

Taiwanese Southern Min Tone and Melody Interaction*

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Abstract

Music and singing are cultural universals. Languages, conversely, display different phonological traits, such as tonality in the Sinitic languages. In research of how lexical tone interacts with musical melody, previous studies (Chan 1987, Lau 2010, Schellenberg 2013, Zhang and Cross 2021) have provided some contradictory findings in the analysis in Cantonese, Mandarin, and Teochew. To date, no such study has analyzed published Taiwanese music, although Chen (2015) analyzed Taiwanese singing and perception. Through the comparison of musical pitch contours with relative tone differences of four original songs performed by three Taiwanese artists, the present project asserts that there is correlation between lexical tone and musical melody for Taiwanese songs. Furthermore, the results suggest that the portrayal of Taiwanese identity by the artist plays an important role in determining the importance of tone melody correspondence. As such, the study has important ramifications for future analysis of Taiwanese music.

Key words

Taiwanese Southern Min, Taiwanese tone, Tone melody correspondence, Taiwanese music

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1. Introduction

Music is a part of every culture currently known. Whether performed through an instrument or sung, music is attested everywhere, serving as a universal of human experience. However, languages around the world are not universally the same, utilizing different phonological cues to create a system of meaning. In such variation, how does a universal such as music manifest itself? Does music manifest itself with the same relationship to language regardless of in which language it is performed? Such a question has been asked many times over by researchers globally. Of particular interest to Chinese linguists is the element of lexical tone. In a language where tone information, the relative level and contour of the fundamental frequency, can determine the difference between words such as “mother” and “horse,” how can such a system interact with singing, an aesthetic process that manipulates the very same fundamental frequency?

The interaction between tonal information and musical melody has been a point of interest for many researchers in many fields (e.g., Chan 1987, Tsai et al. 2018, Lau 2010, amongst others). Schellenberg (2013:20) lists 21 languages that have all been the subject of tone and melody research. However, research into tone-melody interaction within the Sinitic language family has thus far been mainly limited to Cantonese and Mandarin, with most research on Cantonese. Apart from Cantonese and Mandarin, other variants of Chinese have received little attention. The present work expands this line of inquiry to examine Taiwanese, also known as Taiwanese Southern Min or Hokkien, a widely spoken language in Taiwan with distinct tonal system differences from both Cantonese and Mandarin.

A variety of factors complicate the situation—both linguistic and social. In a language such as Taiwanese, the realization of tone can differ depending on the phrasal place and function of the word. Furthermore, the very use of a language or phrase may carry sociopolitical intentions that may, or may not be, reflected within the music itself. To explore these questions, while addressing these myriad factors, the present study takes a two-fold approach of analyzing the quantitative correspondence rate between overall pitch contours in a phrase while also qualitatively looking at the meaning of the lyrics and the background of the speakers. In doing so, the discussion of tone melody correspondence develops looking at it as merely a trait of a language to a tool that is actively used by composers to portray their own thoughts.

2. Background

2.1 Previous studies on tone melody correspondence

There have been a few studies that have analyzed tone melody correspondence in Sinitic languages. Most of these articles have been primarily focused on Cantonese, such as Chan (1987), Lau (2010) and Schellenberg (2013). However, there have been a handful of studies that have analyzed other Chinese varieties, such as Mandarin and Teochew. Before moving to the analysis of the present corpus, it is beneficial to first review the previous literature on the topic.

Chan (1987) provides an early look into tone melody correspondence for Cantonese music. Chan analyzed six Cantonese songs published contemporaneously by looking at corresponding places in stanzas to determine if there was attention paid to tone while composing the music (Chan 1987:26). The result of her analysis showed a significant amount of tone-melody correspondence in Cantonese music—regardless of it was local or foreign (Chan 1987:32). Chan (1987:31) found that with her altered tone matching criteria, only 9.3 percent of her corpus displayed genuine tonal mismatches. Such was not the case for Mandarin, which as Chan notes, completely disregards lexical tone in adoption of foreign melodies such as the “Happy Birthday to You” song. Importantly, Chan also asserts that the endpoint of tone contours play an important role as the tonal

target, disregarding the overall direction of pitch change (1987:30). This finding would be later contested by Lau's (2010:11) finding that the onset also plays an important role in tone melody correspondence in her analysis of Cantonese music. Instead, Lau (2010:11) asserts that contour tones do not display any special status, and such a mismatch could perhaps be due to interaction with the environment.

