The Prosodic Effects on Taiwan Min Tones[*]

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Two experiments were performed to observe the effects of prosody on tones in Taiwan Min. Experiment 1 was a production test in which the subjects were asked to pronounce a series of sentences in the form of 阿發 <u>ABC</u> 做等路, in which three syllable phrases (ABC) were filled in. The first test syllable (A) was either 賣 or 買, the sandhi tones of which are [be21] and [be55] respectively. The second syllable (B) was [lɔ] in four sandhi tones ([55], [33], [21], [51]). The third syllable (C) was either 禮 or 螺, the base tones of which are [le51] and [le24]. F0 measurements were taken and we found that the perseverative coarticulation effect was significantly stronger than the anticipatory coarticulation effect. In Experiment 2, the stimuli produced by one of the subjects in Experiment 1 were used. The three syllables (ABC) produced in Experiment 1 were excised and pasted and submitted to the subjects for perceptual judgments. It was found that about one-third of the items were misjudged except in the case where the target syllable was the [21] tone. The cause of the misperception was found to be the replacement of the first syllable.

Key words: Taiwan Min, prosodic effect, tone, perseverative coarticulation, anticipatory coarticulation

1. Introduction

It has been recognized that neighboring tones can affect each other. A perseverative effect is especially evident, i.e., the effect of a preceding tone upon a following one (Xu 1997). Quite a few studies have focused on tonal effects in Mandarin (Shih 1988, Tseng 1990, Jin 1996, Xu 1997), but few have studied tonal effects in Taiwan Min (cf. Peng 1997). In this study, our goal is to explore the tonal effects of neighboring tones. Specifically, we want to examine which effect exerts the stronger influence on tones, perseverative as Xu 1997 has reported, or anticipatory as Peng 1997 has suggested.

Two experiments were conducted in this study. The first was a production experiment in which six subjects from the Tainan area produced a series of sentences, and

F0s were measured to observe the effects. The second, perception experiment involved 30 subjects listening to excised and pasted syllables, with observations on how the subjects' decisions were affected by neighboring tones.

2. Experiment 1: Production experiment

2.1 Material

The materials used in this experiment were three-syllable phrases in a carrier sentence. The carrier sentence used was *A-huat XXX tso tan-loo* 'A-huat (boy's name) XXX as a gift'. The first of the target syllables (in XXX) was either [be21] '賣 sell' or [be55] '買 buy' in sandhi tone, representing a low tone and a high tone respectively. And the third syllable was either [le24] '螺 spiral shell' or [le51] '禮 gift' in base tone, each providing a low tone and a high tone environment. The critical second syllable consisted of one of four possible **sandhi** tones on [lɔ]: 55, 33, 21, 51. Among these, [lɔ55] '滷 stewed', [lɔ33] '爐 stove', [lɔ21] '露 dew' were real syllables, while [lɔ51] was a nonce syllable.[1] Note that the initial consonants of the second and third syllables were both [l], which is a sonorant consonant. We chose to use sonorants so that the pitch contour would not be interrupted by obstruents.[2] Nasal initials were not used because, as commonly observed, they have to be followed by nasal vowels in Taiwan Min, which would make the choice of stimuli difficult.

2.2 Subjects

Six male subjects from the Tainan area served as subjects. They were all students at Tsing Hua University at the time of experiment. Male subjects were chosen to facilitate F0 measurements. The Tainan dialect was chosen because it is thought to have less of an 'accent' among Taiwan Min dialects, as far as the carrier sentence and the target syllables were concerned. The subjects took part in the experiment voluntarily, and were given a small remuneration for their participation.

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[1] The syllable [lɔ51] exists as the base tone of '滷 stewed'. It just does not occur as a sandhi tone.
[2] The [l] sound was developed from the voiced stop [d], and varies with a nasal counterpart [n]. Some linguists choose to represent the sound with [d], but most agree that the sound is a lateral. As a matter of fact, we also observed spectrographically clear formant structures for this sound, and regard as appropriate a designation of the sound as lateral.

