllabic and a super foot is trisyllabic. Several pieces of evidence support his claim. The first piece of evidence comes from words of four or five syllables. These words are always read as two groups, and the first two syllables are always grouped together.

- (2) wu3 wu3 wu3 wu3 wu3 '55555'
 (wu3 wu3) (wu3 wu3 wu3)
 *(wu3 wu3 wu3) (wu3 wu3)
- (3) wu3 wu3 wu3 wu3 '5555'
 (wu3 wu3) (wu3 wu3)
 *(wu3 wu3 wu3) (wu3)

In (2), *wuwuwuwuwu* can only be grouped into *(wu wu) (wu wu wu)*. A similar situation is found in (3), where the first two syllables from the left are grouped together, as well as the last two. The second piece of evidence comes from borrowing words, as shown in the following.

- (4) ja1 li3 fu2 ni2 ya3 'California'
 (ja1 li3) (fu2 ni2 ya3)
 *(ja1 li3 fu2) (ni2 ya3)
- (5) yu1 sheng4 mei3 di4 'Yosemite'
 (yu1 sheng4) (mei3 di4)
 *(yu1 sheng4 mei3) (di4)

In (4), the English transliteration has five syllables and the first two syllables from the left are grouped together. In other words, when reading such words, native speakers do not pause until the first two syllables from the left are read. By the same token of (4), the first two syllables in (5) must group together and the remaining two syllables must do so as well.

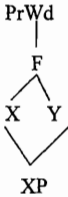
The following Foot Formation Rule and Word Formation Rule determine the domain that third tone sandhi applies

- (6) Foot Formation Rule in Chinese (Feng 1996 355, 1997b 235)



A standard foot must be formed by at least two syllables

- (7) Word Formation Rule in Classical Chinese (Feng 1996 362, 1997b 238)



X and Y form a prosodic word, iff the combination of X with Y simultaneously satisfies the syntactic and prosodic condition of being a phrase and a foot, respectively

Feng (personal communication) further points out that X and Y form a prosodic word if the combination of X and Y simultaneously satisfies the syntactic condition of being a word and the prosodic condition of being a foot. In addition, Feng specifies that ‘X and Y in (7) will attach together through repeated use and form an Idiomatized PrWd, which can easily be further lexicalized as a compound’ (1996 362). Feng (personal communication) suggests that X and Y may form a PrWd if the combination of X and Y simultaneously satisfies the morphological condition of being a word and the prosodic condition of being a foot. For instance, *Xiao-Mei* in (1a) is a PrWd because *Xiao* and *Mei* satisfy the morphological condition of being a word and the prosodic condition of being a foot. Thus, *Xiao Mei* has become an idiomatized PrWd, namely a compound.

The third tone sandhi is closely related to Word formation in Chinese. First, consecutive third tones in a compound undergo the tone sandhi because no consecutive third tones are found in a compound, as shown in (1b) *hen shao* and in (1d) *lao hu*. In this vein, the change from T3 to T2 is morphologically constrained. Prosodically, a lexical compound or an idiomatized compound must be a Prosodic Word according to the Word Formation rule. Thus, the change from T3 to T2 is prosodically and morphologically constrained.

3 PrWd the Domain of T3 Sandhi

The domain that T3 sandhi applies to is within the PrWd and within the PrWd only I propose the following T3 sandhi

- (8) No consecutive T3 is allowed in a PrWd

This is the only sandhi rule that is needed to explain the data The data will be separated into three categories which are explored in the following sections

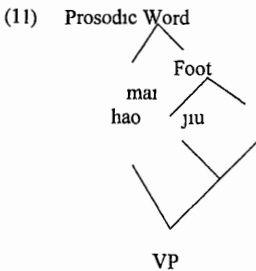
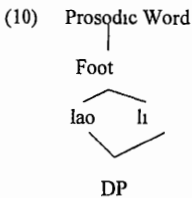
3.1 'The Good Wine' versus 'Old Li'

The T3 tonal patterns which contain two PrWds, for instance subject and predicate, belong to this group Probably the most famous example is *Lao Li mai hou jiu* 'Old Li bought good wine'

(9) (=1e)

Lao Li mai hao jiu					
Old Li buy good wine					'Old Li bought good wine'
3	3	3	3	3	Underlying Tone (UT)
2	3	2	2	3	Surface Tone 1 (ST)
2	3	3	2	3	Surface Tone 2
2	2	3	2	3	Surface Tone 3
2	2	2	2	3	Surface Tone 4

Lao Li makes a PrWd and so does *mai hao jiu* This is shown in the following diagram



In the first PrWd, *Lao* changes to T2 due to *33. In *mai hao jiu*, there are two possibilities: all third tones change to the second except the last, yielding 223. Or the first third tone retains and the second changes.