Instead of analyzing previously published music, Schellenberg (2013) took a more experimental approach to the analysis of tone and melody interaction. In Schellenberg's analysis, Cantonese singers enhanced the tonal representation of the lyrics in the song by including strong rising contours for syllables with a rising tone (2013:139). The opposite was the case for the Mandarin singing analysis (2013:140). This was further underline by Schellenberg's (2013:140) finding that Mandarin speakers were not able to identify sung words out of context, while Cantonese speakers could despite some difficulties. Such a difference suggests that, while context play an important role in both languages, there is some encoding of tone in sung syllables in Cantonese. In explaining possible sociocultural reasons for this difference, Schellenberg (2013:76) asserts that the need to develop and promote a distinctly Hong Konger identity in face of the discussion of what constitutes a national language plays an important role. Such an idea is analogous to the situation found in Taiwan, to be discussed in the present article.

The analysis of non-Mandarin or Cantonese Chinese language varieties is quite limited. Chen (2015) repurposed Schellenberg's (2013) methodology to analyze Taiwanese and Taiwan Mandarin, with results that closely resembled Schellenberg's (Chen 2015:64). As such, Chen asserted that some degree of tonal information is carried in sung syllables in Taiwanese, allowing for perception in tasks that took lexical items out of context. While this provides useful data to assert that lexical tone plays an important role in Taiwanese music, this has not been verified to the author's knowledge with published popular music outside of the laboratory-controlled environment. As such, it is precisely this dearth of scholarship that the present experiment aims to fill.

One final study that merits discussion is Zhang and Cross's (2021) study of tone and melody in Teochew (Chaozhou) songs. Teochew presents an especially important point of comparison as it also belongs to the Southern Min language group, although some mutual intelligibility issues arise in comparison to Taiwanese. Zhang & Cross found that tone melody correspondence was significantly increased when accounting for tone sandhi processes (Zhang and Cross 2021:8). Such a finding is important as Cantonese does not have tone sandhi processes, as such, it was previously unknown to what extent tone sandhi would influence tone melody correspondence. Additionally, Zhang and Cross (2021:10) found that folk songs displayed an 11% higher rate of tone melody correspondence than contemporary popular songs. This finding suggests that genre, and as extension connection to the local, play an important role in tone melody correspondence.

2.2 Songs as political tools in Taiwan

A discussion of Taiwanese music would be incomplete without a brief discussion of the sociopolitical context that this music takes part in. Up until the end of martial law in the 1987, the usage of non-Mandarin languages was specifically discouraged in Taiwan (Chen 2006:322). It was not until even later, concurrent with the election of Taiwan's first native-born president Lee Teng-hui and his successor Chen Shui-bien, that the concepts of "de-China-ization" and "Taiwan-ization" entered public consciousness (Chen 2006:323, Shih 2021:285). It is in this sociolinguistic context that any analysis of Taiwanese music must be contextualized and analyzed.

Such an issue is further emphasized when one considers the long history of music being used

as political protest in Taiwan. Ho (2015) analyzed the production and reproduction of both Chinese and Taiwanese identities throughout the course of three different time periods in Taiwanese history: Japanese occupation, Kuomintang rule, and the post-martial law era. Ho (2015:528) finds that there is a long history of music being used for political protest and messaging—with movements such as the Taiwanese folksong movement centered around using music to promote a specifically Taiwanese identity.

