The Puzzling Case of Boshan Tone Sandhi

More Questions than Answers

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1. Introduction

In recent works Chen (2000) and Lin (2004) have tried to solve the puzzle of tone sandhi in the Boshan dialect (as described in Qian 1993), which behaves 'strange', especially concerning '*its seemly unpredictable rule application directionalities observed in tri-tonal strings*' (Lin 2004: 75). Both Lin and Chen opt for a solution within the framework of Optimality Theory. Thus, the directionality of rule application is assumed to be governed by different criteria (cf. Chen 2004: 806, Lin 2004: 76). Chen proposes three criteria to be important for the output of tri-tonal strings in Boshan. His ranking is given in (1) (cf. Chen 2000: 171):

(1) Complex [Simplicity] > Derivational Economy > Temporal Sequence [left to right]

This solution is rejected by Lin, who notes, that '[…] *the attested outputs are not the most harmonic outputs because complex tones can often be found*' (Lin 2004: 83). He proposes a Prosodic Correspondence Model, which '[…] *requires identity between tonal outputs that stand in certain prosodic relationships*' (ibid. 83).

When I recently stumbled over the original source for the Boshan dialect (Qian 1993), I detected, however, some inconsistencies concerning the data which both Chen's and Lin's explanations rely on. Firstly, there are certain sandhi outputs which are not taken into consideration, neither by Chen nor by Lin. Since their solutions depend on the assumption that certain cases of sandhi can apply while others cannot, these data, which contradicts some of these assumptions, is of crucial importance for the problem. Secondly, there are some sandhi outputs which can be found in the lexical part of Qian's work, but are not included in his description of the Boshan tone sandhi. This suggests a re-evaluation of the Boshan tone sandhi phenomena. The explanations given in Chen and Lin do not seem to account for these new findings.

In the following, I shall give a brief overview over the revisited data for Boshan tone sandhi and discuss two of the problems which result from it: the double outputs for tri-tonal strings with two adjacent *ping*-tones (§3), and the question of how to distinguish between the

two underlying categories of the Boshan *shang*-category (§4). These problems suggest that the explanations given in Chen and Lin do not hold for the revisited data. However, the possible answers I propose (morphosyntactic constraints for certain tonal sequences and a strict rule application from left to right) raise new questions which cannot be sufficiently answered at the moment, especially due to the scarcity of the data, and therefore need further investigation.

2. Tone Sandhi in the Boshan Dialect: A Short Overview

The Boshan Dialect has only three citation tones: *ping* [214], *shang* [55] and *qu* [31]. Their diachronic sources are listed in Table 1 (cf. Qian 1993: 74):

Middle Chinese (MC)		Boshan		
Tone	Initials	*ping*	*shang*	*qu*
ping	Unvoiced	x		
	Resonant		x	
	Voiced stops		x	
shang	Unvoiced		x	
	Resonant		x	
	Voiced stops			x
qu	Unvoiced			x
	Resonant			x
	Voiced stops			x
ru	Unvoiced	x		
	Resonant			x
	Voiced stops		x	

Table 1

As becomes obvious from the table, the modern *shang*-category has two main sources: the Middle Chinese (MC) *ping*-category (voiced initials) and the MC *shang*-category (except from the initials with voiced stops). This former distinction is partially preserved in the Boshan tone sandhi, as Table 2 shows[1]:

	ping [214]	*shang* [55]	*qu* [31]
ping [214]	55.214.	214.55.	24.31.
shang [55]	55.214.	53.55.	24.31.
		214.55. (< MC shǎng)	
qu [31]	31.214.	31.55.	31.31. (24.31.)

Table 2

[1] The phonetic description of tonal values follows Chao (1930).

Sandhi between two syllables of the modern s*hang*-category yields two different outputs: [53.55] and [214.55]. In the following, I will label these two distinct categories S_a (= [53.55]) and S_b (=[214.55]). The reason for this distinction can be found in Middle Chinese: S_a primarily goes back to the MC *ping*-category (voiced and resonant initials), while S_b comes from the MC s*hang*-category (except from the voiced initials). By means of the MC tonal categories, however, it is not possible to predict a certain output for the Boshan tone sandhi since a part of the former S_b category has merged with the S_a category. This goes so far that there are cases where a syllable-morpheme can be assigned to both the S_a and the S_b category, depending on the context. This may be exemplified by taking a look at the Boshan representation of the character *lian* 臉 {face}, whose tonal category goes back to MC s*hang*-tone. In Boshan, however, we find the word in two different sandhi forms: in the word *lian-pen* 臉盆{wash bowl}it has [214], while in *xi-lian-shui* 洗臉水 {face-washing water} it has [53] (cf. Qián 1993: 127)[2]. Thus, the MC tonal categories do not help to predict a certain output for the Boshan tone sandhi since one can never be quite sure whether the special distinction is still preserved in the given context.

