PROGRESS IN TONE SANDHI ANALYSIS

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1. Background

An attempt at analysing and synthesising the dialectal data on isolation tone values and tone alternations in the Wu dialects in eastern China appeared in Ballard (1980). That paper concentrated on one aspect of the tonal alternations in Wu: categorical shifts, i.e., shifts of tones from their isolation category to another category in given contexts. Better, more recent data makes some exploration of the role of stress possible now. In addition the copious new data on the tone sandhi in a proper subset of Wu dialects shows that in addition to the categorical comparison and shifts, a great deal of phonetic similarity in tone alternation prosodies can also be demonstrated. This report discussed some recent work and progress in understanding the phonology of tone in the Wu dialects.[1]

1.1 On discussing tone in Wu

1.1.1 Tone in Wu

The Wu dialects all either show or point clearly to a system containing a set of four tones - one for each of the traditional categories: *pīng, shàng, qù* and *rù* (herein I, II, III, and IV, respectively), each having a pair of subtypes: *yīn* and *yáng* (herein *a* and *b*, respectively). Usually the *a/b* types for each category are phonetically parallel; in any case, the *a* tone is always higher than the *b* tone. All Wu dialects also show a distinction between the *a* and *b* tones in their segmental phonology as well: the exact nature of the distinction has yet to be clarified phonetically, but phonologists refer to the distinction as syllables having voiceless versus voiced initials, and/or as plain (aspirated or not) initials versus initials with voiced aspiration or murmur or breathy voice, etc. I refer to this distinction as register.

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Prosodic analysis and Asian linguistics: to honour R.K. Sprigg, 95-108.
Pacific Linguistics, C-104, 1988

It is important to note that tone as a phonological operant in Wu must involve several other phonetic parameters than pitch perturbations alone. Register has just been mentioned above; Rose has shown that the special register effects are produced differently in Ib from in IIb/IIIb in Zhenhai; other dialect reports talk about how initials change in tone alternations. The reports all indicate considerable differences in length, so that some I, II, or III tones can be longer or shorter. (One expects the IV tones to be shorter, but sometimes they lengthen.) Finally, it is becoming obvious through inferences from the site reports, from Rose's research, and from listening to speakers from various areas that stress plays a major role in at least some combinations in some dialects.

1.1.2 Tone alternations in Wu

Tone alternations in Wu are usually described as changes between the isolation tone of a syllable and its tone in a given context, roughly 'tone sandhi' in English. The Wu dialects show a variety of types of sandhi, but they all show at least one type: tone changes that occur in syllables pronounced together as a single word or phrase unit that constitutes, thereby, a single constituent of the sentence: lexical sandhi. Some of the dialects also show special sandhi for other combinations such as numbers plus numbers, numerical classifiers, reduplications, verb plus object, diminutives, etc., and a number of site reports discuss sandhi in groups of various lengths - anywhere from two to five or six syllables in length. All of the available site reports discuss at least two syllable lexical sandhi, and some just that, so only two syllable lexical sandhi will be considered here.

