The Prosody-tone Connection in Taiwanese Speech, Verse and Idioms: A Corpus Analysis

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1. Introduction

This paper addresses the prosody-tone connection in three linguistic forms of Taiwanese, colloquial speech, literary verse, and idioms. In this research, I established three corpora of Taiwanese, including one corpus of colloquial speech, one of literary verse, and the other of idioms. The corpus study indicates that different linguistic styles substantially affect application of phonological processes. Three observations are in order. First, in colloquial speech, tone sandhi (B→S/___B) is bounded by the phonological phrase, the boundary of which is marked at the right edge of a syntactic XP (Selkirk 1986; Hsiao 1991; Chen 1987, 2000). Second, in literary verse, tone sandhi is confined within the domain of foot. Finally, a more complicated phenomenon is found in idioms, where a third type of reading arises when tone sandhi is blocked by both the phonological phrase and the foot.

2. Tonal Basics and Corpora

There are seven base tones in Taiwanese, and all the seven tones undergo tone sandhi, as given in (1).

(1) Tone Inventory

Base Tones (B)	H	M	L	HM	LM	H̲	M̲
Sandhi Tones (S)	M	L	HM	H	L	M̲	H̲

This research is not concerned with the tone quality of each sandhi tone, but instead it addresses the question as to whether a tone changes in a certain position. Therefore, in the following discussions, I will present the tones with two notations, B stands for a base tone, and S for a sandhi tone.

In this research, I build three corpora of Taiwanese, with the help of two native speakers, male, aged 70 and 73 respectively. Both received college education and are capable of reading Taiwanese verse. The speakers are asked to read speech sentences, verse lines and idioms. The speech corpus contains 624 line tokens, the verse corpus contains 611 line tokens, and the idiom corpus contains 445 line tokens.

3. Prosody and Tone in Colloquial Speech

The paradigm in (2) summarizes a partial hierarchy posited by the Standard Prosodic Theory (Nespor and Vogel 1986, Hayes 1989, Hsiao 1991, among others).

(2) Prosodic Hierarchy
- ι Intonational Phrase
- ϕ Phonological Phrase (P-phrase)
- ω Phonological Word

An inotonational phrase consists of one or more phonological phrases, and a phonological

phrase consists of one or more phonological words. The Strict Layer Hypothesis in (3) is a constraint for the prosodic hierarchy.

(3) Strict Layer Hypothesis (Hsiao 1995: 7)
There is a hierarchy of prosodic constituent types such that, in a prosodic tree, any constituent at a given level of the hierarchy consists exclusively of constituents at the next lower level of the hierarchy.

Specifically, the statement in (3) includes three constraints. First, constituents on the prosodic hierarchy are not allowed to recur. Second, constituents at any level cannot be skipped. Finally, the hierarchical relation between constituents at any two levels cannot be reversed.

Selkirk (1986) posits four end-based parameters to construct a phonological phrase, as in (4). Namely, a phonological phrase boundary is marked at the right or left edge of an XP or a word.

(4) Phonological Phrasing (Selkirk 1986: 389)
ϕ = XP], [XP, word], [word

Chen (1987) posits a cross-categorical generalization that the tone group in Xiamen, a Southern dialect, is marked at the right edge of a non-adjunct XP, but not of an adjunct XP. Hsiao (1991, 1995), as in (5) and (6), observed that a phonological phrase boundary in Taiwanese is marked at the right edge of a non-adjunct and non-clitic XP.

(5) Phonological Phrasing (Hsiao 1991: 147)
ϕ = {Right, XP^{-a}} where –a = non-adjunct

(6) Phonological Phrasing (Hsiao 1995: 67)
ϕ = {Right, $XP^{-a\wedge-c}$} where –a = non-adjunct; –c = non-clitic,

The 624 line tokens in the speech corpus include 6485 toned syllable tokens in total. The tone occurrences in the data are coded in different structures, as in (7). (7a) indicates a non-adjunct/non-clitic XP-final position. (7b) indicates an adjunct XP-final position. (7c) indicates a clitic XP-final position. (7d) indicates a phonological phrase-final position, and (7e) indicates a non-final position.

(7) Structural coding:
a. $]XP^{-a\wedge-c}$: Non-adjunct/ Non-clitic XP-final position.
b. $]XP^{+a}$: Adjunct XP-final position.
c. $]XP^{+c}$: Citic XP-final position.
d. $)_{\phi}$: phonological phrase final position.
e. Y: Non-phonological phrase-final position.

