

The Relationship between 'Citation' and 'Sandhi' Tones in a Modular Analysis*

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Traditionally, citation tones have been taken as the basic or underlying tones while sandhi tones are considered derived. Some recent studies have suggested the possibility of the sandhi tone as the basic tone. This paper re-examines the issue in the broader context of grammar. It shows that the contrast-preserving sandhi tones, which have been used as evidence for their basic status, are distributionally restricted along morphosyntactic lines. Based on this observation, the paper argues for a modular analysis, which allows both the citation tone and the sandhi tone to be basic in different grammatical contexts. A stronger hypothesis, which restricts the basic sandhi tones to the lexical domain, has been put forward for future research.

Keywords: citation tone, sandhi tone, modular, historical tonal categories, dialect

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1. Introduction

1.1. The traditional view. The terms *original tone* and *changed tone* are used in the Chinese tone sandhi literature to refer to the tonal value in isolation and that in combination with other tones (also known as *citation tone* and *sandhi tone*¹). The very terms for them in Chinese, 本調 *bendiao* and 變調 *biandiao* respectively, reflect the traditional view that citation tones are basic and sandhi tones are derived. In recent years, this assumption has been challenged.

1.2. An alternative view. Some studies (Zhengzhang 1964, Lu 1986, Pan 1986, Chen 1988) suggest that the tonal shapes of citation tones can be 'influenced' by sandhi tones due to reanalysis, misperception, or historical development. A number of scholars have even argued for treating the sandhi tone as 'original', 'basic' or 'underlying' (Hashimoto 1982, Ting 1982, Chan 1989) in the synchronic analysis or historical reconstruction of some dialects.

1.3. Purpose of the present paper. The present paper aims to investigate more fully the relationship between citation tone and sandhi tone, focusing in particular on how to incorporate the alternative view in the synchronic analysis of tone sandhi systems. For example, can we simply derive all surface tones from the sandhi tones that are analyzed as underlying? We suggest that such a homogeneous approach cannot satisfactorily account for the range of linguistic facts. A modular approach, which

¹ As pointed out by an anonymous reviewer, the use of the terms *citation tone* and *sandhi tones* can be problematic.

First of all, *citation tone* is not used only for the purpose of citation. The so-called citation tones are also the tones used in monosyllabic words and even sentences. There are no distinct tones for citation only.

The use of the pair of terms *citation tone* and *sandhi tone* easily leads to an assumption that if a tone does not occur in a citation form, it must be a sandhi tone. It may be due to the lack of distinction between the two senses of sandhi tone as *tones resulting from sandhi processes* and *tones occurring in possible sandhi environments*. The former are sandhi tones in the real sense and the latter should perhaps be called *sandhi environment tones*. To avoid the unfortunate confusion, we should use *combination tones* to contrast with the distributionally-based term of *citation tone*.

But for the sake of convenience, we will continue to use the terms *citation tone* and *sandhi tone* when no misunderstanding is expected.

includes more than one levels of representation and rule application, will be proposed. In this model, depending on the level, both the citation tone and the sandhi tone can be basic in the same dialect.

It should be pointed out that the spirit of the modular approach to tone sandhi is not entirely new. To begin with, the distinction between 字音變調 *ziyin biandiao* 'phonetic tone change' and 字調變調 *zidiao biandiao* 'categorical tone change' (see Lü 1980) and that between 變音 *bianyin* 'morphological tone change' and 變調 *biandiao* 'tone sandhi' (see Li 1978, 1979) have been made before. Furthermore, it has been traditional in Chinese dialectal studies to distinguish between 廣用式 *guangyongshi* 'widely used pattern' and 窄用式 *zhaiyongshi* 'narrowly used pattern', which are different sandhi patterns applying to different morphosyntactic structures. The contribution of the present paper lies in its application of the modular approach to the problem of the relationship between citation and sandhi tones.