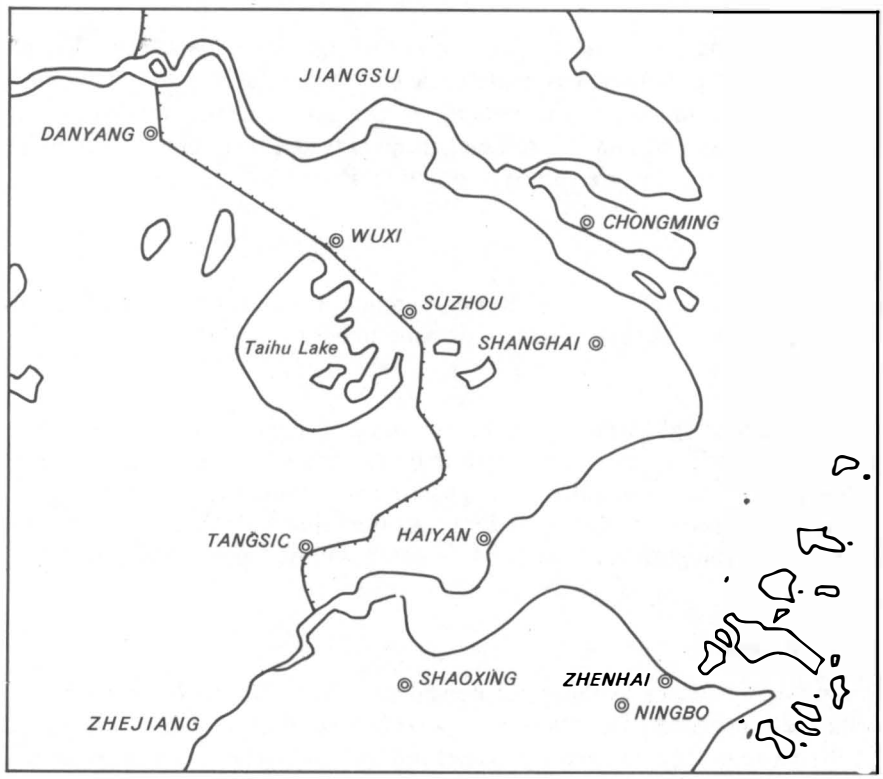
1.1.3 The dialect subset

The data here are all taken from dialects that belong to Northern Wu, i.e. what Xu (1985) dubbed Area I and Fu et al. (1986) call the Taihu area. Map I shows the locations in southern Jiangsu and northern Zhejiang of the dialects discussed here. The data sources are as follows: Chongming (CM): Zhang Huiying (1979, 1980); Shanghai (SH): Old - Shen (1981a, 1981b); New - Lounsbury (ms.), Miyata et al. (1983), Sherard (1972); Suzhou (SZ): *Hanyu fangyan gaiyao* (Anonymous 1960), Yuan Jiahua et al. (1983), Miyata et al. (1983), Qian (1983), Wang Ping (1983), Xie (1982), Ye (1979a, 1979b, 1984a), Zhang Jimao (1979), and an editor's note in *Fangyan* 1979; Haiyan (HHY): Hu (1959); Shaoxing (SX): Wang Futang (1959); Ningbo (NB): Chan (1985); Zhenhai (ZH): Rose (1985); Tangsic (TS): Kennedy (1953); Wuxi (WX): Chan and Ren (1986). An additional dialect is included in this study: Danyang (DY): Liu (1980). DY appears to be a former Wu dialect that is in transition to becoming a Mandarin dialect: there is a literary layer with four tones and no sandhi, and a colloquial layer with six tones and tone sandhi. Neither layer has preserved the three-way initial distinction typical of Wu. IVb is higher than IVa, but IV does still end in a stop. However, the tone sandhi system, which is quite confusing on the surface, yields some clarity to an analysis based on the historical categories, and that analysis provies to be quite comparable to other Wu dialects in the area.

Some comments about the data in various dialects should be made here.

Chongming

Zhang's data contains the apparent but not made explicit interaction of tone with stress. For several combinations Zhang shows slightly different results that would appear to be indistinguishable on the basis of pitch alone. Thus, is pitch the real discriminator among [242-3], [24-3], and [24-33]? [42-33] and [42-3]? [25-3] and [13-33]? Since the single digit tones here are not related to tone IV, it seems likely that they represent short, unstressed tones.



Map 1: Some Wu dialects

Shanghai

Shen 1981a and 1981b concern a variety of Shanghai speech that is claimed to be more archaic. Shen's citation tone values are much the same as in other SH reports, and if only the current tone categories are considered, then Old SH tone sandhi would appear to have the same substantial amounts of variation as do Suzhou and Chongming. However, Shen claims that a lot of this variation in the variety he studied represents confusion of the distinct historical origins of the tones now merged in III. If these historical categories are taken into consideration as in DY, then the tone sandhi shows much less variation - as depicted below as Old SH. The newer varity of SH appears to have lost all of these distinctions, according to the reports, both in sandhi and in isolation.

Suzhou

My 1980 paper was based on *Hanyu fangyan gaiyao* (Anonymous 1960). The more recent edition (Yuan 1983) of that volume has made some changes in the data for SZ, but does not give any explanation of the differences. In general the earlier data seem to represent an older stage of Suzhou speech; the revised edition lies somewhere in between that version and the more recent new data. These three sources are referred to below as Old SZ, Med(ium) SZ, and New SZ, respectively.

Zhenhai

This summary is based on a handout at a conference; a fuller, formal version of the report should be published soon. There is a final glottal stop in both II and IV.

