

The Conformity of Language and Melody in Mandarin Children's Song

Wang-Chen Ling

National Chengchi University, Taipei

100555501@nccu.edu.tw

This study establishes a corpus of 10 Mandarin children's songs and discusses how Mandarin tone and rhythm are reconciled with music melody. According to the corpus, Mandarin tone has a stronger influence on the melodies within the foot domain than within the intonational phrase domain. In particular, 100% of the tone sandhi form matches the music pitch within a foot. The conformity of language and melody also shows the alignment of prosodic domain and music beat. For instance, the leftmost syllable of an intonational phrase aligns with the strongest beat in a measure. Furthermore, the music rhythm of an unstressed syllable tends not to be longer than that of its adjacent syllables unless the unstressed syllable is at the end of an intonational phrase. To summarize, this paper shows the conformity of language and music in Mandarin Children's song and suggest that it is an appropriate learning material for learners of Mandarin.

Keywords: corpus, Mandarin children's song, tone, rhythm, prosodic phonology

1. Introduction

The correspondence between language and music is shown in different aspects in songs. The reconciliation of Mandarin tone and music melody has been discussed by several scholars. Wee (2004) examines ten Mandarin songs and discusses how listeners understand the meaning of lyrics. He indicates that the tones of prominent words in language are more likely to be preserved in music melody. Li (2002) conducts several perception experiments of Mandarin lyric recognition. She concludes that when *Ying Ping* (55)¹ and *Qu* (51) are the first syllables of di-syllabic strings, they match the music pitches which are higher. As for suggestion for composing music, Sun (1988) suggests that music pitch of two adjacent Mandarin syllables should follow the principle in (1), so that listeners can understand the meaning of lyrics. In (1), ">" stands for *higher than*. For example, the music pitch of *Ying Ping* (55) should be higher than that of *Qu* (51).

(1) **Music Pitch:** *Ying Ping* (55) > *Qu* (51) > *Yang Ping* (35) > *Shang* (214)

This study constructs a corpus and adopts Sun’s (1988) criteria of composing music to examine the tone-music pitch correspondence of Mandarin children’s song. This study finds that Mandarin tone corresponds to music pitch to different extents in different prosodic levels. The corpus also suggests that the surface form of language is well preserved in music pitch. The conformity of language and music not only shows in tone-pitch correspondence, but also in the alignment of language-music boundaries. The rest of the paper is organized as follows. § 2 introduces the corpus. § 3 analyzes the influence of language on music melody. § 4 concludes this paper.

2. Corpus of Mandarin children’s song

The corpus collects ten children’s song from the book, *Xiaohouzi*, ‘Little Monkey,’ written by Li (2007). There are totally 71 lines which are serial numbered as in (2). The abbreviation “LM” stands for *Little Monkey*. The first number “02,” represents the second song in the corpus. The following number “05,” stands for the fifth line of that song. Lines are indicated by breath groups which define the intonational phrases (IP)².

(2) Serial # LM-02-05

The correspondence between Mandarin tones and music pitch is shown in (3). Adjacent syllables which belong to different IPs are not regarded as a pair. In (3), there are three pairs of syllables in line LM-06-01. All of the syllable pairs match their corresponding music pitch.

(3) Correspondence between tone and music pitch within IPs

Serial #	# of pairs of syllables within IPs	# of pairs of syllables that match music pitch within IPs
LM-06-01	3	3

Similarly, this corpus also examines how many pairs of Mandarin tones are kept in music pitch within feet. As exemplified in (4), there are totally three pairs of syllables within feet and all of them match their corresponding music pitch.

(4) Correspondence between tone and music pitch within feet

Serial #	# of pairs of syllables within feet	# of pairs of syllables that match music pitch within feet
LM-05-03	3	3

Particularly, the correspondence of Mandarin neutral-toned syllables and music

pitch are examined in the corpus. The neutral-toned syllable and its neighboring syllable are regarded as a pair of syllables. As shown in (5), there are 2 pairs of syllables within IPs. Both pairs match their corresponding music pitch in line LM-10-06.