2.3 Procedure

The subjects were tested individually. At each session, a subject sat facing a microphone in a sound-proof recording booth. One of the experimenters sat near the subject, while outside the booth another did the recording on a REVOX B215 cassette tape recorder. The experimenter inside the booth presented the stimuli, flash cards on which Chinese characters had been printed. The first eight items contained the second and the third syllables of the target syllables ([lɔ] in four tones and [le] in two tones, respectively). The next 16 items contained the three target syllables, with [be] in two tones, [lɔ] in four tones, and [le] in two tones. All this was to familiarize the subject with the target syllables. Then the three target syllables were put in the carrier sentence *A-huat XXX tso tan-loo* 'A-huat (boy's name) XXX as a gift'. Each sentence was read three times one after the other, yielding a total of 48 items. The subjects were told to read the sentences as quickly and smoothly as they could. Their responses were tape-recorded and digitized by CSL for later analysis.

2.4 Results

The digitized stimulus items were submitted to CSL and Multiple Speech programs for analysis. Pitch values were extracted, and the beginnings and ends of the segments in the target syllables were marked by observing the waveforms and spectrograms, as well as by listening to the stimuli themselves.

The pitch values of the target syllable [lɔ] were measured. The values presented in (1) show the values of each case averaged across the three trials by a subject and across all six subjects.

(1) Mean pitch values

The pitch values shown in this table are the values of the syllable [lɔ] in three tones and in contexts preceded by [be21] or [be55] and followed by [le24] or [le51]. The pitch values of three points in the syllable are shown: the **Initial** point, the **Mid**-point, and the **Final** point.

	Initial	Mid	Final
(賣)爐(螺) (be21) lɔ33 (le24)	116.46	117.22	114.45
(賣)爐(禮) (be21) lɔ33 (le51)	120.07	117.35	122.29
(賣)露(螺) (be21) lɔ21 (le24)	110.92	106.28	107.88
(賣)露(禮) (be21) lɔ21 (le51)	113.25	108.49	112.57
(賣)□(螺) (be21) lɔ51 (le24)	138.46	136.00	109.05
(賣)□(禮) (be21) lɔ51 (le51)	137.21	133.88	123.40

(賣)滷(螺) (be21) lɔ55 (le24)	127.25	134.16	126.85
(賣)滷(禮) (be21) lɔ55 (le51)	126.30	132.75	133.16
(買)爐(螺) (be55) lɔ33 (le24)	125.46	115.82	112.05
(買)爐(禮) (be55) lɔ33 (le51)	126.10	117.24	119.99
(買)露(螺) (be55) lɔ21 (le24)	123.53	104.32	99.97
(買)露(禮) (be55) lɔ21 (le51)	124.61	104.77	104.76
(買)□(螺) (be55) lɔ51 (le24)	149.83	132.08	107.56
(買)□(禮) (be55) lɔ51 (le51)	150.42	137.40	128.22
(買)滷(螺) (be55) lɔ55 (le24)	141.16	137.59	131.22
(買)滷(禮) (be55) lɔ55 (le51)	143.64	137.80	135.10

This table seems to indicate that both anticipatory and perseverative coarticulations were at work. Looking at the values for [lɔ33], we find that the values of the first points are 116 and 120 when they were preceded by [be21], and 125 and 126 when preceded by [be55]. That is to say, the pitches were lower when preceded by a low tone, and higher when preceded by a high tone. In contrast, the final points of the same syllable are 114 and 112 when followed by [le24], and 122 and 119 when followed by [le51]. Tables (2) and (3) show the pitch values of the [lɔ] syllables preceded by [be] and followed by [le] respectively. As we can see, the values in the right columns in (2) and (3) are higher than those in the left columns. A series of Wilcoxon Signed Ranks Tests were run to test the differences between these pairs, and the results are shown in the Z values and their probabilities.