Examples are given in (8) and (9). The NPs and VPs in (8) are non-adjunct and non-clitic XPs. The phonological phrases are marked at the right edges of the NPs and/or VPs, etc. As a result, the sentence in (8) is parsed into three phonological phrases, in each of which the final tone retains its base form, while the rest of the tones are changed to their sandhi forms. (B: base tone; S: sandhi tone)

(8) $]XP^{-a\wedge-c}$

[*Thao-ke*]^{NP} [*ai-khuã* [[*yin kiã*]^{NP} [*ian* [*pote-hi*]^{NP}] ^{VP}]^{S}]^{VP}

Boss love-watch his son perform puppet-show

( )$_{\phi1}$ ( )$_{\phi2}$ ( )$_{\phi3}$

S B S S S B S S S B

'The boss loves to watch his son perform puppet shows.'

In (9a), the QP is an adjunct modifying the noun head *te* so that no phonological phrase is marked at the right edge of the QP. As a result, the entire NP forms a single phonological phrase, where only the final syllable, *te*, preserves its base tone. In (9b), the pronoun is a clitic so that no phonological phrase is marked at the right edge of the pronoun. As a result, the entire VP forms a single phonological phrase, where only the final syllable, *ts^{h}e*, preserves its base tone.

(9) a. $]XP^{+a}$

[[*Tsit pue*]^{QP} *te*]^{NP}

One cup tea

( )$_{\phi}$

S S B

'A cup of tea'

b. $]XP^{+c}$

[*Ho* [*gua*]^{NP} [*tshe*]^{NP}]^{VP}

Give me book

( )$_{\phi}$

S S B

'Give me the book'

The tables in (10) and (11) show how the tone occurrences in the phonological phrases are counted.

(10) Tone occurrences at)$_{\phi}$

	B	S	Total
)$_{\phi}$	823	43	866
Percentage	95.03%	4.97%	100%

(11) Tone occurrences at Y

	B	S	Total
Y	621	4998	5619
Percentage	11.05%	88.95%	100%

The speech corpus reveals a pattern. Tone sandhi of the colloquial speech is basically conditioned by the phonological phrase, where the rightmost syllable retains its base tone, found in 95.03% of the data, as in (10), while all the preceding syllables surface with their sandhi tones, found in 88.95% of the data, as in (11).

However, a question arises from the alternative readings in (12); in particular, (12b) cannot be predicted through phonological phrasing. The answer can be searched from the literary verse corpus.

(12) Alternative readings

[*Ying-hiong*]^{NP} [*lan kui* [*bi-zin kuan*]^{NP}]^{VP}

Hero hardly pass beauty barrier

a. (S B) (S S S S B)

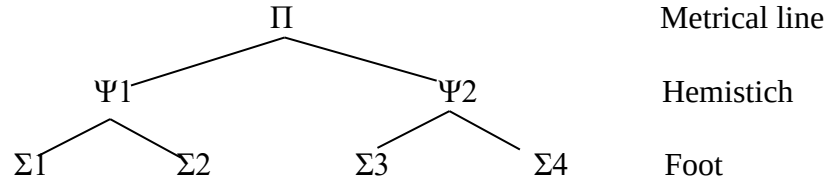
b. (S B) (S B) (S S B)

'A hero can hardly resist a beauty.'

4. Prosody and Tone in Literary Verse

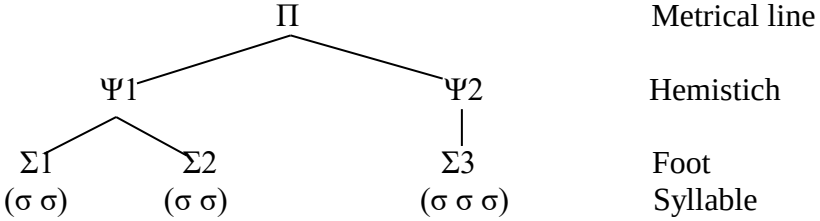
The literary verse corpus contains 611 line tokens, and there are 6,495 toned syllable tokens in total. The "regulated verse" in Chinese, known as *lu-shi,* calls for a predetermined number of lines in a poem, and a fixed number of syllables in each line, usually either five or seven, throughout the poem. A Metrical Hierarchy (Chen 1979, Yip 1980, Hsiao 2007), distinct from the Prosodic Hierarchy, has been proposed as in (13). A metrical line of the regulated verse is parsed into two hemistichs. The first hemistich is divided to two binary branching feet, while the second is comprised of a nonbranching foot and a binary branching foot, showing a left- or right-branching structure.