For Taiwanese music specifically, the affective force of music performed in Taiwanese is so strong that they have become a staple of election campaigns since 1993 (Ho 2015:534). As Ho (2015:534) notes, these songs tend to be used as a strategy to not only win support, but to “promote Taiwanese awareness and the unity and empowerment of people through nationhood.” In this context, songs are more than just entertainment for Taiwanese. They serve as statements of political thought, resistance, and resilience. For this reason, it is impossible to analyze Taiwanese music without first situating it in its appropriate sociocultural context.

3. Methodology

The corpus for the present study consists of four songs composed by three authors. These songs were *Island Sunrise* 島嶼天光 (2014) by Fire EX. 滅火器 *mièhuǒqì*, *Waves Wandering* 浪流連 (2018) and *Love you One More Time* 閣愛妳一擺 (2021) by EggPlantEgg 茄子蛋 *qíezǐdàn*, and *No Sleep* 無眠 (2009) by Sodagreen 蘇打綠 *sūdǎlǜ*. These songs were chosen for their relative popularity and for the fact that there are publicly available musical scores.

The present study adapted the methodology of previous research, particularly that of Zhang and Cross (2021). One of the four different methodologies noted by Schellenberg (2015:14), and the most common methodology amongst similar studies, contour comparison was adopted as the methodology. In this methodology, the comparison is not focused on any individual note, but instead looks at the transition between consecutive notes. This methodology more accurately equates a sung phrase with its spoken counterpart (Schellenberg 2015:15). Taiwanese has seven lexical tones, leading to a total of 49 different tone combinations. Each tone combination in the music could have a pitch relationship that increases, decreases, or remains steady. Of these choices, only one is the canonical pitch difference according to Taiwanese tone rules. To allow for some musical interpretation, the absolute pitch difference was not analyzed, but the analysis instead focused on directionality.

A major concern in the contour comparison methodology is that of tone sandhi. Taiwanese has extensive tone sandhi governed not by tone neighbors, as in Mandarin, but by sandhi domains (Chen 2018:6). Chen (2018:21-22) provides a detailed outline of where these “Sandhi Domain Boundaries” occur within utterances governed by syntactic and pragmatic considerations. However, as Chen notes, there is a level of ambiguity and variation with some of these boundaries, while others are widely accepted. As such, a major point of attention was to determine how to set these sandhi domain boundaries should be analyzed in the musical text.

The first step in the process was to define a single musical utterance. To do so, musical cues provided an initial division upon the phrase boundaries. Whenever the singer would pause to breathe or to take a break, that was counted as one musical utterance. Not all short breaks were counted, however, if they lasted for less than half a beat and their inclusion would break up a logical prosodic unit. This served as the initial analytical frame for tone sandhi, as it was predicted to be sufficient for a general analysis of tone-melody correspondence. To confirm this prediction, one song was selected for more in-depth analysis utilizing the rules set forth by Chen (2018) to determine intra-phasal sandhi domains. The results of this verification will be discussed later in

Section 4.

Once the phrase boundaries were set, each syllable was coded for either its lexical or tone sandhi tone value, utilizing Chao's Tone Letter system. Following Chan (1987:30), the endpoint of contour tones was taken as the tonal target. However, in cases of mismatch, the entire contour was analyzed in context. Afterwards, these pairs were then coded as to if the musical pitch direction between consecutive syllables matched the anticipated linguistic tone direction. This was coded as a binary match or no match variable. Finally, these were combined into an overall correspondence rate for the entire song. To assess the significance of these results, a Chi Square Good of Fit Test was performed in order to determine if these results were significantly different from chance values. A test was also run on the combined results of all the songs. As the present experiment was running multiple tests, which inflates the risk of a Type I error, a familywise error rate correction was employed—particularly the Bonferroni Correction. As such, all tests were subject to a more conservative alpha value of 0.01 to reject the null hypothesis that lexical tone does not interact with melody in Taiwanese music.