(2) Comparisons of the Initial pitch values of [lɔ] preceded by [be21] or [be55]

	[be21]	[be55]	Z	*p*
lɔ33 (le24)	116.46	125.46	-2.201	<.05
lɔ33 (le51)	120.07	126.10	-1.363	>.10
lɔ21 (le24)	110.92	123.53	-2.201	<.05
lɔ21 (le51)	113.25	124.61	-1.992	<.05
lɔ55 (le24)	127.25	141.16	-2.201	<.05
lɔ55 (le51)	126.30	143.64	-2.201	<.05

(3) Comparisons of the Final pitch values of [lɔ] followed by [le24] or [le51]

	[le24]	[le51]	Z	*p*
(be21) lɔ33	114.45	122.29	-2.201	<.05
(be55) lɔ33	112.05	119.99	-2.201	<.05
(be21) lɔ21	107.88	112.57	-1.572	>.10
(be55) lɔ21	99.97	104.76	-1.153	>.10
(be21) lɔ55	126.85	133.16	-.943	>.10
(be55) lɔ55	131.22	135.10	-1.782	>.05

From these comparisons, it seems that perseverative coarticulation has had more of an effect than anticipatory coarticulation, as only two of the six comparisons showed significance in (3), whereas five of the six comparisons showed significance in (2).

Based on these results, Experiment 2 was designed to test whether such pitch differences can be discerned by native speakers. Specifically, we sliced and recombined the target syllables to see if misperceptions would occur.

3. Experiment 2: Perception experiment

3.1 Material

The recorded materials from one of the subjects in Experiment 1 were used as the test material for Experiment 2. This subject's data were chosen because he read the materials smoothly and did it the fastest.

The target syllables were excised from the carrier sentences. This was done by first converting the sound files from ESP format to WAVE format, and then editing these files with Creative Wave Studio (錄音大師) software.

The target syllables were the three syllables used in Experiment 1. Nevertheless, of the second syllable, only [lɔ55], [lɔ33], and [lɔ21] were used. This was because [lɔ51] has a high-falling tone, hence less likely to cause confusion, and consequently of less interest.

The three target syllables were first sliced as unedited tokens. Then the first and last syllables were separately replaced with their counterparts. For example, the first syllable in [be21 lɔ21 le24] was replaced with the first syllable in [be55 lɔ21 le24] (the **head replacement**); the third syllable in [be21 lɔ21 le24] was replaced with the third syllable in [be21 lɔ21 le51] (the **tail replacement**), and the first and third syllables in [be21 lɔ21 le24] were replaced with the first and third syllables in [be55 lɔ21 le51] (the

margin replacement). This resulted in 48 items (12 unedited tokens × 2 first syllable replacements × 2 third syllable replacements). Besides these three-syllable tokens, there were also 24 two-syllable tokens that were constructed by removing the first syllables of the unedited tokens and replacing the third syllables.

3.2 Subjects

Thirty native speakers were recruited as subjects. The speakers with the following 'accents' were excluded from the test:

1. Those who use [35] as the sandhi tone for [51]; e.g., 'seaside' is pronounced as [hai35 pĭ55] rather than [hai55 pĭ55]. These subjects were excluded because their perception of the 55 tone in sandhi positions might be affected, as the dialect does not have 55 as a sandhi tone.
2. Those who use [21] as the sandhi tone for [24]; e.g., 'by the stove' is pronounced as [lɔ21 pĭ55] (identical to 'roadside') rather than [lɔ33 pĭ55]. They were excluded so that the responses involving 'stove' (which appears in sandhi form as [lɔ33] in this experiment) would not be affected.
3. Those who use [44] rather than [55] for Yinping tone; that is, the Yinping tone is pronounced a little lower than most people. They were excluded so that the perception of the Yinping tone would be consistent across subjects.

These subjects participated in the experiment voluntarily, with a small remuneration.

3.3 Procedure

Each subject was tested individually. The subject listened to the stimuli as they were played back from a tape recorder. The items were presented in six parts. The first and second parts contained two-syllable stimuli. One part contained [lɔ] in three tones, followed by [le24], and the other part contained [lɔ] and [le51]. In the next four parts, three-syllable stimuli were tested. The frames used in each part were '[be21] X [le24]', '[be21] X [le51]', '[be55] X [le24]', or '[be55] X [le24]', where X is [lɔ] in any of the three tones [21], [33], [55]. The items in each part were randomized and all subjects listened to the stimuli in the same order. However, the order of the parts varied. The first two parts were always the two-syllable stimuli, and the next four parts were presented in different orders for different subjects.