When taking a look at the sandhi outputs for tri-tonal strings, the situation gets even more complicated. If we only take the three citation tones as a basis and examine the different combinations, there are 27 possibilities for individual outputs[3]. Although there are many cases where different outputs yield the same result, there are still a lot of combinations that look strange, since the sandhi rules for the disyllabic words either do not apply fully or seem to be applied from different directions. The traces of the MC s*hang*-category can be found in almost all of the cases where one would expect them, yielding a double output for a single input (i.e. where two or more modern *shang*-tones appear next to each other), but there are many cases where a MC *shang*-tone has the output of the S_a category. The relationships of input and output are listed in Table 3[4].

[2] Another example is 小 *xiao* {small} (cf. examples No. 11b and 17c in Table 5 below).

[3] At this point of the investigation I ignore the two underlying categories S_a and S_b on purpose. Since MC does not help to assign a certain word or morpheme to one of the categories without doubt, it seems more appropriate to draw possible conclusions as a second step of the investigation.

[4] P, S and Q are the abbreviations for the citation tones. The columns which are labelled with an arrow show the two different directions in which the rules can be expected to apply, I and II mark the different steps of application. There are three sandhi rules which apply to disyllabic inputs: PP (= sandhi of *píng* and *píng* citation tone), $SS_{a/b}$ (= sandhi of *shăng* and *shăng* citation tone, $_a$ or a $_b$ give the two different outputs, i.e. SS_a = [53], SS_b = [214]), QT (= sandhi of *qù* and any other tone). If the expected rule is not applied, I put it in brackets. 0 stands for the case when the citation tone remains the same according to the rules listed in Table 2. I have added some outputs which are not included in the presentation of the Boshan tone system in Qián (1993), but are listed in the lexical part of the work. I have marked these cases with an asterisk in the output. The TS column (Temporal Sequence, cf. Chen 2000: 110f) shows whether the output can be arrived at only by direction-sensitive application of the rules (→ resp. ←), or whether the output will be the same in either direction. Cases where none of the rules yields an expected output are marked with a question mark.