4. Results

The results, reported in Table 1, showed that there was strong interaction between lexical tone and musical pitch in three of the four songs. This correspondence rate was then tested with a Chi Square Goodness of Fit test to determine the significance of these results as related to chance level. Three of the songs return a p-value less than 0.01, suggesting that these the rate of correspondence was unlikely due to mere chance. The fourth song failed to reach significance under the stricter alpha level imposed by the Bonferroni Correction.

Table 1. Chi square (χ^2) goodness of fit test

Song Title	Correspondence Ratio	χ^2 Value	P value	Directionality
Island Sunrise	168:57	172.98	<.00001***	Positive
Love You One More Time	118:71	72.024	<.00001***	Positive
Waves Wandering	88:83	25.289	<.00001***	Positive
No Sleep	65:178	4.741	.02946	Negative

When analyzed as a whole, the results also returned significant (457:389, $\chi^2 = 162.899$, $p < 0.00001$), providing evidence overall that tone was linked to melody in a significant manner in Taiwanese music. As an effort to verify methodology, the song *Island Sunrise* was also analyzed using the stricter tone sandhi domain criteria set forth in Chen (2018) to determine if it made a significant impact on the results. The newly analyzed song returned an even stronger correspondence at 173:53 ($\chi^2 = 188.18$, $p < 0.00001$) or a 76.44% correspondence rate, as compared to the original 74.67%. This is a 1.77% difference overall.

5. Discussion

5.1 Tone and melody correspondence


It is evident from the data that there is some level of tone melody correspondence in Taiwanese

music. While a limited sample size, the overall corpus did return a significant result supporting the claim of an interaction between the lexical tone and musical melody in Taiwanese pop music. However, a more detailed analysis of the results provides more insight into the correspondence. The first major finding from these results is the level of variation that is present between the songs. In three of the songs, there was a significant positive correspondence rate. However, for one of the songs, there was not only a result that failed to be significantly different from chance—which for the present study was 33 percent. The fact that one song completely disregards tone melody correspondence is an important finding, as the sources that discussed Cantonese found that there was a near unanimous tendency to have strong tone-melody correspondence, with rates in their corpus reaching 90 percent or higher (Chan 1987:31, Lau 2010:11, Schellenberg 2013:21). Meanwhile, no song in the present corpus reached such high levels of correspondence. Such a finding appears has several possible explanations discussed below.

The two bands that had significant correlation rates were Fire EX. and EggPlantEgg. Both bands are artists who are notably active in the Taiwanese-language music scene. As such, both band’s discographies consist of many singles performed in Taiwanese, with a smaller proportion of those performed in Mandarin. Meanwhile, Sodagreen performs primarily in Mandarin. Due to them performing primarily in Mandarin, it is possible that Sodagreen was influenced by their composition practices in Mandarin, which does not consider the tone. A second explanation for this variation is that different bands or genres have different practices. Fire EX. is typically classified as punk rock, whereas EggPlantEgg is indie rock. Sodagreen, on the other hand, is typically considered as indie pop. This rock versus pop distinction could have contributed to the choice of tone melody correspondence, but more investigation would be necessary. A third possible explanation is that the usage of Taiwanese tone melody correspondence is an artist choice meant to evoke a feeling in the listener. This explanation will be considered in greater detail below. Finally, it is possible that there was simply too small a corpus to draw any meaningful conclusions, however, this seems unlikely due to the circumstances surrounding the performance of these songs.

The present study is consistent with the previous literature (Zhang and Cross 2021:8) in finding that there is more tone melody correspondence present when tone sandhi is considered than when it is not considered. Given that Zhang & Cross analyzed Teochew songs, another variant of Southern Min that shares limited intelligibility with Taiwanese, it is to be expected that there would be some overlap in tendencies. However, the present study did provide some conflicting evidence when it comes what part of a contour tone serves as a target. Unlike Zhang and Cross (2021:8), the present study more closely replicated what was observed by Chan (1987:32) with the ending point of a contour tone being more important. One such example, taken from Island Sunrise, can be seen below in example (1):

(1)



請 你 毋 通 煩 惱 我

tsiánn lí m̄ thang huân ló guá
55 55 21 33 33 55 52

‘Please do not worry about me.’