(13) Metrical Hierarchical Template (Hsiao 2007: 8)



Hsiao (1995) observes that Σ3 and Σ4 do not together form a tone sandhi domain in Taiwanese verse, but they tend to merge into a single domain. Therefore, a more plausible hierarchy is the one developed as in (14).

(14) Σ3 + Σ4 → Trisyllabic Σ (Hsiao 1995: 130)



The tone occurrences in the data are coded as in (15). (15a) indicates a foot-final position, while (15b) indicates a non-final position.

(15) Structural coding:
a.)$_{\Sigma}$: Foot final position.
b. Z: Non-foot final position.

Hsiao (1995) also observes that the metrical template in (14) may be fully or partially triggered in some folk ballads and adages (of this dialect) which preserve the metrical patterns of regulated verse. For example, the heptasyllabic verse in (16) triggers the entire template of (14).

(16) Heptasyllabic verse

Hue-siu	*kho-lian*	*ko-bu*	*te,*	*Tsin-tiong*	*tsu ko*	*te-ong*	*tsiu*
recollect	miserable	song-dance	land	Tsin-tiong	since ancient	emperor	state
( )$_{\Sigma1}$	( )$_{\Sigma2}$	( )$_{\Sigma3}$		( )$_{\Sigma1}$	( )$_{\Sigma2}$	( )$_{\Sigma3}$	
S B	S B	S S B		S B	S B	S S B	

'Looking back the miserable land of song and dance; Tsing-Tiong has been the emperor's state since ancient time.'

(17) Pentasyllabic verse: Σ1 is absent

kin sui ti hi sieng, kin san siek niau im
near water know fish habit near mount know bird song
( )$_{Σ2}$ ( )$_{Σ3}$ ( )$_{Σ2}$ ( )$_{Σ3}$
S B S S B S B S S B
'Being near the rivers will know the habits and characteristics of fish; being near the mountains will know the melody of birds

In (17), the first foot is absent in the pentasyllabic verse, and in (18), the first hemistich, including the first two feet, is absent is the trisyllabic verse.

(18) Trisyllabic verse: Ψ1 (Σ1 + Σ2) is absent

'Stand farther, and see more clearly.'
Khia tiek uan, bong tiek tshing
stand as far see as clear
( )$_{Σ3}$ ( )$_{Σ3}$
S S B S S B

In (19), the second hemistich, or the third foot is absent is the tetrayllabic verse.

(19) Tetrasyllabic verse: Ψ2 (Σ3) is absent

Tshieng sui kian te, bieng kieng tsiao sim
clean water see bottom clear mirror reflect heart
( )$_{Σ1}$ ( )$_{Σ2}$ ( )$_{Σ1}$ ( )$_{Σ2}$
S B S B S B S B
'See the bottom through clean water; reflect the heart by the mirror.'

The tables in (20) and (21) show how the tone occurrences in the feet are counted.

(20) Tone occurrences at)$_{Σ}$

	B	S	Total
)Σ	1558	31	1589
Percentage	98.05%	1.95%	100%

(21) Tone occurrences at Z

	B	S	Total
Z	106	4800	4906
Percentage	2.16%	97.84%	100%

One pattern is observed from the literary verse corpus. Tone sandhi of the literary verse is conditioned by the foot, where the foot-final syllable retains its base tone, found in 98.05% of the data., while all the non-final syllables surface with their sandhi tones, found in 97.84% of the data. At this point, it becomes clear that the alternative readings in (22) are derived from phonological phrasing and foot template respectively.

(22) Alternative readings

[*Ying-hiong*]^{NP} [*lan kui* [*bi-zin kuan*]^{NP}]^{VP}
hero hardly pass beauty barrier
a. (S B)$_{ϕ1}$ (S S S S B)$_{ϕ2}$
b. (S B)$_{Σ1}$ (S B)$_{Σ2}$ (S S B)$_{Σ3}$
"A hero can hardly resist a beauty."