Tangsic

Kennedy (1953) discussed two tone sandhi patterns in Tangsic: (1) attribute + head, stress on the attribute; right spreading sandhi as in SH, and (2) verb + object, stress on the object; mid level plus original tone. (2) is parallel to the descriptions of an iambic pattern contained in the CM, SH, SZ, and SX reports. In this right dominant type first syllables tend to be mid level and to lose more or less all categorical distinctions except, possibly, the *a/b* distinction.

2. The data: tone tables

The isolation tones for eight Wu dialects are shown in Table 1. Tables 2-7 represent, tone by tone, the tone sandhi prosodies that result from a combination of the table tone category as first syllable plus the various column headings as second syllable. These tables are arranged in this fashion to facilitate prosodic comparison. No tables are given for IV in first position because such prosodies are always distinct in other ways as well: length and the presence of a glottal stop. Therefore, such combinations are irrelevant for the present analysis.

3. Categorical comparison

These tone sandhi groups are all left dominant in the sense that more distinctions are preserved in the first position than in the second, and in the sense that what happens with any

given combination is determined solely in many dialects and tones and almost solely elsewhere by the category of the tone in the first position. With that caveat, there are two interesting groups of mergers or shifts in these data. In first position, (1) there are a few regular mergers, and (2) there are a number of 'irregular' shifts to another category; this latter type appears in the charts as alternant readings for various combinations. In second position, (1) there is almost complete loss of the register distinction, and (2) there are extensive categorical mergers among I, II and III.

Table 1: Isolation tones for eight Wu dialects

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	55	24	435	241	33	213	ʔ55	ʔ23
SH	52	(1)13	24	(1)13	24	(1)13	ʔ5	ʔ23
SZ	44	23	52	331	412	331	ʔ44	ʔ23
DY	33	24	55	24	24	11	3	4
SX	51	231	335	113	33	11	45ʔ	12ʔ
NB	53	35	424	313	33	213	ʔ55	ʔ34
ZH	441	241	324	213	441	213	5ʔ	24ʔ
HY	54	31	434	242	25	213	5	2

Note: For SZ, Wang (1983) shows IVa as [ʔ43] and IIIa as [231]. Qian and Shi (1983) also note a slight initial rising component to IIIa; similarly Xie (1982 shows [231].

Table 2: Ia plus

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	55-53	55-53	45-3	45-3	45-3	45-3	55-ʔ55	55-ʔ55
Old SH	55-52	55-52	55-31	—	55-31	55-31	55-ʔ53	55-ʔ53
New SH	55-21	55-21	55-21	—	55-21	55-21	55-ʔ22	55-ʔ22
Old SZ	44-21	44-21	44-21	—	44-21	44-21	44-21	44-21
New SZ	44-21	44-21	44-21	—	44-21	44-21	44-ʔ22	44-ʔ22
DY	42-11	42-11	(42-11)	(42-11)	(42-11)	(42-11)	(42-1)	(42-1)
		55-55	55-55	55-55	55-55	55-55	55-5	55-5
HY	54-31	54-31	54-31	54-31	54-31	54-31	54-31	54-31
SX	33-51	33-51	33-55	33-55	33-55	33-5	33-5	33-5
ZH	33-'441	33-'441	33-'441	33-'441	33-'441	33-'441	33-'4ʔ	33-'4ʔ
NB	44-42	44-44	44-35	44-44	44-44	44-44	44-5	44-4

Note: Qian and Shi (1983) claim New SZ must be [55-21].

Table 3: Ib plus

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	24-53	24-53	25-3	25-3	13-33	25-3	24-?55	24-?55
Old SH	11-55	11-55	11-55	11-55	11-55	11-55	11-?5	11-?5
Old SZ	24-41	24-331	24-41	—	24-41	331-331	24-4	24-?23
						24-331		
Med SZ	22-44	22-33	22-44	—	22-44	22-33	22-?4	22-?3
	12-31	12-21	12-31	—	12-31	12-21	12-31	12-21
New SZ	22-44	22-44	22-44	—	22-44	22-44	22-?44	22-?44
	23-21	23-21	23-21	—	23-21	23-21	23-?22	23-?22
DY	55-55	55-55	24-55	24-55	24-55	24-55	24-5	24-5
	42-11	42-11						
HY	31-434	31-434	31-434	31-434	31-434	31-434	31-21	31-21
SX	11-51	11-51	11-55	11-55	11-55	11-55	11-5	11-5
ZH	11-'441	11-'441	11-'441	11-'441	11-'441	11-'441	11-'4?	11-'4?
NB	22-44	22-44	22-44	22-44	22-44	22-44	22-4	22-4