No.	Input	Output	→		←		TS
			I	II	II	I	
1	PPP	a 55.55.214.	**PP**	**PP**	(0)	PP	→
		b 214.55.214.*	(PP)	PP	**0**	**PP**	←
2	SPP	55.55.214.	**0**	**PP**	(SS)	PP	→
3	QPP	31.55.214.	**0**	**PP**	**0**	**PP**	↔
4	PPS	a 55.214.55.	**PP**	**0**	**PP**	**0**	↔
		b 21.22.55.	(PP)	(0)	(PP)	(0)	?
5	SPS	a 55.214.55.	**0**	**0**	**0**	**0**	↔
		b 21.22.55.	(0)	(0)	(0)	(0)	?
6	QPS	31.214.55.	**0**	**0**	**0**	**0**	↔
7	PPQ	a 55.24.31.	**PP**	**QT**	(0)	QT	→
		b 214.55.31.	(PP)	(QT)	0	(QT)	?
		c 214.24.31.*	(PP)	QT	**0**	**QT**	←
8	SPQ	55.24.31.	**0**	**QT**	**0**	**QT**	↔
9	QPQ	31.24.31.	**0**	**QT**	**0**	**QT**	↔
10	PSP	214.55.214.	**0**	**0**	**0**	**0**	↔
11	SSP	a 55.55.214.	($SS_{a/b}$)	0	($SS_{a/b}$)	0	?
		b 214.55.214.	**SS_b**	**0**	**SS_b**	**0**	↔
12	QSP	31.24.214.	0	(0)	0	(0)	?
13	PSS	a 214.53.55.	**0**	**SS_a**	**0**	**SS_a**	↔
		b 21.22.55.	(0)	($SS_{a/b}$)	(0)	($SS_{a/b}$)	?
14	SSS	a 55.53.55.	($SS_{a/b}$)	SS_a	**0**	**SS_a**	←
		b 55.214.55.	($SS_{a/b}$)	SS_b	**0**	**SS_b**	←
		c 214.53.55.	**SS_b**	**SS_a**	(0)	SS_a	→
		d 21.22.55.	($SS_{a/b}$)	($SS_{a/b}$)	(0)	($SS_{a/b}$)	?
15	QSS	a 31.53.55.	**0**	**SS_a**	**0**	**SS_a**	↔
		b 31.214.55.	**0**	**SS_b**	**0**	**SS_b**	↔
16	PSQ	214.55.31.	0	(QT)	0	(QT)	?
17	SSQ	a 55.24.31.	(SS)	QT	**0**	**QT**	←
		b 214.55.31.	SS_b	(QT)	0	(QT)	?
		c 53.24.31.*	**SS_a**	**QT**	(0)	QT	→
		d 53.55.31.*	SSa	(QT)	(0)	(QT)	?
18	QSQ	31.24.31.	**0**	**QT**	**0**	**QT**	↔
19	PQP	24.31.214.	**QT**	**0**	**QT**	**0**	↔
20	SQP	24.31.214.	**QT**	**0**	**QT**	**0**	↔
21	QQP	31.31.214.	(QT)	0	(QT)	0	?
22	PQS	24.31.55.	**QT**	**0**	**QT**	**0**	↔
23	SQS	24.31.55.	**0**	**0**	**0**	**0**	↔
24	QQS	31.31.55.	(QT)	0	(QT)	0	?
25	PQQ	24.24.31.	**QT**	**QT**	(0)	QT	→
26	SQQ	a 24.24.31.	**QT**	**QT**	(0)	QT	→
		b 24.55.31.*	QT	(QT)	(0)	QT	?
27	QQQ	a 31.31.31.	(QT)	(QT)	(0)	QT	?
		b 31.24.31.	(QT)	QT	**0**	**QT**	←

Table 3

Of the 42 outputs that are listed in Table 3, 16 are insensitive to direction, 7 can be explained by application of the rules from left to right, 6 by application from right to left, and 14 by

neither of them. Thus, although many of the individual outputs correspond to expected rules, there are quite a few cases which cannot be easily explained. Firstly, there is a considerable amount of two or more outputs which seem to result from the application of the rules on the same input in different directions (Nos. 1, 7, 14 and 17). In these cases, one would expect one of the outputs to be chosen, but this seems not to be the case for the Boshan dialect. Secondly, the number of outputs which cannot be explained by any of the given rules is significantly high (cf. the Nos. marked with a question mark).

In the following I shall try to present some of these problems in detail. I do not claim to solve the whole puzzle of Boshan tone sandhi and many questions will have to remain open. Frankly spoken, there will be even more questions than answers, but I think that these questions are important for the solution of the Boshan problem in the future.

3. The Double Outputs of the *ping*-Category: Morphosyntactic Constraints?

As mentioned above, there are four different inputs which yield outputs that suggest that the sandhi rules have been applied from different directions for the same form. In Table 4 I have listed two of these inputs, which all concern the Boshan *ping*-category; the exceptions (the ones with the question mark) have been excluded from these considerations.

No.	Input		Output	TS	Examples (Qián 1993)	
1	PPP	a	55.55.214.	→	收音机 shou-yin-ji (28)	雞冠花 jī-guān-huā (122)
		b	214.55.214.*	←	拖拉机 tuo-la-ji (119)	北博山 běi-bó-shān (115)
7	PPQ	a	55.24.31.	→	穿衣鏡 chuan-yi-jing (28)	工商業 gong-shang-ye (28)
		c	214.24.31.*	←	香椿樹 xiang-chun-shu (121) [5]	煎雞蛋 jian-ji-dan (144)

Table 4

How can these facts be accounted for? Since the solutions given in Chen (2000) and Lin (2004) both require that one input yields only one output, they do not seem to hold for the additional examples listed in Table 4. But how can these phenomena be explained then? Chen (2000) and Lin (2004) both exclude morphosyntactic constraints from their solutions. Chen gives the example 鬼吹燈 *gui-chui-deng* {dirty tricks}, which '[…] *displays a right-branching structure, but its output* [55b.55.214] […] *is derivable only by applying the relevant rules in a left-to-right sweep*' (Chen 2000: 168). This seems likewise to hold for the new distinctions, 拖拉机 *tuo-la-ji* {tractor} (Qian 1993: 119) and 收音机 *shou-yin-ji* {radio} (ibid. 28): both suggest a morphosyntactic structure (xx)x.