Each part contained twelve items. Before the test items, the stimuli were presented as unmodified tokens to the subjects. At the same time, the characters representing these

syllables were shown to the subjects. These practice items were separately recorded and were not excised from the carrier sentences as the test items were. These practice items included the [lɔ] syllables in four tones; that is, the three sandhi tones [21], [33], [55] which were used in the stimuli, plus the [51] tone, which was not used in the test stimuli but was nonetheless provided as a possible choice. After the sixth item in each part, the practice items were repeated in a different order to refresh the subjects' memory of the test items.

Each item was presented twice, followed by a three-second silence. The subjects were asked to indicate with a checkmark their choices on the answer sheet. Each item had four choices, represented by four characters, with '滷' representing the syllable [lɔ55], '爐' representing the syllable [lɔ33], '露' representing the syllable [lɔ21], and '☐' representing the syllable [lɔ51] (as this last syllable does not occur in the language). The order of presentation for these characters in each item was balanced throughout the experiment.

Each part of the stimuli was recorded on a cassette tape and played back to the subjects with a portable recorder. After each part, the experimenter switched the tape while the subjects took a short break.

3.4 Results

The results are shown in (4)[3].

(4) Responses to two-syllable items
The braces {} in the left column indicate the original syllable which was removed. The slashes // indicate a replaced syllable. /le24/ would mean the original syllable was [le51] and was replaced with [le24]. The numbers show frequency counts of the response types made to each token.

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[3] One of the anonymous reviewers wonders if there is a statistical procedure to determine the significance of these numbers. One may consider the fact that there are four possible choices. So any number that is smaller than 8 (total number is 30, one fourth of which is 7.5) may be considered a random response. Beyond that, I do not know of any procedure that can determine whether a difference between 10 and 12, as shown in row 5 of (4a), is significant. What we can be sure of is that some confusion has occurred which has substantially motivated the subjects to choose a response other than the expected one.

a. [lɔ33] as the target syllable

	lɔ33	lɔ21	lɔ51	lɔ55
1. {be21} **lɔ33** le24	10	14	2	4
2. {be21} **lɔ33** /le51/	9	16	2	3
3. {be21} **lɔ33** le51	19	6	1	4
4. {be21} **lɔ33** /le24/	22	0	3	5
5. {be55} **lɔ33** le24	10	12	6	2
6. {be55} **lɔ33** /le51/	13	7	9	1
7. {be55} **lɔ33** le51	10	4	14	2
8. {be55} **lɔ33** /le24/	21	4	5	0

b. [lɔ21] as the target syllable

	lɔ33	lɔ21	lɔ51	lɔ55
1. {be21} **lɔ21** le24	3	22	2	3
2. {be21} **lɔ21** /le51/	2	24	0	4
3. {be21} **lɔ21** le51	4	24	0	2
4. {be21} **lɔ21** /le24/	2	24	2	2
5. {be55} **lɔ21** le24	4	22	1	3
6. {be55} **lɔ21** /le51/	2	24	4	0
7. {be55} **lɔ21** le51	4	19	3	4
8. {be55} **lɔ21** /le24/	5	21	4	0

c. [lɔ55] as the target syllable

	lɔ33	lɔ21	lɔ51	lɔ55
1. {be21} **lɔ55** le24	5	1	3	21
2. {be21} **lɔ55** /le51/	1	2	7	20
3. {be21} **lɔ55** le51	9	2	3	16
4. {be21} **lɔ55** /le24/	19	0	2	9
5. {be55} **lɔ55** le24	2	2	5	20
6. {be55} **lɔ55** /le51/	3	1	14	12
7. {be55} **lɔ55** le51	3	6	13	8
8. {be55} **lɔ55** /le24/	6	1	1	22

It is easy to see that the target syllable [lɔ21] in (4b) showed consistent responses. The majority of answers were correct. The high tone in the preceding syllable raised the vowel pitch of the target syllable (5-8 in (4b); see (2) above), but the change was not perceived as categorical. Neither was the perception of the vowel pitch affected by the following syllable. In (4b), the items followed by /le24/ (the tail replacements) were originally followed by [51], but the anticipatory raising of the pitch was not observed by the subjects.