Table 4: IIa plus

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	42-53	42-53	34-3	42-33	42-33	42-33	42-?55	42-?55
				34-3	42-53	34-3		
Old SH	24-53	13-53	24-53	13-53	33-55	33-55	24-?53	24-?53
Old SZ	41-35	41-24	41-35	—	41-21	41-331	513-4	513-?23
					41-35	41-24		
					41-31	41-21		
Med SZ	44-31	44-21	44-31	—	44-31	44-21	41-35	41-24
New SZ	52-34	52-34	52-34	—	52-34	52-34	52-?44	52-?44
	52-21	52-21	52-21	—	52-21	52-21	52-?22	52-?22
	44-21	44-21	44-21	—	44-21	44-21	44-?22	44-?22
DY	33-33	42-24	42-24	42-24	42-24	42-4	42-24	42-4
	(55-55)	(33-33)	33-33	33-33	33-33	33-33	33-3	33-3
	(42-24)							
HY	434-434	434-434	434-434	434-434	434-434	434-434	434-5	434-5
SX	335-51	335-51	335-51	335-51	335-51	335-51	335-54	335-54
ZH	'334-51	'334-51	'334-51	'334-51	'334-51	'334-51	'334-5?	'334-5?
NB	42-42	44-44	42-42	44-44	42-42	44-44	42-4	44-4

Table 5: IIb Plus

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	31-53	31-53	31-33 24-3	241-3 31-33	241-3	241-3	31-ʔ55	31-ʔ55
Old SH	13-52	13-52	13-52	13-52	11-55	11-55	13-ʔ53 (11-ʔ5)	13-ʔ53
DY	11-11 (42-24)	11-11 (42-24)	11-11 (42-24)	11-11 (42-24)	11-11 (42-24)	11-11 (42-24)	11-1 42-4	11-1 42-4
HY	242-31	242-31	24-213	24-213	24-213	24-213	242-21	242-21
SX	115-51	115-51	115-51	115-51	115-51	115-51	115-54	115-54
ZH	'114-51	'114-51	'114-51	'114-51	'114-51	'114-51	'114-5ʔ	'114-5ʔ
NB	44-44	44-44	22-44	44-44	24-42	22-44	44-4	22-4

Table 6: IIIa plus

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	42-53	42-53	34-3 45-3	34-3	42-33 45-3	34-3 45-3	42-ʔ55	42-ʔ55
Old SH	24-52	24-52	24-52	24-52	55-31 (33-55) (24-52)	55-31	24-ʔ53	24-ʔ53
New SH	33-44 55-21	33-44 55-21	33-44 55-21	— —	33-44 55-21	33-44 55-21	33-ʔ44 55-ʔ22	33-ʔ44 55-ʔ22
Old SZ	44-21	44-21	44-21	—	44-21	44-21	513-4 44-31	513-ʔ23 44-21
Med SZ	44-35	44-24	44-35	—	44-35 52-31	44-24 52-21	44-35	44-24
New SZ	44-21 52-34	44-21 52-34	44-21 52-34	— —	44-21 52-34 52-21	44-21 52-34 52-21	44-ʔ22 52-ʔ44	44-ʔ22 52-ʔ44
DY	33-33 (55-55) (42-24)	42-24 (33-33)	42-24 33-33	42-24 33-33	42-24 33-33	42-24 33-33	42-4 33-3	42-4 33-3
HY	25-42	25-42	25-42	25-42	25-42	25-42	25-42	25-42
SX	33-33	33-33	33-33	33-33	33-33	33-33	33-3	33-3
ZH	'44-31	'44-31	'44-31	'44-31	'44-31	'44-31	'44-32ʔ	'44-32ʔ
NB	44-44	44-44	44-44	44-44	44-44	44-44	44-4	44-4