1.4. Organization. In section 2, we present, as background information, the phenomenon of contrast-preserving sandhi forms and the predictability argument. In section 3, we examine the distribution of contrast-preserving sandhi forms in a number of dialects. Special attention will be drawn to the distributional restrictions, which can be tonal, lexical and morphosyntactic. In section 4, a modular approach will be outlined. In section 5, the modular approach will be illustrated with a case study of Pingyao reduplication. In the last section, a stronger hypothesis for further research will be proposed.

2. Contrast-preserving Sandhi Forms and Predictability

In quite a number of dialects,² historical tonal distinctions that are no longer found in citation forms are nonetheless preserved in sandhi forms. An example can

² In Hashimoto (1982), a few Mandarin dialects are reported to have more tonal contrasts in sandhi environments. Chan (1989) mentions dialects from both Mandarin and Wu dialect groups, including Pingyao, Wenling, Suzhou, Ningde, Yinchuan. Our own limited search turns up Shanghai, Danyang, Yongkang in Wu and the Shanxi dialects of Changzhi and Xinzhou. In his study of tonal merger in Northern Mandarin dialects, Lien (1986) also gives a list of some 26 dialects.

be given from Yinchuan (Zhang 1984), where two words identical in tonal composition in terms of citation tones nonetheless yield different sandhi tones due to a difference in the historical tonal category of the first syllable:

(1)	強 占		搶 占	
	tɕiaŋtɕan		tɕiaŋtɕan	
	'forcefully occupy'		'rob and occupy'	
	Yang Ping + Yin Qu		Yin Shang + Yin Qu	(historical)
	53 + 13	=	53 + 13	(citation)
	53 + 13	not=	35 + 13	(sandhi)

This is the phenomenon on which the predictability argument is based. The logical basis of the argument is the inability to predict distinct sandhi tones from identical citation tones in identical environments. It is clear that the following is impossible (A=citation tone; B/C= sandhi tones; D/E= environment):

- (2) A--->B / D__E
 A--->C / D__E

Reversing the direction of derivation is a possible way out, as we can certainly neutralize the difference between two distinct underlying tones in a given environment:

- (3) B--->A / D__E
 C--->A / D__E

The predictability argument is therefore used, for example by Chan (1989), to motivate the setting up of sandhi tones, instead of citation tones, as underlying.

3. Distribution of Contrast-preserving Sandhi Forms

3.1. Variable extent. When older tonal distinctions are found in sandhi forms, especially when these sandhi forms are regarded as basic, it may be tempting to assume that the older distinctions are found across-the-board in all sandhi forms of the relevant historical tonal categories. It may even be assumed that the only forms not exhibiting older distinctions are the citation forms. Logically possible such a state of affairs certainly is, it is not the typical situation. It is more often the case that older distinctions surface in only some sandhi forms, in some environments.

Dialects can differ greatly in the extent of the preservation of older distinctions. Whether or not there are dialects that have preserved historical distinctions in all sandhi forms, one Wu dialect, Wenling, comes quite close. In Wenling (Li 1978, 1979), two tones have merged in very limited contexts and they remain distinct in all other environments. At the other end of the scale, we find Suzhou (Ye, 1984), where an older distinction only surfaces in a very restricted environment.

Even varieties of the same dialect can be different in this regard. Shanghai (Xu et al., 1981, 1982, 1983; Shen, 1981, 1982) has an older and a newer variety. Both varieties have five citation tones but there are more contrasts preserved in sandhi forms in the old variety than in the new variety, in which only a handful of words still show earlier distinctions.

3.2. Tonal restriction. According to some previous dialectal descriptions, the environment for the preservation of older distinctions can be specified tonally.

According to Ye (1984)'s description of Suzhou, Yang Shang and Yang Ru remain distinct only after Yin Ru but have merged in all other tonological environments.

According to Li (1978, 1979)'s descriptions of Wenling, Yang Ping and Yang Shang remain distinct in all tonal environments, except after Qu tones.