However, we can observe some misperceptions in (4a) and (4c). The target in (4a)

was [33], but in three instances the tone was perceived as [21]. This may be because the phrase [lɔ21 le24], meaning 'snail' (or a common nickname for Rolex), is a familiar word. But still, the replaced syllable in row 2, which was originally [lɔ33 le24], was misperceived as [21], even though the following syllable is now [le51]. In the latter case, lexical familiarity was obviously not the cause for the misperception; rather, it was probably caused by the enlarged jump from a lowered [lɔ33] to a high tone [le51].

It is also interesting to observe that, among the items in (4a), row 4 performed better than row 1, and row 8 performed better than row 5.[4] Rows 1 and 5 were cases where the [le] syllables were not replaced. It seems that the original [le51] syllables brought up the pitches of [lɔ33], and the replaced [le24] enlarged the distances from [lɔ33] to [le24]. Thus we see an anticipatory coarticulation at work, although such an effect was not strong enough to bring [lɔ33] to a level to confuse it with [lɔ55].

In (4c), three instances of [55] were misperceived, among which two were misheard as [51] and one misheard as [33]. The reason why row 7 was misheard as [51] is hard to assess, as the item was not tail-replaced.

(5) Frequencies of responses to three-syllable stimuli with [lɔ33] as the second syllable
The syllables in slashes // are head-, tail- or margin-replaced syllables.

				lɔ33	lɔ21	lɔ51	lɔ55
1.	be21	lɔ33	le24	14	10	2	4
2.	/be55/	lɔ33	le24	5	22	1	2
3.	be21	lɔ33	/le51/	12	16	0	2
4.	/be55/	lɔ33	/le51/	4	23	2	1
5.	be21	lɔ33	le51	26	2	2	0
6.	/be55/	lɔ33	le51	26	3	0	1
7.	be21	lɔ33	/le24/	21	5	0	4
8.	/be55/	lɔ33	/le24/	26	3	1	0
9.	be55	lɔ33	le24	27	2	0	1
10.	/be21/	lɔ33	le24	19	5	4	2
11.	be55	lɔ33	/le51/	26	1	0	3
12.	/be21/	lɔ33	/le51/	3	2	22	3
13.	be55	lɔ33	le51	28	0	0	3
14.	/be21/	lɔ33	le51	1	6	21	2
15.	be55	lɔ33	/le24/	24	3	2	1
16.	/be21/	lɔ33	/le24/	17	1	6	6

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[4] I owe this observation to Jie Zhang.

This table shows quite a few misperceptions. Three were misperceived as [21] (rows 2-4), and two were misperceived as [51] (rows 12 and 14). The fact that row 2 was misperceived is understandable. In this case, the first syllable was originally [be21], and was replaced by [be55]. The pitch of [lɔ33] may have been brought down by the preceding [be21], and when the same syllable was instead preceded by [be55], the distance between [be55] and [lɔ33] was enlarged and may have become more like that between an original [be55] and [lɔ21].

A similar rationale can be applied to row 3 where the third syllable was replaced by [le51]. The pitch of [lɔ33] was brought down by the following [le24], but when [le51] replaced the third syllable, the distance between [lɔ33] and [le51] was increased to a degree close to that between [lɔ21 le51], causing this kind of misperception.

The case of row 4 is a combination of replacements of both [be] and [le] syllables, although it did not have a combined effect. As noted in Experiment 1, anticipatory coarticulation did not have as strong an effect as perseverative coarticulation, hence the frequency of misperception is lower than rows 2 and 4.

The reason why [lɔ33] in rows 12 and 14 was perceived as [51] is also understandable. The first syllable in both cases was originally [be55], and presumably the high tone had brought up the first part of the [lɔ33] syllable. When the first syllable was replaced by [be21], the pitch difference between the first and the second syllables was enlarged, making it close to tonal level [5].