Table 7: IIIb plus

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb
CM	31-53	31-53	31-33	31-33	31-33	31-33	31-?55	31-?55
				25-3	25-3	13-33	25-3	
Old SH	13-52	13-52	13-52	13-52	11-55	11-55	13-?53	13-?53
								(11-?5)
New SH	22-44	22-44	22-44	—	22-44	22-44	22-?44	22-?44
	55-21	55-21	55-21	—	55-21	55-21		
Old SZ	24-41	24-331	24-41	—	24-41	24-331	24-4	24-?23
Med SZ	22-44	22-33	22-44	—	22-44	22-33	22-?4	22-?3
						12-31	12-21	
	44-31	44-21	44-31	—	44-31	44-21		
New SZ	22-44	22-44	22-44	—	22-44	22-44	22-?44	22-?44
	23-21	23-21	23-21	—	23-21	23-21	23-?22	23-?22
	44-21		44-21	—	44-21	44-21		
DY	11-11	11-11	11-11	11-11	11-11	11-11	11-1	11-1
	(42-24)	(42-24)	(42-24)	(42-24)	(42-24)	(42-24)	42-4	42-4
HY	23-21	23-21	23-21	23-21	23-21	23-21	213-5	213-5
SX	11-11	11-11	11-11	11-11	11-11	11-11	11-3	11-3
ZH	11-'34?	11-'24?	11-'34?	11-'24?	11-'34?	11-'21?	11-'4?	11-'4?
NB	24-44	22-44	22-44	22-44	44-44	33-31	44-4	44-4

3.1 First position categorical mergers

In contrast to second position syllables, the *a/b* distinction is preserved throughout these dialects in first position, but there are mergers across categories. (Since one problem is to determine direction of merger, = rather than > is used herein to show loss of contrast.) The IIa/IIIa distinction is apprently being lost in the north. CM shows mergers (by mixing the two as variants), SH shows a progression of loss (some contexts in Old SH to all in New SH), New SZ shows the loss of contrast except in the range of variants, and DY loses the distinction in all contexts. IIb = IIIb in all contexts in SH, SZ and DY, often in CM, and sometimes in NB; the equation also applies to SX and ZH, but the effect of the twon tones on the following syllables is different. (Where a dialect has lost a tonal distinction completely, data on that tone in that dialect is missing from the relevant table.)

3.2 First position alternations or variations

There is extensive, apparently free, variation or shifting from the etymologically proper tone sandhi result to another one in the northern dialects. In other words, for example, an otherwise

IIIa + X compound will instead be treated in tone sandhi as if it were Ia + X. The shifts in all four dialects are apparently extensive and unpredictable, but the patterning is parallel. Thus, IIa shows Ia alternants in SZ and DY; IIIa, Ia in SZ, New SH, DY and CM. All of the alternations in *b* appear to represent the mergers in progress of all the *b* tones, especially IIb and IIIb.

The most interesting aspect of this problem concerns learnability and the nature of the tone sandhi rules themselves. From the learnability point of view, if there is no way to predict which compounds will shift, then new speakers of the dialect must simply memorise a tonal configuration or envelope for the compound as a word. In other words, it would appear that tone sandhi formation rules are not learned or productive. If this is true, then tone sandhi rules are not parts of the speakers' grammars, but historical artifacts or reconstructions.

It is interesting to speculate on the possible origins and the timing of the beginning of this variation. Since the variations and losses of contrast are heaviest in DY, and since there is more reported for New SH and SZ than for the older varieties, then a recent origin is suggested, and one possibly connected with the impact of Putonghua. But there is also a question as to whether the phenomenon is a new appearance, or possibly the result of better fieldwork and reportage. M.J. Hashimoto (personal communication and to appear) has suggested an origin in similar tone shifts in nearby Mandarin dialects, but the only dialect to mirror the variations in mergers in the *a* register in isolation (Ia = IIIa) is ZH, for which dialect Rose does not report any variation. In SH IIa = IIIa, but Ia is quite distinct, both in sandhi and in isolation. In *b* register, there are extensive mergers underway leading all syllables to one tone, and the affected dialects all show similar phonetic values for all *b* register tones, so the variation may be, in part, the result of tone mergers in progress.