According to the description of Xinzhou in Wen (1985), Yin Ping and Shang (in syllables with voiceless and nasal/lateral initials) have merged in most cases but remain distinct before Ru and Ping and after Shang and Yang Ping.

In Yinchuan (Zhang 1984), a Northwestern Mandarin dialect, Yang Ping³ and Shang⁴ have merged in citation forms and most sandhi forms but remained distinct before the Qu tone. (4) shows that the distinction is preserved before the Qu tone. The difference between Yang Ping and Shang is that Yang Ping does not change before Yin Qu but Yin Shang does:

³ Middle Chinese categories, different from Zhang (1984)'s dialect-internal labeling.

⁴ Middle Chinese Qu + Yang Shang with voiced initials.

(4) 強占		搶占	
tɕianʈʂan		tɕianʈʂan	
'forcefully occupy'		'rob and occupy'	
Yang Ping + Yin Qu		Yin Shang + Yin Qu	(historical)
53 + 13	=	53 + 13	(citation)
53 + 13	not=	35 + 13	(sandhi)

3.3. Morphosyntactic restriction. While in dialects like Suzhou, the environments for the contrast-preserving sandhi forms can be specified tonally, some dialects have purely morphosyntactic environments for these sandhi forms.

In Pingyao (Hou, 1980), a dialect in Shanxi, the contrast between the two Ping tones is retained in the environments in (5a) but lost elsewhere, including those morphosyntactic environments in (5b):

(5) a. reduplication of nouns/measures/numbers/adjectives

zʌʔ-suffixation

endocentric constructions

coordinate constructions

verb-complement constructions

b. reduplication of verbs and adverbs

subject-predicate constructions

verb-object constructions

In Changzhi (Hou, 1985), another Shanxi dialect, the two historical Ru tones contrast only in three morphosyntactic environments:

(6) verbal reduplication

r-suffixation

teʔ/ti suffixation (similar to zi-suffixation in Mandarin)

In Luanxian (Wang, 1956), a Hebei dialect, two distinctions not found in citation tones are preserved before toneless syllables, i.e., in trochaic forms. The tendency for trochaic forms to preserve older contrasts is not unique with Luanxian, as we will see later in the discussion of Yinchuan. But it is worth noting that the relevant environment may not really be stress per se. The real environment may be morphosyntactic, as the tendency for trochaic forms to be associated with

morphosyntactic classes seems to be common. For example, in Beijing Mandarin, the formation of trochaic forms tends to concentrate in a small number of word-formation processes.

3.4. Distinctness of tonal and morphosyntactic environments. In some dialects, where tonal and morphosyntactic environments for the contrast-preserving sandhi forms are both found, the two kinds of environments can be conflicting and therefore necessarily distinct from each other.

As mentioned in 3.2., the distinction between Yin Ping and Shang remain distinct before Ru and Ping and after Shang and Yang Ping in Xinzhou. The distinction is preserved in reduplicated forms as well:

(7)	公公		姐姐
	kuəŋkuəŋ		tɕietɕie
	'grandpa'		'sister'
	Yin Ping		Shang (historical)
	313 + 313	=	313 + 313 (citation)
	24 + 31	not=	42 + 313 (sandhi)

We take these reduplicated kinship terms to belong to a morphosyntactic class and the tone sandhi here to be morphosyntactically conditioned. What is interesting is that this morphosyntactic environment is distinct from the tonal one, because non-reduplicated forms with the same tonal composition do not distinguish Yin Ping and Shang:

(8)	西瓜		草紙
	ɕikua		ts'otsɿ
	'watermelon'		'coarse paper'
	Yin Ping		Shang (historical)
	313 + 313	=	313 + 313 (citation)
	33 + 31	=	33 + 31 (sandhi)

As mentioned in 3.2., in Wenling, Yang Ping and Yang Shang remain distinct in all tonal environments, except after Qu tones. What is interesting is that the two tones still remain distinct, even after Qu tones, in a morphological tone rule called

bianyīn. (9) below shows that in non-*bianyīn* context Yang Ping and Yang Shang behave identically after Yang Qu, i.e., they both assume the citation tone value:

(9) 内行	大肚		
nefĩ	dudu		
'expert'	'big belly'		
Yang Qu+Yang Ping	Yang Qu+Yang Shang		(historical)
13 + 31	=	13 + 31	(citation)
13 + 31	=	13 + 31	(sandhi)

But they behave distinctly after Yang Qu in the *bianyīn* context :

(10) 舊年	飯桶		
dziunje	ve duŋ		
'last year'	'glutton'		
Yang Qu+Yang Ping	Yang Qu+Yang Shang		(historical)
13 + 31	=	13 + 31	(citation)
13 + 15	not=	13 + 51	(sandhi)

The conflict between tonal and morphosyntactic conditions is also found in Yinchuan. As mentioned in 3.2., Yang Ping and Shang have merged in citation forms and most sandhi forms but remained distinct before the Qu tone. Interestingly, the tonal distinction has also been preserved in some trochaic forms with toneless syllables at the end, such as the reduplication of nouns. (11) gives a minimal pair:

(11) 爺爺	姐姐		
ieie	tɕietɕie		
'grandpa'	'sister'		
Yang Ping	Yin Shang		(historical)
53 + 53	=	53 + 53	(citation)
53 + neutral	not=	35 + neutral	(sandhi)

In this pair, the first syllables are necessarily not before Qu tone, hence failing to meet the tonal condition observed elsewhere; and yet Yin Shang again differs from Yang Ping in undergoing a tonal change. That noun reduplication is a distinct morphosyntactic environment can also be seen from the fact that verbal reduplication, also resulting in trochaic forms, does not preserve the older contrast. Zhang (1984) has only

reduplicated verb forms with Yin Shang tones but no Yang Ping tones. Hence a minimal pair cannot be given. But since we know that the contrast-preserving property is reflected in the tonal change and lack of it for Yin Shang and Yang Ping respectively, a verbal reduplication form with Yin Shang that does not undergo tonal change will mean that Yin Shang patterns with Yang Ping. Hence, Yin Shang behaves differently in verbal reduplication than in noun reduplication. Such an minimal pair is given in (12):

(12)	V + V		N + N	
	數數		姐姐	
	susu		tɕietɕie	
	'count a bit'		'sister'	
	Yin Shang		Yin Shang	(historical)
	53 + 53	=	53 + 53	(citation)
	53 + neutral	not=	35 + neutral	(sandhi)

3.5. Lexical restriction. The preservation of tonal distinction is subject to lexical idiosyncrasy as well. So far, we have been simplifying the matter somewhat. When we said that certain tones have merged in a certain environment, we meant that, without exception, the tones behave identically; but when we said that certain tones are contrastive in a certain environment, we actually mean that they are contrastive for some lexical item in this environment. Under identical tonal and morphosyntactic conditions, some lexical items preserve the older tonal distinction but others don't.

In (13) below, we see a pair of words from Yinchuan identical in tonal and morphosyntactic makeup but different in their sandhi patterns. The second of the pair is exceptional in that its first syllable should also change to 35:

(13)	喜歡		滾湯	
	çixuan		kunŋ'arŋ	
	'like'		'hot soup'	
	Yin Shang + Yin Ping		Yin Shang + Yin Ping	(historical)
	53 + 33	=	53 + 33	(citation)
	35 + neutral	not=	53 + neutral	(sandhi)

In Pingyao, there are also lexical exceptions. Noun reduplication is a contrast-preserving environment, where Yang Ping syllables do not undergo sandhi while Yin Ping syllables do. But some Yin Ping syllables in this environment are no different from Yang Ping syllables:

(14) 猩猩

ɕiŋɕiŋ

'gorilla'

Yin Ping (historical)

13 + 13 (citation)

13 + 13 (sandhi)