- (12) *Lao Li* 'Old Li'
 3 3 UT
 2 3 ST
- (13) *mai hao jiu* 'buy good wine'
 3 3 3 UT
 2 2 3 ST1
 3 2 3 ST2

The first surface tone of *mai hao jiu* is a result of applying the tone sandhi rule across the board. In this line of rule application, the internal structure of the PrWd matters little. Thus the sandhi rule works like a mathematical formula:

- (14) Application of T3 sandhi rule across the board
 $T3_1 T3_2 T3_3 \rightarrow T3_n \rightarrow T2_1, T2_2 T2_3 \quad T3_n, \text{ while } n > 0$

In this paper the explanation for instances such as 3333->2223 is not investigated, since the sandhi rule is applied structure-free. Now we go back to the analysis of the tonal pattern of *Lao Li mai hao jiu*. After the tonal patterns of each PrWd are determined, they are put together and the result is illustrated in the following:

- (15) *Lao Li* 23
mai hao jiu 223 323
- (16) *Lao Li mai hao jiu*
 a 23 223
 b 23 323
 c 22 323
 d 22 223

(16d) is the result of the sandhi rule being applied structure-free. (16c) is the consequence of the sandhi rule being applied in between the PrWd. Note that when it is the case of 23+323, two consecutive third tones are found at the edge of the PrWd. Since *33 applies within a PrWd only, it may apply within each PrWd or it may apply once again in the 'big' PrWd, which is the entire sentence in this case. In other words, the consecutive third tones found in the edge of PrWd optionally undergo the sandhi rule. When the rule applies, the result is 22323, given in (16c). Otherwise the result is 23323, given in (16b). 23223 as shown in (16a) is the combination of 23+223.

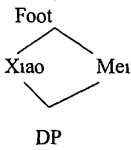
Another example follows:

- (17) *Xiao Mei zhao nai-zue*
Xiao Mei search pacifier 'Xiao Mei searches for the pacifier'
 3 3 3 3 3 UT
 2 3 2 2 3 ST1

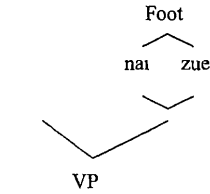
2	2	3	2	3	ST2
2	3	3	2	3	ST3
2	2	2	2	3	ST4

Xiao Mei makes a PrWd and *zhao nai zue* another. The following diagrams show the structure of each PrWd.

(18) Prosodic Word



(19) Prosodic Word



Similar to *Lao Li mai hao jiu*, the tonal pattern of *Xiao Mei* is 23 and the tonal patterns of *zhao nai zue* are 223 and 323. Thus the tonal patterns for the entire sentence are the same as those of *Lao Li mai hao jiu*.

3.2 'Walk toward the north' versus 'seldom roar'

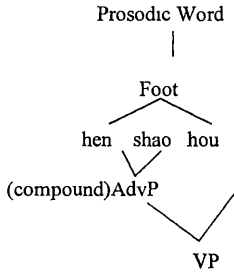
The tonal patterns of four consecutive third tones are varied according to the internal structure of the PrWd. This is shown in the following examples discussed in (Zhang 1997)

(20) a	Ma wang bei zou				
	horse toward north walk				'Horses walk toward the north'
	3	3	3	3	UT
	3	2	2	3	ST1
	2	3	2	3	ST2
	2	2	2	3	ST3
b	Ma hen-shao hou				
	horse very-seldom roar				'Horses seldom roar'
	3	3	3	3	UT
	3	2	2	3	ST1