3.3 Loss of register contrast in second position

In Old and Med SZ, and sometimes in New SZ, there is a slight pitch difference between *a* and *b* in second position in tones I, III and IV after any tone except Ia. A similar slight phonetic difference occurs in I and IIIb in ZH. After IIa, NB shows a merger of tone categories with a distinction in *a*/*b* only, so that IIa + Ia = IIa + IIa = IIa + IIIa, and similarly IIa + Ib, etc. In several cells, CM shows a possible *a*/*b* distinction in the incidence of variants: in II and III after IIa, in II after IIb (possibly), and in III after IIIa; similarly in I after IIIa in DY. In I and II after IIa in Old SH and in I after IIIb in NB, the *a*/*b* distinction is lost in second position but is reflected in the first position. In III after IIIb in ZH and NB, the *a*/*b* forms are quite different, but there is a strong parallel between the two sites. And in a few other odd cells the *a*/*b* distinction is maintained: in I, II, and IV after Ia in NB, in III after Ib in CM, in IV after IIa in Old SZ, in II after IIb in NB, and in IV after IIIa in Old SZ. Otherewise, as a general proposition, there is no *a*/*b* distinction in second position. Note that the nearly universal loss of the *a*/*b* distinction within each tone category tends to demonstrate that each *a*/*b* pair is in fact a single category in the speaker's grammar - and not two separate tones.

The minimal pitch differences in SZ may merely reflect differences in register, or they, plus the variation in incidence of alternation seen in CM, may suggest the manner in which this

distinction was lost in Northern Wu - narrowing of any isolation phonetic differences in close juncture and adoption of the same alternation patterns for both *a* and *b* types in each category.

3.4 Loss of I/II/III contrasts in second position

II = III in most sites in most combinations except after II or III in Old SH, after Ia, IIb or IIIb in NB, after Ib or IIIa in CM, and after IIa in Old SZ, i.e., in older and/or more peripheral dialects in selected environments. Moreover, I = II after II and III in Old SH, after IIa in Old SZ, after IIIa in CM, and after IIIb in NB - again, older, more peripheral varieties. As a more prevalent pattern, I = II = III after all tones in ZH and New SZ, after all tones except Ib in DY, after all tones except IIa in Old SZ, after all tones except IIb in HY, after all tones except I in SZ, after all tones except II(a) in New SH, after Ib in Old SH, and after Ib, IIa and IIIa in NB.

3.5 Wuxi tone sandhi

Chan states that there are two basic patterns for tone sandhi in Wuxi: pattern extension and pattern substitution, in her terminology; essentially, right spread, as in Shanghai, and left neutralisation. Chan has little to say about right spread, except to note that it operates much as in Shanghai, and that just as in Shanghai there is total rightwards neutralisation. But even in this context the Ib/IIIb distinction surfaces: Ib + Ib yields a rising-falling pattern over two syllables, [12-41], whereas IIIb + IIIb yields a falling-rising pattern, [32-24].

The second type, or pattern substitution, is harder to interpret from Chan's paper, but it appears that there ar some fist syllable categorical shifts; then right spread applies. The rules for the categorical shifts appear to be in part parallel to the neighboring dialects: II to III, III to I, all *b* to Ib. These shifts in first position are conditioned by the tone category in second position: usually II, III versus I, IV. The variations according to the category of the following syllable are also paralleled in other Wu dialects, even as to the members of conditioning categories.

Chan claims that her pattern substitution type parallels the iambic pattern in Tangsic and Shaoxing (?); that would, of course, include the similar patterns in Shanghai and Suzhou. However, in these other dialects left neutralisation leads to middish level tones in first position; often these tones cannot be easily identified with any isolation tone value. Rather Chan's report seems to indicate the same kind of categorical shifting seen in Shanghai, Suzhou, and Chongming.

3.6 Unmerging in tone sandhi: the always fewer myth

Some scholars have alleged that there are always fewer tone distinctions in tone sandhi positions than in isolation, and this 'fact' is used as an argument for taking isolation values as basic or underlying in any given tone system. In a certain sense, tone sandhi does imply loss: given an eight tone system, there are 64 possible combinatorial disyllabic prosodies, and no Wu dialect ever shows nearly that many prosodies within tone sandhi groups. (Of course, sequences of non-sandhied syllables will show the full 64 possible combinations.) Moreover, much of the