In this example, the final word of the phrase is in a focal position, as can be seen through by the duration difference. This first-person pronoun ‘me’ has two notes, starting on a B with a

melisma to a G. The effect of this melisma is that it reproduces the high to low tone contour of the spoken word. When taken in context of the entire phrase, the B exactly matches the other parts of the utterance that are also a high pitch in the phrase, such as *tsiánn*, and it falls all the way to where *m̄* is as a low pitch note. This supports Lau's (2010:10) assertion that the tone contour itself is important. However, it is also important to consider a phrase-medial position to determine if the onset or the final of the tone contour is more important. For this, consider example (2).

(2)



pháinn	sè	lah	ài	lín	a
55	52	--	52	24	--
'I'm sorry, my loved one'					

Like in Example (1), the end of the phrase, disregarding the sentence final particle *a* which does not bear a strict tone, the contour of *lín* 'person' is replicated in the music by a melisma from A to D, mimicking the rising fifth tone in Taiwanese. However, the words *sè*, part of *pháinn-sè* 'sorry' and *ài* 'love' tell a very different story. *Sè* is represented in the music as only as a G with a quarter-note duration. Given that *pháinn*, which has a tone value of 55, was at B, if the onset of a tone contour was the more important target, we would also expect *sè* to follow suit at a B. Instead, it drops down to a G, which is more reflective of the end point of its tonal contour. This is repeated with the example of *ài*, which does have a small melisma, however, it is still centered around the low area of the register.

Given examples (1) and (2), which are characteristic of the patterns seen repeatedly throughout the corpus, we can conclude the following about tone melody correspondence in Taiwanese:

1. Tone melody correspondence does exist in Taiwanese music, but it is not as obligatory as in Cantonese music.
2. The end of the phrase receives focus, being much more likely to have reproduction of the full tonal contour than an item in a phrase-medial position.
3. In items with a reduced tone contour, the end of the contour serves as the target pitch.

Finding 2 is interesting when taken in context of tone sandhi. Under normal stress patterns, the beginning of the utterance is what is typically seen to receive stress, with stress decreasing further into the phrase. However, the finding that phrase-final words are more likely to receive a full reproduction of tone contour counteracts this idea, as they become a more emphasized position. Such a finding implies that the process of tone sandhi in Taiwanese is also in effect in the performance, as the lexical tone is produced on the last position, thereby increasing perceptual prominence. As past findings (Lin and Repp 1989:43) have found that tone contour is more important in tone perception in Taiwanese, unlike Cantonese which favors tone height, it is possible that reproducing the full contour at the end of a phrase is more essential to comprehension. Such findings merit further investigation.

5.2 Motivations for tone and melody matching

Given the results presented in section 5.1, the question now turns to why an artist may choose to have tone and melody correspondence. While it is impossible to make any definitive claim as to causality without an interview with the artist, there are several aspects that merit discussion and analysis. Firstly, as briefly mentioned in section 5.1, the artists analyzed in the present study have very different attitudes towards the use of Taiwanese. Both Fire EX. and EggPlantEgg songs have much higher percentage of their discography performed in Taiwanese than Sodagreen. While all bands perform in both Taiwanese and Mandarin, this distribution suggests that Fire EX. and EggPlantEgg may see the usage of Taiwanese in the public sphere as more important.

Such a conclusion is not unreasonable when one considers the history of the songs. EggPlantEgg has been noted by some to be “spearheading” a resurgence in the Taiwanese-language music scene and have been noted for intentionally incorporating their bilingual background into the music (Gao 2018). EggPlantEgg specifically paid homage to past Taiwanese-language performances, stating that they take their inspiration from these artists. As such, it is evident that EggPlantEgg considers them to be the most recent continuation in the Taiwanese-language music tradition. There are not merely performing in Taiwanese, they are continuing a heritage and a tradition.