4. A Modular Approach

The distribution of contrast-preserving sandhi forms has been observed to have the following three characteristics:

First of all, the distribution of these sandhi forms can be restricted tonally, lexically and morphosyntactically. Across-the-board distribution is rather atypical. The most restricted cases are: the new variety of Shanghai, where only a few lexical items still preserve older tonal distinctions; Suzhou, where two tones are distinct only in a limited tonal context; and Changzhi, where only a few morphosyntactic processes retain the distinction between two tones. Therefore, even in dialects that have preserved older tonal distinctions, there can be many tone sandhi processes where the old distinctions are clearly no longer relevant.

Secondly, it is abundantly clear that the environments for contrast-preservation are not only tonal. The mere fact that they can be morphosyntactic is, at first blush, rather startling. But if morphosyntax is relevant for synchronic tone sandhi, as is more and more evident in the tone sandhi literature, its relevance for diachronic tonal phenomena is exactly what we should expect. It is probably largely due to morphosyntactic restrictions to earlier tone sandhi that led to the current distributional patterns.

Thirdly, there is a clear tendency for certain morphosyntactic structures to retain older distinctions better. The general tendency seems to be that tonal distinctions are more likely to be preserved in word-formation rules like nominalization, r-suffixation or its equivalent, endocentric constructions and reduplication of nonverbal elements while they are more likely to be lost in verbal reduplication, verb-object and subject-predicate constructions.

Such distributional facts suggest a modular, rather than a homogeneous, approach to tone sandhi in dialects having contrast-preserving sandhi forms. In the following, we outline such a modular approach.

4.1. Lexical listing. In dialects like the new variety of Shanghai, where older distinctions are retained in only a handful of lexical items, it will be unmotivated to set up any rules at all. The more reasonable solution is to simply list these items in the lexicon. The necessity to lexically list exceptional word tones is independently motivated in any case. Exceptional word tones are seen even in Mandarin, which otherwise has mostly regular and productive tonal rules. For example, there are three different tones for the same morpheme 指 *zhi* 'having to do with finger': first tone in the word 指甲 *zhijia* 'finger nail', second tone in 指頭 *zhitou* 'finger' and the third tone for the citation form and other lexical items associated with finger and pointing. The morpheme 主 *zhu* 'main', with a third tone, nonetheless has an idiosyncratic second tone in the word 主意 *zhuyi* 'idea'.

Danyang has even more idiosyncratic word tones. For example, the combination of the same two citation tones gives rise to as many as five different 'sandhi' forms. All the following disyllabic words have the citation tones with the tonal values of [3] and [24] for the first and second syllable respectively, but the sandhi form for 京戲 *jingxi* 'Peking opera' is [5 5], for 金礦 *jinkuang* 'gold mine' [42 1], for 空氣 *kongqi* 'air' [3 3], for 霜降 *shuangjiang* 'frosting' [42 24] and for 繃帶 *bengdai* 'bandage' [24 5]. As far as can be discerned, no older historical distinctions are responsible for the divergence in sandhi forms. The proper account for these idiosyncratic word tones is not by rules but rather by lexical listing. (Lü's paper uses characters but no transcriptions. So Pinyin for Mandarin is used here instead.)

4.2. Tonally and morphosyntactically conditioned rules. When more regular distribution of older tonal contrasts is found, rules are required. But it is clear that at least the following types of rules are necessary, i.e., purely tonally conditioned, morphosyntactically conditioned or a combination of the two types.

In dialects like Wenling, Suzhou, Xinzhou and Yinchuan, where contrast-preserving environments can be specified tonally, tonally-conditioned rules are necessary.

In dialects like Changzhi and Pingyao, where older distinctions are only preserved in certain morphosyntactic environments, and in Xinzhou, Wenling and Yinchuan, where older distinctions are preserved in some morphosyntactic as well as tonal environments, morphosyntactically conditioned rules are required.