(5) Correspondence between neutral-toned syllables and music pitch within IPs

Serial #	# of pairs of neutral-toned syllables and their neighboring syllables within IPs	# of pairs of tones that match music pitch within IPs
LM-10-06	2	2

The relationship between a string of two low tones and their corresponding music pitch is incorporated in the corpus on the assumption that the surface form of language will have influence on the music pitch. (6) shows that the surface form of a pair of low tones preserve their pitch shape in music pitch contour.

(6) Correspondence between adjacent low tones and music pitch within IPs

Serial #	# of pairs of two adjacent low tones within IPs	# of pairs of two adjacent low tones that match music pitch within IPs
LM-07-08	2	2

In addition to the harmony between Mandarin tone and music pitch, the corpus examines the coherence of syllable length and note length. As shown in (7), the final syllable is the longest syllable within its IP.

(7) The longest syllables at IP final positions

Serial #	# of IPs	# of IP final syllables that are the longest syllables
LM-06-05	1	1

As indicated in (8), neutral-tone syllables, also known as unstressed syllables, tend not to be longer than their adjacent syllables. However, as shown in (9), when the unstressed syllables are at IP final positions, they tend to be longer.

(8) The length of unstressed syllables at non-IP-final positions

Serial #	# of pairs of unstressed syllables within IPs	# of unstressed syllable that is longer than adjacent syllables within IPs
LM-02-06	2	0

(9) The length of unstressed syllables at IP final positions

Serial #	# of pairs of unstressed syllables within IPs	# of IP final unstressed syllables that are longer than adjacent syllables
LM-05-01	1	1

The corpus also investigates the alignment between Mandarin lyrics and music melody. It is found that the leftmost syllable within an IP aligns with the left edge of the strongest beat in a measure.

(10) Alignment of IP initial syllables and the strongest beat in a measure

Serial #	# of IP	# of IP initial syllables that align with the strongest beats in a measure
LM-07-08	1	1

3. The analysis

The tones in language match music pitch to different extents in different prosodic levels. As shown in (11), 72% of pairs of tones match their corresponding pitch within an IP. In particular, 77% of pairs of tones conform to the music melody within a foot, which indicates that Mandarin tone has a stronger influence on music pitch within a foot.

(11) Correspondence between tone and music pitch within IPs and feet

	Total # of pairs of syllables within IPs	Total # of pairs of syllables within feet
	162	135
	Total # of pairs of syllables that match music pitch within IPs	Total # of pairs of syllables that match music pitch within feet
	117	104
Percentage	72%	77%

The above data is illustrated in (12). The music pitch of *pin* is higher than *guo*, which follows Sun’s (1988) criteria (see § 1 earlier) within an IP. However, when examined within the foot domain, *guo* and *li* belongs to different feet and they do not follow Sun’s (1988) criteria. Moreover, *li* and *you* do not form any syntactic structure but still form a foot whose tone shape matches music pitch. This supports the indirect reference hypothesis, which indicates the need for a distinct level between syntax and phonology, namely the prosodic level.

(12) ‘There is a big caterpillar in a big apple.’

	[[da pin-guo]Ft[li you]Ft[da mao-mao-chong]Ft]IP									
Gloss	big	apple	LOC	have	big	caterpillar				
Mandarin tone	51	35	21	35	21	51	35	55	35	(surface form)
Music pitch	5	5	4	3	1	5	5	6	5	(numbered music notation)

According to the corpus, the music pitch of a neutral-toned syllable tends to be lower than its adjacent syllables. As shown in (13), 80% of the neutral-toned syllables are set to lower music pitches than their adjacent syllables within IPs. In particular, 86% of the neutral-toned syllables correspond to lower music pitches than their neighboring syllables within feet. Again, this indicates that Mandarin tones are better preserved within the foot domain. The harmony between neutral-toned syllables and their corresponding music pitch within feet is exemplified in (14) below.