categorical discussion above has concentrated on mergers (= loss of contrast) in tone sandhi groups. However, this reduction is taken from the point of view of a tone system with eight tones, whereas SH, SZ, DY, ZH and possibly NB already have isolation tone systems with fewer than eight tones. Moreover, except in the newer, more reduced systems in DY, New SH and SZ, the isolation system plus the sandhi system allow for the internal reconstruction of a full system of eight tones in all of the dialects. In other words the tone sandhi systems often reflect distinctions that have been lost in the isolation values for the tones. For example, in Zhenhai the Ia/IIIa and IIb/IIIb isolation mergers are undone in sandhi. (Oddly, Ib and IIIb then merge in first position, but their tone sandhi groups as wholes are distinct because of differences in the second, stressed position.) In addition, in a number of cases here and in other sites and in other kinds of sandhi groups in Wu, tones appear in tone sandhi groups that have no obvious parallel in the isolation tones of that dialect - for example, CM's [42] and [31]. And DY displays more register prosodies (four) than are called for by the full set of three tones. Thus, in no sense is it true that the isolation tone values represent, necessarily, the maximal tone system for any given dialect. To claim otherwise is simply to fly in the face of reality.

4. Stress and tone sandhi

Most of the dialect reports except Rose refer to these tone sandhi groups as conforming to a heavy-light pattern of stress. (The alternant tone sandhi in SH, SZ, and TS and SX is said to be light-heavy.) However, most of these authors are quite clear in stating that whatever is meant by heavy/light, the phenomenon is quite different from the atonality, vowel reduction, and shortening seen in unstressed syllables in Putonghua, though Miyata (1983) does suggest that final syllables in longer tone sandhi groups in SZ do approach Putonghua's atonality. Rose, on the other hand, has shown stress differences in first and second syllables in different combinations. In particular, he feels his acoustic evidence on amplitude, among other phonetic factors, the judgments of his informants, and his own auditory impressions all suggest that placement of stress alone can predict pitch prosody differences between groups with initial Ia syllables versus those with IIIa syllables in ZH. Since the SX data is so blatantly parallel to Rose's, we may infer that the same facts apply there as well.

Let us hypothesise that Rose's second syllable stress with Ia as first syllable accounts for the higher pitch and more dramatic fall on the second syllable. Then, if the stress were to shift leftwards, we could expect that higher pitch would move left and that the dramatic fall would lessen or begin to appear on the first syllable. It seems that the CM, Old SH and NB data on I + I combinations all point to the first stage of this shift, that New SH and SZ point to a leveling of all contrasts after I with almost complete shift of stress to the left, and that, finally, the DY variation [42-11] appears to have shifted the stress leftwards to the most extreme degree. I would also suggest that CM's maintenance of a I [53] versus II/III distinction in second position also reflects the stress pattern to be reconstructed for this tone, and similarly for Old SH, a distinction which disappears in New SH. Stress shift left in the north may also explain the frequent Ia alternants for IIIa in SH, SZ and DY. But it should also be noted that a high falling tone in second position

Stress effects are less obvious elsewhere in the data. There is some possibility that the Old SZ [24-41] versus New SZ [23-21] difference in Ib-plus sequences in comparison with ZH reveals a shift in stress leftwards in the north. Then only IIIb might be said to be stress right in Northern Wu, which might account for the frequent alternants in Ia and for IIIb's high level final pitch.

5. Prosodic comparisons

The prosodies for tone sandhi groups with Ia in first position point to a single prosody: high level plus falling. Stress shift to the left appears to explain the degree, and, possibly, placement of the drop. [44-'441], i.e. more or less the ZH form, seems to capture the dialect data nicely. None of the dialects in Jiangsu regularly distinguish IIa-plus prosodies from IIIa-plus prosodies, but they do show comparable prosodies across dialects. Thus, there is a level + level prosody (in which the second level tone may be higher) in SH and DY, as well as in SX and NB, a rising-falling prosody in Old SH, as well as in HY, SX and ZH, a falling-rising prosody in SZ and DY, as well as in HY, and a falling-falling prosody in CM and SZ, as well as in NB. Only HY, SX and ZH regularly distinguish IIa-plus from IIIa-plus, and no prosodies are shared by all three for any one tone; even where they share a rising-falling prosody, SX and ZH use it for IIa-plus, whereas HY uses it for IIIa-plus. Thus, for the two tones we find three prosodies, approximately [44-44], ['34-51], and [52-34].