Both tonal and morphosyntactic rules are needed in dialects like Wenling and Xinzhou, where older distinctions are preserved in both tonal and morphosyntactic environments.

4.3. A modular solution to the problem of underlying tone. To accommodate the greater number of contrasts in sandhi forms by rules, it seems inevitable that sandhi forms incorporating these contrasts be taken as basic and other forms, including the citation forms, be derived. On the other hand, since in many dialects, older distinctions are found in quite restricted tonal or morphosyntactic environments, to derive all sandhi forms from the contrast-preserving underlying forms would seem unmotivated. While this kind of homogeneous analysis will accommodate the contrastive forms, the sandhi forms that are not contrast-preserving will not be well-accounted for. Two possible problems for this kind of analysis are as follows, in the order of their severity:

1). If the contrast-merging sandhi forms are identical in tonal value to the citation forms, as found often in verb-object and subject-predicate constructions (such as in Pingyao) or more generally *zhaiyongshi*, the most transparent analysis will treat them as unchanged. But deriving them from the contrast-preserving sandhi forms, not the citation forms, would mean that these contrast-merging sandhi forms would have to undergo tonal changes too. Although the rules may be needed anyway for deriving the citation forms, this is an inelegant, let alone unnatural, analysis.

The most significant mechanism used in this modular solution is level-ordering, for which there needs to be independent support. We hypothesize that the earlier rules differ from the later ones in being more lexical in nature. There is some indication that this is the case. For example, in Pingyao and Yinchuan, there are lexical exceptions to the rules deriving the contrast-preserving sandhi forms. Therefore, these rules are likely to be lexical rules.

5. Pingyao Reduplication: A Case Study

To illustrate the modular approach, we will use the example of tone sandhi in Pingyao reduplication. Pingyao has no distinction between Yin Ping and Yang Ping in the citation form. But the distinction is preserved in some sandhi forms. To accommodate this, we will first try the simplest option, i.e., by taking the contrast-preserving sandhi forms to be basic and deriving all the surface tones from these underlying tones. Although this solution is homogeneous and solves the predictability problem, it is rather problematic.

As was mentioned earlier, in this dialect, the contrast-preserving sandhi forms do not occur across-the-board but are morphosyntactically restricted. The contrast-preserving environments and the contrast-merging environments are repeated in (16):

(16) a. reduplication of nouns/measures/numbers/adjectives

 ʒʌʔ-suffixation

 endocentric constructions

 coordinate constructions

 verb-complement

 b. reduplication of verbs and adverbs

 subject-predicate constructions

 verb-object constructions

To illustrate the two kinds of environments, let us contrast reduplication of nouns with that of verbs and adverbs. The Yin/Yang Ping distinction is preserved in noun reduplication:

(17)	N + N		N + N	
	開開		姨姨	
	k'æk'æ		i i	
	'idea'		'aunt'	
	Yin Ping		Yang Ping	(historical)
	13 + 13	=	13 + 13	(citation)
	31 + 35	not=	13 + 13	(sandhi)

But the distinction is lost in verb reduplication, which has a distinct sandhi pattern:

(18)	V + V		V + V	
	開開		縫縫	
	k'æk'æ		xuŋxuŋ	
	'open'		'sew'	
	Yin Ping		Yang Ping	(historical)
	13 + 13	=	13 + 13	(citation)
	35 + 31	=	35 + 31	(sandhi)

The distinction is also lost in adverb reduplication, which also has its own sandhi pattern:

(19)	AD.+AD.		AD.+AD.	
	剛剛		明明	
	tɕiaŋtɕiaŋ		miŋmiŋ	
	'just now'		'clearly'	
	Yin Ping		Yang Ping	(historical)
	13 + 13	=	13 + 13	(citation)
	31 + 53	=	31 + 53	(sandhi)

The homogeneous solution would derive the contrast-merging verbal/adverbial reduplication, along with the contrast-preserving noun reduplication, from the two distinct underlying forms for Yin Ping and Yang Ping. While this serves noun reduplication well, it renders the account for verbal and adverbial reduplication rather inelegant. Since the underlying forms are different for Yin Ping and Yang Ping, two different rules would have to be used to derive each of the non-nominal reduplication

patterns. Thus the parallel behavior of Yin Ping and Yang Ping will be unaccounted for. It will be an accident that the two rules give rise to the same outcome. The fact that verbal and adverbial reduplication patterns have distinct sandhi patterns and yet are both contrast-merging makes the matter worse. More rules will be used unnecessarily and more parallel behavior will be missed.