2 2 2 3 ST2
 *2 3 2 3

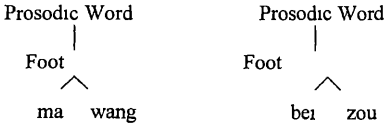
What puzzles linguists is the question why 2323 is ill-formed in (b). Prosodically, four consecutive third tones are naturally grouped into two, for instance 55/55 for 5555, as discussed in Feng (1997:26). Thus the prosodic environment forces both *ma wang bei zou* and *ma hen-shao hou* to be grouped into two PrWds, namely (*ma wang*) (*bei zou*) and (*ma hen*) (*shao hou*). Thus the only possible tonal patterns should be 2323 and 2223, where the latter is assumed according to our theory. Yet *hen-shao* simultaneously satisfies the prosodic condition of being a foot and the morphological condition of being a word. Thus *hen-shao* has become a lexicalized compound, which means seldom, not 'very seldom'. In this vein, the tonal pattern of *hen-shao* is 23 in the lexicon. Here the interaction of prosody and morphology determines the tonal patterns of *ma hen-shao hou*, namely prosody gives way to morphology/lexicon.

(21) Ma hen shao hou 'Horses seldom roar'



Yet no compound is found in *ma wang bei zou*. Thus the natural footing remains. In this vein, the prosodic structure of *ma wang bei zou* is illustrated in the following:

(22) Ma wang bei zou 'Horses walked toward the north'



Therefore, the tone sandhi pattern is 3223, 2223 and 2323

3.2 Sentence final *le*

The tonal pattern of three consecutive third tones in a sentence is determined by the sentence final *le*, which has not been discussed in the literature.

(23) a

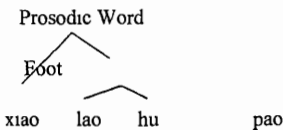
	Xiao	lao-hou	pao		
	small tiger	run			'Small tiger runs/is running'
	3	3	3	3	UT
	2	2	3	3	ST1
	2	2	2	3	ST2
	3	2	2	3	ST3
	*3	2	3	3	

b

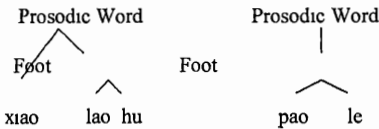
	Xiao	lao-hu	pao	le		
	small tiger	run	ASP			'The small tiger ran away'
	3	3	3	3	Neutral	UT
	3	2	2	3	N	ST1
	2	2	2	3	N	ST2
	2	2	3	3	N	ST3
	3	2	3	3	N	ST4

When the sentential particle *le* is absent, 3233 is ill-formed, as illustrated in (a). According to our theory, this phenomenon is predicted. The structure in the PrWd *xiao lao hu pao* is different from that of *xiao lao hu pao le*.

(24) (a) Xiao lao hu pao 'The small tiger ran away'



(b) Xiao lao hu pao le 'The small tiger ran away'



(24b) shows that *pao* and *le* constitute a PrWd. Yet in (a), *pao* alone cannot constitute a PrWd. Thus *xiao lao hu pao le* constitutes two PrWds: *xiao lao hu* and *pao le*. The tonal pattern for *xiao lao hu* is 223 or 323. So the tonal pattern for *xiao lao hu pao le* is 223+3 and 323+3. For 2233, the third tones at the edge of the PrWds optionally undergo the sandhi rule. If it undergoes the rule, the result is 2223. Otherwise the result is 2233. A similar situation is found in 3233. Thus the result is 3223 or 3233. So there are four tonal patterns for *xiao lao hu pao le*: 2223, 2233, 3223, and 3233.

However, there is only one PrWd for *xiao lao hu pao*. So the tonal patterns are 323 and 223 for *xiao lao hu*. For *xiao lao hu pao*, the pattern is 323+3 and 223+3. Again, the sandhi rule may optionally

apply The result is 3223, 3233 and 2223 Our theory successfully explains the difference between *xiao lao hu pao* and *xiao lao hu pao le*, which has not been addressed in previous analyses

4 Conclusion

The third tone sandhi phenomenon is the product of the interaction of phonology, prosody, morphology, and syntax This paper has displayed that the Mandarin third tone sandhi phenomenon is closely related to Prosodic Word, which stands in the interface of prosody, morphology and syntax In this approach, the avoidance of third tone sandhi, found in the consecutive third tone environment, need not be taken as an exception

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