[5] This case is quoted in two different versions in Qian (1993): [214.24.31] (p. 121) and [214.55.31] (p. 28).

However, 拖拉机 *tuo-la-ji* is the only examples for this structure which I could find in the source. The other forms show the morphosyntactic structure x(xx). Furthermore, it is far from obvious that the example must have the input PPP. 拉 *la* (MC *lop*)[6] {to pull}belongs to the MC *ru*-category. Because of its resonant initial we would expect to find the word with the meaning {pull} in the *qu*-category of the Boshan dialect (cf. Table 1), where we indeed can meet it (cf. Qian 1993: 162). The meaning of 拉 *la* in the *ping*-tone is restricted to 拉胡琴 *la hu-qin* {play the violin}(ibid. 161), therefore we wouldn't expect to find it in a loan for the English word "*tractor*", which can be literally translated as "*drag-pull-machine*". The output, however, remains strange since the form does not correspond to our expectation (which would be the output No. 19 in Table 3).

The assumption that sandhi can be blocked because of morphosyntactic constraints might likewise hold for the output 7c: 煎雞蛋 *jian-ji-dan*{fried egg} and 香椿樹 *xiang-chun-shu* {Toona Sinensis} both can be described as x(xx). I have to admit, however, that the case of 香椿樹 *xiang-chun-shu* is somewhat problematic. One has to assume that 香 *xiang* {odorous} is interpreted as an adjective. Furthermore, there are two different outputs for the form: the one given in Table 4 and the output [214.55.31] (=7b, cf. Qian 1993: 28), which I excluded from the table since it doesn't seem to correspond to one of the expected rules. Thus, whether the postulation of morphosyntactic constraints can lead to a satisfying solution for the double outputs in the *ping*-category cannot sufficiently be verified here. This is mostly due to the scarcity of the data. Further research is required.

4. The *shang*-Tone Problem: How Can We Recognize S_a and S_b?

Not only remain the double outputs of the *ping*-category a puzzling issue, the revisited data for the various tri-tonal strings which contain at least two adjacent *shang*-tones seems strange as well. The greatest problem is to decide whether a member of the shang-category belongs to one of the underlying categories S_a or S_b. Table 5 lists the relevant sets:

[6] The values for Middle Chinese (MC) follow Baxter (1992), they are listed in Baxter (2000), an unpublished resource, which is accessible from the internet (cf. the references).

No.	Input		Output	TS	Examples (Qián 1993)	
11	SSP	a	55.55.214.	?	河涯邊 he-ya-bian (113)	洋油燈 yang-you-deng (127)
		b	214.55.214.	↔	美人蕉 mei-ren-jiao (124)	小拇指 xiao-mu-zhi (136)
13	PSS	a	214.53.55.	↔	單眼皮 dan-yan-pi (135)	東陳瞳 dong-chen-tong (115)
		b	21.22.55.	?	招口舌 zhao-kou-she (114)	天老爺 tian-lao-ye (147)
14	SSS	a	55.53.55.	←	洗臉水 xi-lian-shui (127)	鼻梁骨 bi-liang-gu (135)
		b	55.214.55.	←	洗澡盆 xi-zao-pen (127)	長果仁 chang-guo-ren (122)
		c	214.53.55.	→	草鞋底 cao-xie-di (124)	普及本 pu-ji-ben (28)
		d	21.22.55.	?	土門頭 tu-men-tou (115)	討迷財 tao-cai-mi (125)
15	QSS	a	31.53.55.	↔	飼養員 si-yang-yuan(130)	炕頭王 kang-tou-wang (131)
		b	31.214.55.	↔	日本人 ri-ben-ren (130)	大掃除 da-sao-chu (28)
17	SSQ	a	55.24.31.	←	城隍廟 cheng-huang-miao (28)	圓白菜 yuan-bai-cai (121)
		b	214.55.31.	?	早晨飯 zao-chen-fan (142)	土霉素 tu-mei-su (28)
		c	53.24.31.*	→	爐神廟 lu-shen-miao (115)	小伙計 xiao-huo-ji (156)
		d	53.55.31.*	?	十拉個 shi-la-ge (185)	n.a.