Almost all of the b tone prosodies are low rising-falling in one way or another; this overall similarity is probably related to the ongoing mergers among these tones. For Ib, Old SH, SZ, SX, ZH and NB show a prosody like [22-44]; DY could be seen as having essentially the same prosody with an earlier onset for the rise. The final fall in SX and ZH (and CM?) is lost with stress shift to the first syllable. Thus, the underlying prosody might be posited as being something like [22-'441]. For IIb, all of the dialects show rising-falling, a prosody something like [24-42] with SX and ZH showing an initial plateau, perhaps associated with initial stress. (Does that mean the northern dialects reflect a prosody with even stress on both syllables?) For IIIb, SH, SZ, CM, HY and perhaps NB, show a prosody more or less like [24-31]. In that this prosody is low and shows a minimal rise and fall, DY, SX and ZH's [11-11] or [11-'34?] seem fairly close in value. Alternatively, their tones here in IIIb and the higher level sequences in IIa and IIIa in CM, New SH, DY, SX, and NB may reflect an etymologically distinct prosody similar to the iambic pattern mentioned briefly above.

6. Reconstructions

Reconstruction of the (isolation) tone system and its evolution and of the tone sandhi system and its evolution *must* go hand in hand. If we compare the values in Table 1 with the prosodies posited in 4, and if we assume that right spread is the basic sandhi pattern in these dialect materials, then we can reconstruct the values shown in Table 8 for Proto-Northern Wu. In most categories the reconstructed prosody seems to be merely an extension of the isolation value, but the two different tones shown for *IIIb seem somewhat dissimilar. Still they may just represent two sides of the same low level but unstable tone. I am less certain of the reconstruction of

the two different tones shown for *IIIb seem somewhat dissimilar. Still they may just represent two sides of the same low level but unstable tone. I am less certain of the reconstruction of stress. End stress with a shift left in *I seems to capture the history of that tone; despite Rose's ZH data, *II looks better with even stress. Reconstructing different stresses for *IIIa versus *IIIb, and leaving stress placement as the only carrier of the distinction between *IIIa and *Ia is more problematic.

Table 8: Reconstruction of Northern Wu tones and tone sandhi prosodies

		I	II	III
a		441'	524	'441
		44-'441	44-44, '34-51, 52-34	
b		241'	241	213
		22-'441	'24-42	24-'31

The near universal loss of the *a/b* distinction is second position indicates that that was the first neutralisation in that position - if it ever existed as such in tone sandhi groups. Then II and III merged in most dialects, probably because of similarity in both the isolation and sandhi prosodies. They are also subsequently merging in first position. In the north II and III are also similar in showing frequent alternants in I, and a general merger of II with III that began with IIb and IIIb - possibly under the influence of Putonghua. I remains distinct in a few dialects in second position, but in a few others merges with II, and in isolation and first position in some sites it is moving towards II/III. In first position Ib shows some movement towards merger with IIb/IIIb, partly as a result of phonetically similar prosodies, partly because of the adoption of the same alternants.

Through stress shifts it is also possible to see an explanation of patterns of alternation in terms of internal history. Thus, given a value like ['34-51] in SZ for IIIa-plus groups, as stress shifted left in Ia-plus group's [44-'441], the two become more and more alike, until, perhaps, there was no phonetic difference left. But Med and New SZ show another alternant [52-34] also similar to a reconstructed form seen in Table 8, so perhaps that is basic and [34-51] an iambic neutral pattern for IIIa, with a shift of trochaic IIIa-plus groups to IIa under some conditions yet to be determined; compare this variation with the overlapping of variants seen in IIa and IIIa in CM. Despite the current quandries, the possibilities for future knowledge seem very promising for this sort of data and analysis.

Comparing this type of tone sandhi in Northern Wu with other types in the same area, as well as tone sandhi elsewhere in Wu, shows an increasing prevalence of left dominance versus right, of the shift of stress leftwards, and, hence, of reduced contrasts on rightwards syllables. As that occurred, right spread became the prevalent pattern.

7. Conclusion

The most unexpected product of this research was the discovery that the prosodies were so comparable across dialects despite differences in isolation values. The difficulty of comparison in some tones and/or some dialects then becomes all the more intriguing. The degree of comparability that will remain when the scope of comparison is extended to the Southern Wu dialects remains an open question.

The recent progress in Wu tone studies has served mainly to make the current research needs more clear. Far too little is known about the phonetics of stress, amplitude and register; much needed are fuller site reports that cover these features and variation in greater detail. Exploration of the differences between the northern and southern Wu types of tone systems is much in order. It is to be hoped that the explosion in interest, research, conferences and publications in Wu will continue.

NOTES

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