The song by Fire EX displays this tendency to an extreme degree. *Island Sunrise*, at its core, is a political rally song. The narrative of the song centers around the speaker apologizing to first his mother and then his partner, stating that he cannot take her to the movies because he must go stand up against those who are bullying them. The chorus is translated as follows:

“The sky is getting lighter. There is a group of people here to protect our dream, becoming a people who have more bravery. The sky is getting lighter, we already are not frightened anymore. Today is that day that changes us into those who will protect you all.”

It is evident from this language in the chorus that this song is meant to inspire bravery and pride in the Taiwanese who listen to it. It is obvious that the “bully” that the song mentions in referring to the existential threat continuously posed to Taiwan by China and the Chinese Communist Party, a sensitive topic in any discussion of Taiwan. As mentioned previously, Ho (2015:23) mentioned that Taiwanese songs have a long history of being used for political purposes dating back to the Japanese colonial era. Such songs were also used by the Taiwanese government during the period of martial law to promulgate anti-communist ideologies. As such, *Island Sunrise* is merely the continuation of this tradition. Indeed, *Island Sunrise* has a history of protest and native sentiment in Taiwan. In 2014, *Island Sunrise* became the unofficial theme song of the Sunflower Movement, a student-led protest against economic legislation that was perceived to open Taiwan up to Chinese influence (Gao 2018). In 2016, Fire EX. was invited to perform *Island Sunrise* at President Tsai Ing-wen’s inauguration, a politician who has been continually associated with pro-Taiwanese identity movements (Shih 2021:286).

The issue at this point becomes indecipherable. Did *Island Sunrise* see such success as a protest song due to its message, underscored by its close tone-melody correspondence which aided in being comprehensible—and thereby its affective force—to Taiwanese speakers? Did Fire EX. intentionally include a higher rate of tone-melody correspondence to heighten to the songs power as a political statement? The answer is unclear at the present junction. The present author believes that it is likely a combination of both factors—Fire EX. intended this song to be fully

understandable without the need to search lyrics. This caused the song to be a prime candidate for adoption by the students who were protesting, as they needed a song that would simultaneously promote their message while lifting their spirits—and what better song than one mirroring spoken Taiwanese making a statement of resistance?

6. Conclusion

The present study has demonstrated a correspondence between pitch and tone in Taiwanese music through the analysis of four songs and three artists. This expands the previous literature on tone-melody correspondence to include a yet unrepresented language variety: Taiwanese. Through this analysis, the present project supports the previous literature in finding that tone sandhi and contours play important roles in tone-melody correspondence. Nonetheless, Taiwanese behaves differently from that of Cantonese, Mandarin, and Teochew, displaying its own unique traits in composition.

Finding that tone melody correspondence has significant variation, the present project also explored possible explanations as to why this variation would be present. Given the political nature of the songs that displayed high rates of tone melody correspondence, it is suggested here that affective force is central to a decision by the composer to account for tones. In songs that are projecting a strongly Taiwanese identity, such as that of *Island Sunrise*, the use of close correlation between tone and melody strengthens the impact and the message of the song. Conversely, the song with no tone-melody correspondence is a love song ballad that is unconcerned with the concerns of the language in which it is being performed. Given the importance of identity promotion, these results have significant implications in the future study of Taiwanese music. If there truly is a relationship between tone melody correspondence and promotion of Taiwanese identity, this can become an important metric in media analysis of these songs. Additionally, the correspondence rate can serve as a sociolinguistic index of sorts to assess identity construction tactics by Taiwanese artists.

The present experiment is but an initial foray into the topic, as there remains more questions posed than answers provided. One such question that merits further investigation is the exact nature of the relationship and the various strategies that are used by artists performing in Taiwanese. For example, what is the relationship between utterance position, note duration, and semantic importance on the likelihood of correspondence? While the present research provides some insights, it is left to future research to determine the exact relationship. Nonetheless, it is evident that for some artists, the relationship between lexical tone and a song's melody is anything but arbitrary.

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