Table 5

Up to this point we have not made a distinction between S_a and S_b. This was due to the fact that we can only rely on dialect data in order to distinguish the two categories (cf. §2). While this is easy for bi-tonal strings, where in a sequence of two *shang*-tones the former always surfaces as either [53] (=S_a) or [214] (=S_b), it becomes somewhat problematic for tri-tonal strings, where the former of two adjacent *shang*-tones can also surface as [55], [21] or [22] (cf. Nos. 11a, 13b and 14c). How can we decide which of the two categories the respective inputs belong to? A first step to a possible solution of this problem is proposed in Table 6: Under the assumption that S_a and S_b only surface as [53] resp. [214] before another *shang*-tone, the expected outputs are compared with the attested ones, matches are marked with bold letters.

No.	Input		Output expected		Output attested	
			→	←	attested =expected	attested ≠expected
11	a	S_aSP	53.55.214.			55.55.214.
	b	S_bSP	**214.55.214.**		**214.55.214.**	
13	a	PS_aS	**214.53.55.**		**214.53.55.**	21.22.55.
	b	PS_bS	214.214.55.	55.214.55.		
14	a	S_aS_aS	53.53.55.	**55.53.55.**	**55.53.55.**	21.22.55.
	b	S_aS_bS	53.214.55.	**55.214.55.**	**55.214.55.**	
	c	S_bS_aS	**214.53.55.**	**55.53.55.**	**214.53.55. /55.53.55.**	
	d	S_bS_bS	214.214.55.	**55.214.55.**	**55.214.55.**	
15	a	QS_aS	**31.53.55.**		**31.53.55.**	
	b	QS_bS	**31.214.55.**		**31.214.55.**	
17	a	S_aSQ	**53.24.31.**	**55.24.31.**	**55.24.31. /53.24.31.***	53.55.31.* 214.55.31.
	b	S_bSQ	214.24.31.	**55.24.31.**	**55.24.31.**	

Table 6

As the table shows, there are only six cases out of fourteen which the expected outputs do not match. Thus, in No. 11a, where there is only one expected output regardless of direction,

we can simply claim that the attested but not expected representation [55.55.214] comes from the input S_aSP. Why the sandhi rule SS_a is actually blocked has to be explained in a further step[7].

Likewise we can proceed with No. 13b. The output of PS_bS seems to yield [21.22.55]. This case is, however, more complicated than the former one, since we have two possible expected outputs, namely [214.214.55] and [55.214.55]. Here I prefer the former of the two, since it better conforms to the attested output[8].

No. 14 is more problematic than the previous cases. Firstly, the attested output [21.22.55] doesn't match with any of the expected ones. Secondly, both of the two expected outputs of No. 14c match with an attested output. Since the latter of them ([55.53.55] already occurs in No. 14a, preference should be given to the former one, i.e. [214.53.55]. Note that this suggests a rule application from left to right. If we accept this direction to be general, we can claim that the same holds for No. 14d and take [214.214.55] as the expected output. In doing so, we can discard [55.214.55] (which already occurs in No. 14b) and claim that [214.214.55] matches with the attested but not expected output [21.22.55]. If we take the rule application from left to right as the predominant one, we have to claim for Nos. 14a and 14b that the sequences [53.53.55] and [53.214.55] yield the attested outputs in a further step.

This explanation apparently bears some attractiveness since all the inputs correspond to a single output and there is only one direction of rule application. However, the matter seems to be a bit more complicated. It has been assumed in §2 that, while a *shang*-tone which surfaces as [53] may either be traced back to a MC *ping*-tone or a *shang*-tone, a *shang*-tone which surfaces as [214] always corresponds to a MC *shang*-tone. This assumption finds support in most of the data, yet not in the attested output [21.22.55]. The MC tonal categories for 土門頭 *tu-men-tou* {place-name} (cf. Qian 1993: 115), for example, are SPP. We are on the horns of a dilemma now: Either the key assumption concerning the Boshan S_b category stated in §2 has to be rejected completely, or we have to accept that S_bS_aS likewise may yield the output [21.22.55]. I have to admit that, for the moment, there are no other explanations I can give for this puzzling issue[9].

[7] In Qian (1993: 81) I could find one form, which shows the expected output [53.55.214]: 俺老孌 *an-lao-mi* {aunt}. This form, however, seems to be isolated.

[8] Additionally it may be mentioned that the surface form [214] in fast speech often occurs as [21] (cf. Qian 1993: 25f).