Naturally, if we derive verbal and adverbial reduplication patterns from the citation form, then we will have none of the problems mentioned above. Only one rule, instead of two, will be used for each reduplication pattern and thus the parallel behavior between Yin Ping and Yang Ping will be a matter of course. But of course, the contrast-preserving noun reduplication will be unaccounted for.

In order to account for both the contrast-preserving and contrast-merging reduplication patterns, we will have to adopt a modular analysis. The general model of the approach outlined in (15) will be applied in Pingyao reduplication in the following way:

- (20)
- | | |
|--|---------------------|
| UNDERLYING TONES (Yin Ping, Yang Ping) | |
| | |
| noun reduplication rule, neutralization rule | |
| | |
| REDUPLICATED NOUN, UNDERLYING (Ping) | |
| | |
| verb reduplication rule, adverb reduplication rule | |
| | |
| REDUPLICATED VERB | REDUPLICATED ADVERB |

There is independent justification for ordering noun reduplication before verbal and adverbial reduplication. Cross-dialectally, noun reduplication is commonly more lexical than reduplication of verbs and adverbs. It is then only natural that older tonal distinction is found in the former while lost in the latter. In Pingyao, noun reduplication admits lexical exceptions. Some Yin Ping syllables in noun reduplication are no different from Yang Ping syllables, which do not undergo any sandhi rule. The example from (14) is repeated below:

(21) ɕiŋɕiŋ

猩猩

'gorilla'

Yin Ping (historical)

13 + 13 (citation)

13 + 13 (sandhi)

But no such exceptions are reported for verbal and adverbial reduplication.

6. In Search of a Stronger Hypothesis

In this section, we draw attention to an important issue unresolved in this paper, namely, the independent confirmation of the lexical status of the contrast-preserving sandhi forms. The resolution of this issue will have important consequences for our analysis.

In our modular approach, the most important mechanism is the postulation of levels and the ordering between these levels. In order for this postulation not to be arbitrary, we need to have independent evidence of the reality of the levels. One kind of evidence would be the difference between the levels in terms of their grammatical status, such as the lexical vs. post-lexical distinction, which has been well-motivated in the linguistic literature.

There is some evidence for the lexical nature of contrast-preserving morphosyntactic rules. As has been observed, cross-dialectally, there is a clear tendency concerning what morphosyntactic environments are likely to preserve older contrasts. Noun reduplication seems to be a contrast-preserving environment. But there is still some uncertainty. In Yinchuan and Pingyao, older tonal distinctions are merged in verbal reduplication; but in Changzhi and Xinzhou older contrasts are retained in this same environment.

There is less evidence available at this point for the lexical nature of contrast-preserving tonal rules. Although the exceptions from Pingyao and Yinchuan give us some indication of the lexical nature of the contrast-preserving sandhi forms in these

dialects, similar examples have not been found in all the dialectal descriptions referred to in this paper.

6.1. A stronger hypothesis. The question about the lexical status of contrast-preserving forms has important ramifications for our analysis. From the discussion so far, there is no question that some contrast-preserving sandhi forms are either lexically listed or derived by lexical rules. The more interesting question, however, is whether the following stronger hypothesis is true:

- (22) The preservation of older contrasts can only be found in morphological environments, in other words, older contrasts cannot be preserved across-the-board in all sandhi forms.