5. Prosody and Tone in Idioms

Some Taiwanese idioms can be rendered with colloquial pronunciation only, while others must be rendered with literary pronunciation. Due to the fact that the colloquial idioms are conditioned by phonological phrasing like colloquial speech, this section will simply focus on the literary idioms, which show interesting interaction of phonological phrasing and footing. The literary idiom corpus contains 445 line tokens, and there are 2,833 toned syllable tokens in total. The tone occurrences in the data are coded as in (23). (23a) indicates a phonological phrase-final and foot final position. (23b) indicates phonological phrase-final but not foot final position. (23c) indicates a foot-final but not phonological-phrase final position. (23d) indicates a non-final position.

(23) Structural coding:

a. $)_{\phi}\ )_{\Sigma}$: phonological phrase final and foot final position.
b. $)_{\phi}$: phonological phrase final but not foot final position.
c. $)_{\Sigma}$: Foot-final but not phonological phrase final position.
d YZ: Non-final position.

What is interesting here is that the boundaries of both the phonological phrase and the foot will block tone sandhi. For example, in (24), the right edge of ϕ2 and the right edge of Σ2 create two pairs of monosyllabic domains, *ru* and *tiao*, and *kak* and *hai*. All the monosyllables retain their base tones.

(24) Heptasyllabic literary idiom

Siong-hun put ru tiao iu-sin, siong-si si kak hai hui tshim
joint-hate not as tide credible lovesick start know sea not deep
( )$_{\phi1}$ ( )$_{\phi2}$ ( )$_{\phi3}$ ( )$_{\phi1}$ ( )$_{\phi2}$ ( )$_{\phi3}$
( )$_{\Sigma1}$ ( )$_{\Sigma2}$ ( )$_{\Sigma3}$ ( )$_{\Sigma1}$( )$_{\Sigma2}$ ( )$_{\Sigma3}$
S B S B B S B S B S B B S B

'Hating each other not being credible as the tide is; being lovesick, then realizing that the sea is not deep

In (25), the right edge of ϕ1 and the right edge of Σ1 also create two pairs of monosyllabic domains, *hok* and *ru,* and *siu* and *bi*. All the monosyllables retain their base tones as well.

(25) Tetrasyllabic literary idiom

Hok ru tong hai, siu bi lam san
Fortune as Eastern Ocean lifespan as Southern Mountain
( )$_{\phi1}$ (b)$_{\phi2}$ ( )$_{\phi1}$ ( )$_{\phi2}$
( )$_{\Sigma1}$ ( )$_{\Sigma2}$ ( )$_{\Sigma1}$ ( )$_{\Sigma2}$
B B S B B B S B

'(May your) good fortune be as great as the Eastern Ocean, (and your) lifespan be as timeless as the Southern Mountain.'

The tables in (26-29) show how the tone occurrences in the foot-phonological phrase interaction are counted.

(26) Tone occurrences at $)_{\phi}$ $)_{\Sigma}$

	B	S	Total
$)_{\phi}$ $)_{\Sigma}$	760	4	764
Percentage	99.48%	0.52%	100%

(27) Tone occurrences at $)_{\phi}$

	B	S	Total
$)_{\phi}$	297	123	420
Percentage	70.71%	29.29%	100%

(28) Tone occurrences at $)_{\Sigma}$

	B	S	Total
$)_{\Sigma}$	381	8	389
Percentage	97.94%	2.06%	100%

(29) Tone occurrences at YZ

	B	S	Total
YZ	45	1215	1260
Percentage	3.57%	96.43%	100%

Based on the literary idiom corpus, it becomes clear that tone sandhi of the literary idioms is conditioned not only by the foot but also by the phonological phrase, where in 70.71% of the data, the phonological phrase-final tone remains unchanged.

6. Conclusion

In brief, according to our corpus analysis, three patterns are in order. First, tone sandhi of the colloquial speech is conditioned by the phonological phrase, where the rightmost syllable retains its base tone, found in 95.03% of the data., while all the preceding syllables surface with their sandhi tones, found in 88.95% of the data. Second, tone sandhi of the literary verse Iis conditioned by the foot, where the foot-final syllable retains its base tone, found in 98.05% of the data., while all the non-final syllables surface with their sandhi tones, found in 97.84% of the data. Finally, tone sandhi of the literary idioms is conditioned not only by the foot but also by the phonological phrase, where in 70.71% of the data, the phonological phrase-final tone remains unchanged.

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