(13) Correspondence between neutral-toned syllables and music pitch in IPs and feet

	Total # of pairs of neutral-toned syllables and their neighboring syllables within IPs	Total # of pairs of neutral-toned syllables and their neighboring syllables within feet
	18	13
	Total # of pairs of syllables that match music pitch within IPs	Total # of pairs of syllables that match music pitch within feet
	14	11
Percentage	80%	86%

As shown in (14), the neutral-toned and unstressed *zi* is toneless underlyingly (Duanmu 2000: 242). Yip (2001) indicates that to minimize articulatory effort, phonologically toneless syllables surface with unmarked low tones in many languages. De Lacy (2002) also examines the interaction between tone and prosodic positions. He observes that non-head positions (i.e., unstressed syllable) prefer M tone over H tone as in (15), which implies non-head positions prefer L tone over M tone. Since the light

syllables are prosodic non-heads, they tend to surface as low register tones.

- (14) [qie you-zi]_{Ft}
 Gloss cut pomelo ‘Cut a pomelo.’
 Mandarin tone 55 **51 2** (surface form)
 Music pitch 5 **6 5** (numbered music notation)

(15) Tonal preference in the non-head position

*NONHD / H » *NONHD / M

Similar to neutral-toned syllables whose surface forms are kept in music pitch, the surface forms of two adjacent low tones also reflect on the music pitches. In a string of two low tones, the first *Shang* (214) changes to *Yang Ping* (35) because of OCP effect (Leben 1973, Goldsmith 1976). As shown in (16), 75% of the surface tones of two adjacent low tones are kept in their music pitch within IPs. Moreover, 90% of the surface tones of two adjacent low tones are preserved in the music pitch within feet. In other words, the surface form of a string of two low tones have stronger influence on music pitch within the foot domain. The data above is instantiated in (17).

(16) Correspondence between adjacent low tones and music pitch in IPs and feet

	Total # of pairs two adjacent low tones within IPs	Total # of pairs two adjacent low tones within feet
	12	10
	Total # of pairs of two adjacent low tones that match music pitch within IPs	Total # of pairs of two adjacent low tones that match music pitch within feet
	9	9
Percentage	75%	90%

As shown in (17), the underlying tone of *yao* is 214, which changes to 35 before another 214. *Yao* is then set to a rising pitch which has higher music pitch than *wo* within the foot domain.

(17) ‘It bites me.’



- [ta **yao wo**]_{Ft}
 Gloss 3SG bite 1SG
 Mandarin tone 55 **35 214** (surface form)
 Music pitch 3 **23 1** (numbered music notation)

The correspondence between Mandarin Chinese and Mandarin Children’s song is also shown in the duration of syllables and notes. As exemplified in (18), the IP final syllable, *qiao*, is the longest syllable in that IP.

(18) ‘When the bridge is broken, build another one.’

[duan le zai da yi zho **qiao**]_{IP}
 Gloss broken PRF again build one CLF bridge

Music beat 

(“” stands for an eighth note. “” stands for a quarter note.)

As indicated in (19), 89% of the IP final syllables are the longest syllables within their IPs. This conforms to Lindblom (1978). He indicates that *final lengthening* is a form of boundary marking, occurring in both speech and music. It is shown as the longer duration of a speech sound or a longer note in the final position of an intonational phrase.

(19) The longest syllable at IP final positions



Total # of IP final syllables	Total # of IP final syllables that are the longest syllables	Percentage
71	63	89%

In addition, the note-syllable duration correspondence shows in unstressed syllables and their corresponding notes. As shown in (20), *le* and *zi* are unstressed syllables. The IP medial *le* is shorter than its adjacent syllables while the IP final *zi* is not shorter than its adjacent syllable.

(20) ‘Cut a pomelo.’


[qie le you- zi]_{IP}
 Gloss cut PRF pomelo
 Mandarin syllable unstressed unstressed

Music beat 

(“” stands for a dotted eighth note. “” stands for a sixteenth note.)

As shown in (21), IP final *zi* is the longest syllable within its IP, which conforms to Lindblom’s (1978) *final lengthening*.

(21) ‘Hold a knife.’