This is a very intuitive hypothesis, since we expect vestiges of the older stages of a language to be typically found in morphology. But this is also a very strong hypothesis. It predicts that there will be no dialect in which the only contrast-merging environment is the citation context. This hypothesis, if true, will shed some light on the mechanism of language change and the possible states of linguistic systems in transition. Although we won't be able to confirm or disconfirm the stronger hypothesis in this paper, we will suggest now a possible test for the lexical status of tonal rules.

6.2. The productivity test. A major difficulty in identifying some contrast-preserving rules as lexical lies in their apparent regularity. But what appears to be regular tone sandhi may nonetheless be unproductive, which we assume to be a crucial characteristics of lexical rules. We cite the rather intriguing phenomenon concerning the lack of productivity in tone sandhi rules in Wenzhou. Wenzhou has rather regular tone sandhi rules. But Zhengzhang (1964) mentions a very interesting feature of Wenzhou tone sandhi, i.e., its treatment of unfamiliar terms. While the more familiar terms *chemistry*, *philosophy*, *literature*, *mathematics* and *medicine* all undergo regular sandhi rules, the less familiar terms, such as *Sinology* and *acoustics* assume citation tones for the initial syllables and an invariable contour of 21 for the second ones. The failure to extend the otherwise regular sandhi rules to unfamiliar items is very

much unexpected⁵. We may be forced to conclude that the regular tone sandhi rules in Wenzhou are not productive. In other words, they are rather lexical rules relating the existing entries in the lexicon. Doubt concerning the psychological reality of regular tonal rules was also expressed in Hsieh (1970), in which he argues that the otherwise regular sandhi rules in Southern Min may not have psychological reality at all. In his experiments to test the productivity of Min sandhi rules, nonsense tonal syllables were combined and subjects were asked to assign correct sandhi tones to them according to sandhi rules. Most subjects fail to do it. The lack of productivity in Wenzhou and Southern Min tonal rules contrasts sharply with the productivity of the Third Tone Rule in Mandarin. The productivity of the rule is clearly demonstrated in its across-the-board application regardless of the degree of familiarity. Thus, the rule not only applies in 水果酒 *shui3guo3jiu3* --->*shui2guo2jiu3*, 'fruit wine', it is even operative when native words are juxtaposed with English unstressed syllables interpreted as having a low tone: 好 *hao3 professor* --->*hao2 professor* (Cheng 1968).

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⁵ It is familiar terms that we expect to be associated with irregularity and not unfamiliar ones. Take English for example. On the one hand, familiar verbs in English often have irregular past tense forms, such as the verb *to be* and the verb *to go*. On the other hand, English regular past tense formation has been at times extended to unfamiliar irregular verbs (Hooper, 1976). When people do not know the irregular forms of unfamiliar verbs, they fall back on the regular rule. Thus, although both the past tense forms for *keep* and *creep* are irregular, i.e. *kept* and *crept* respectively, **creeped* sounds much better as the past tense form of *creep* than **keeped* does as the past for *keep*. The reason is that *keep* is much more familiar than *creep*. It is exactly in the unfamiliar forms that we see the productivity of rules in effect. Familiar forms can be memorized but unfamiliar ones have to be generated by rules. We cannot very well say that all the unfamiliar forms that do not undergo regular sandhi are exceptions, since they constitute a potentially open-ended class.

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從變調跟語法的聯系看本調與變調之間的關係

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一般認為，本調為基本調而變調為衍生調。近來，諸學者提出了變調亦可為基本調的觀點。本文從變調與語法的聯系著眼，再次探討本調和變調的關係問題。變調可為基本調這一論點是基於某些方言中變調中的調類多於本調中調類的現象。但本文指出此種保留歷史調類的變調在分佈上是受語法方面的限制的。因此，我們提出一種模塊式的分析。即在不同的語法環境中，本調和變調都可能是基本調。本文最後提出一個假設，即作為基本調的「變調」均為詞匯性而非普遍性的變調。

關鍵詞：本調 變調 模塊 歷史調類 方言