[9] The data suggests that the sandhi which Qian (1993) describes as [22.21.55] only applies to *ping* and *shang* sequences with a *shang*-tone in the end of the string. Thus, the form might be a diachronic residue from times when the tones where similar (e.g. all characterised by the feature "low"). But this would suppose *ping* category of MC was uniform once, which may generally be doubted (cf. Branner 2003, Mei 1970).

While No. 15 is completely unproblematic since the two expected outputs completely correspond to the attested ones, No. 17 again raises questions which cannot be fully explained. If we give priority to the left-to-right direction of rule application, we can take the expected output [53.24.31] as the original one, but we have to assume that there is an ongoing shift from [53.24.31] to [55.24.31]. This would allow us to discard [55.24.31] as the expected output for No. 17b and replace it by the attested but not expected output [214.55.31]. Since there is only one example for the attested output [53.55.31] we may fully ignore it. However, the question why the attested sandhi forms do not correspond to the expectations remains unsolved.

Table 7 summarizes the correspondences between expected and attested outputs which have been assumed in this paragraph. The unsatisfying cases are marked with bold letters.

No.	Input		Output expected	Intermediary steps	Output attested
			→		
11	a	S_aSP	53.55.214.	53.>55.	55.55.214.
	b	S_bSP	214.55.214.	no	214.55.214.
13	a	PS_aS	214.53.55.	no	214.53.55.
	b	PS_bS	214.214.55.	214.214.>21.22.	21.22.55.
14	a	S_aS_aS	53.53.55.	53.>55.	55.53.55.
	b	S_aS_bS	53.214.55.	53.>55.	55.214.55.
	c	S_bS_aS	214.53.55.	no	214.53.55.
	d	S_bS_bS	**214.214.55.**	**?**	**21.22.55.**
15	a	QS_aS	31.53.55.	no	31.53.55.
	b	QS_bS	31.214.55.	no	31.214.55.
17	a	S_aSQ	**53.24.31.**	**(53.>55.)**	**53.24.31.* or 55.24.31.**
	b	S_bSQ	**214.24.31.**	**block of 55.> 24.**	**214.55.31.**

Table 7

5. Concluding Remarks

In this short overview I intended to show that the Boshan tone sandhi phenomena are far more puzzling than has been assumed before. Although the revisited data seems to reject the solutions presented in Chen (2000) and Lin (2004), the answers I tried to give remain provisional and likewise cannot account for all the facts. The main obstacle is the scarcity of the data. For most of the new forms I couldn't find more than four to five examples, but this can likewise be said about the forms which are included in Qian's description of the Boshan tone sandhi phenomena and which both Chen's and Lin's analyses rely on.

Another problem is the status of the S_a-S_b-distinction. Since there are forms which can surface as both [53] and [214] (cf. §2), Middle Chinese is not a good advisor for the actual

distinction in the Boshan dialect. The data suggests that we are dealing with an ongoing merger, but further research is required to reveal its direction and degree. It might likewise be possible that some words show archaic sandhi forms which are gradually replaced by new ones.

Whether my suggestion that morphosyntactic constraints should not be excluded as a possibility for certain sandhi outputs can be maintained or even be substantiated by more facts remains for future research to decide. The same can be said about the directionality of rule application, which I assume to be predominantly from left to right.

A further interesting question which has not been raised here and can only be sketched in brief is the interplay of tone sandhi and other grammatical structures in the Boshan dialect. During my examination of Qian's material I stumbled over some interesting cases where sandhi seems to be blocked under the influence of information structure. Cf. the examples (2) and (3):

(2) 我拿動了，他拿不動。*wo na-dong le, ta na-bu-dong*. {I can carry [it], he cannot}(Qian 1993: 78).

(3) 我干活，吃飯都使左手，光寫字使右手。 wo gan-huo, chi-fan dou shi zuo-shou, guang xie-zi shi you-shou. {I work and eat with my right hand, with my left hand I only write}(ibid. 82).

In (2), the personal pronoun 我 *wo* {I}surfaces as [53], which is due to the sandhi connection with the following verb 拿 *na* [55]{carry}, which belongs to the *shang*-category. In (3), however, 我 *wo* has [55] inspite of the following *qu*-tone (干 gan [31]{to work}).

Thus, the tone sandhi phenomena of the Boshan dialect remain a puzzling issue and further research is required to solve the problems in full.

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