	[na dao -zi]IP
Gloss	hold knife
Mandarin syllable	unstressed
Music beat	

The above phenomena are incorporated in the corpus. As indicated in (22), only 33% of the unstressed syllables are longer than their neighboring syllables, which shows that unstressed syllables tend to be shorter. On the other hand, all of the IP final unstressed syllables are longer than their adjacent syllables.

(22) The length of unstressed syllables

	Total # of pairs of unstressed syllables and adjacent syllables within IPs	# of unstressed syllable that is longer than adjacent syllables within IPs
	18	6
Percentage	100	33
	# of IP final unstressed syllables	# of IP final unstressed syllables that are longer than adjacent syllables.
	6	6
Percentage	100	100

The alignment between Mandarin lyrics and music melody is illustrated in (23). As shown in (23), the leftmost syllable of the IP is *ni*, which aligns with the left edge of the strongest beat of that measure.

(23) ‘You come to my house to eat an apple.’

	[ni lai wo jia chi ping-guo]IP
Gloss	2SG come 1SG home eat apple
Music beat	•

(“•” represents the strongest beat in a measure.)

As shown in (24), all of the leftmost syllables of IPs align with the left edge of the strongest beats of their measures.

(24) Alignment between IP initial syllables and strongest beats in measures

Total # of IP initial syllables	Total # of IP initial syllables that align with the strongest beats in measures	Percentage
71	71	100

4. Conclusion

This study shows the conformity between language and music melody in Mandarin children's song. The music pitch is largely influenced by Mandarin tone especially within the foot domain. The neutral tone and the *Shang* (214) tone sandhi show that the music pitch reconciles with the surface forms of Mandarin tone. The corpus also shows that all of IP initial syllables align with the strongest beat in that measure while IP final syllables tends to align with the longest syllable in that IP. As for syllable-note duration correspondence, unstressed syllables tend not to be longer than their adjacent syllables. However, if the unstressed syllables happen to be IP final syllables, they tend to be longer than their neighboring syllables. The conformity of language and music in Mandarin Children's song suggest that it can be used as a teaching material for both L1 and L2 learners of Mandarin Chinese.

Endnotes:

1. The four tone categories in Mandarin are Ying Ping (55), Yang Ping (35), Shang (214), and Qu (51). The parenthesized numbers are their numerical tone notations (Chao 1930).
2. The book *Xiaohouzi*, "Little Monkey" (Li 2007) is provided with a CD. In the CD, lyrics of songs are not only sung but also read so that we can define the breath groups.

References:

- Chao, Y. R. (1930) 'A System of Tone Letters', *Le Maître Phonétique* 45: 24-27.
- De Lacy, P. (2002) 'The Interaction of Tone and Stress in Optimality Theory', *Phonology* 19(1): 1-32.
- Duanmu, S. (2000) *The Phonology of Standard Chinese*. Oxford: Oxford University Press.
- Goldsmith, J. A. (1976) *Autosegmental Phonology*. Cambridge: MIT dissertation.
- Leben, W. R. (1973) *Suprasegmental Phonology*. Cambridge: MIT Dissertation
- Li, Z. R. (2007) *Xiaohouzi [Little Monkey]*. Taipei: Hsin-Yi
- Lindblom, B. (1978) 'Final Lengthening in Speech and Music', in E. Gårding, G. Bruce & R. Bannert, (eds) *Nordic Prosody: Papers from a symposium*. Lund: Lund University Linguistics Dept.
- Sun, C. Y. (1988) 'Xiqu Changqiang Han Yuyan De Guanxi' [The relationship between

the music for voices and language in Chinese opera], In Y.L Yang, and D.K. Li, et al. (eds) Yuyan Yu Yinyue [Language and Music]. Taipei: Danqing Book co., Ltd.

Wee, L. H. (2004) 'Unraveling the Relation Between Mandarin Tones and Musical Melody', Occasional Papers No. 152, Dept of Chinese Studies, National University of Singapore.

Yip, M. (2001) 'Tonal Features, Tonal Inventories and Phonetic Targets', UCL Working Papers in Linguistics 161-188.

Acknowledgements

I would like to thank Ministry of Science and Technology for offering travel grant (#MOST-106-2922-I-004-069).