(6) Frequencies of responses to three-syllable stimuli with [lɔ21] as the second syllable
The syllables in slashes // are head-, tail- or margin-replaced syllables.

				lɔ33	lɔ21	lɔ51	lɔ55
1.	be21	lɔ21	le24	3	24	0	3
2.	/be55/	lɔ21	le24	1	22	6	1
3.	be21	lɔ21	/le51/	3	27	0	0
4.	/be55/	lɔ21	/le51/	3	23	2	2
5.	be21	lɔ21	le51	4	21	2	3
6.	/be55/	lɔ21	le51	1	26	3	0
7.	be21	lɔ21	/le24/	5	23	1	1
8.	/be55/	lɔ21	/le24/	7	23	0	0
9.	be55	lɔ21	le24	2	27	0	1
10.	/be21/	lɔ21	le24	3	21	2	4
11.	be55	lɔ21	/le51/	3	27	0	0
12.	/be21/	lɔ21	/le51/	1	28	1	0
13.	be55	lɔ21	le51	0	27	1	2

14.	/be21/	lɔ21	le51	2	24	2	2
15.	be55	lɔ21	/le24/	4	23	0	3
16.	/be21/	lɔ21	/le24/	2	23	2	3

The stimuli with [lɔ21] as the target syllable were basically perceived perfectly, as in (4b), and hence need no more comments.

(7) Frequencies of responses to three-syllable stimuli with [lɔ55] as the second syllable
The syllables in slashes // are head-, tail- or margin-replaced syllables.

				lɔ33	lɔ21	lɔ51	lɔ55
1.	be21	lɔ55	le24	3	1	1	25
2.	/be55/	lɔ55	le24	2	0	0	28
3.	be21	lɔ55	/le51/	1	2	2	25
4.	/be55/	lɔ55	/le51/	3	0	8	19
5.	be21	lɔ55	le51	0	1	10	19
6.	/be55/	lɔ55	le51	18	1	6	5
7.	be21	lɔ55	/le24/	8	2	1	19
8.	/be55/	lɔ55	/le24/	19	2	3	6
9.	be55	lɔ55	le24	1	1	1	27
10.	/be21/	lɔ55	le24	0	1	14	15
11.	be55	lɔ55	/le51/	0	3	4	23
12.	/be21/	lɔ55	/le51/	0	4	19	7
13.	be55	lɔ55	le51	0	2	6	22
14.	/be21/	lɔ55	le51	1	2	25	2
15.	be55	lɔ55	/le24/	1	0	1	28
16.	/be21/	lɔ55	/le24/	2	2	2	24

Again, we can observe some misperceptions in this group. In two instances, [lɔ55] was perceived as tone [33] (rows 6 and 8), while in two other instances it was perceived as tone [51] (rows 12 and 14). There were also two instances in which [lɔ55] was significantly perceived as [51] (rows 5 and 10), although the frequencies of misperception were not in the majority.

The common point about rows 6 and 8 is that the first syllables were both replaced by [be55] from an original [be21]. The pitch in [lɔ55] may have been brought down by the original low tone, and was not recovered by the replaced high tone.

In the four instances where [lɔ55] was significantly misperceived as [lɔ51], the first syllables were all [be21], and all except the one in row 5 were head-replaced. The original

first syllable [be55] obviously brought up the pitch of [lɔ55] in rows 10, 12, and 14. But this only explains why the items were perceived as high tone. The reason why it was perceived as a high-falling tone may be that the [be21] syllable that the subjects heard boosted up the perceptual distance of the first part of the following high tone, making it sound like a falling tone.

In summary, as can be seen from Tables 4-7, there are at most two significant numbers in each row. When there is only one significant number in a row, it is either the correct answer, or a misperceived answer with coarticulation explanation. When there are two significant numbers, one of them is the correct answer, and the other is the one with coarticulation explanation. Thus it seems that all significant misperceptions shown in this experiment can be explained by coarticulation.

In order to check the different effects of perseverative and anticipatory coarticulations, we add all the **correct** responses in Tables 5-7, and obtain the following results: Head replacement=194, Tail replacement=278, Margin replacement=203. That is to say, of all the 360 responses out of the 12 items with head replacements, there were 194 correct responses. This number is far fewer than the correct responses of tail replacement items (χ^2=43.4, p<.01), and this fact demonstrates the stronger effect of perseverative coarticulation over anticipatory coarticulation.

4. General discussion and conclusion

In this study we performed two experiments to observe the effect of pitch differences in various situations. Specifically, we examined how the pitch of a tone can be affected productively and perceptually by preceding and following tones. From Experiment 1, we found that both anticipatory and perseverative coarticulation effects existed, but perseverative coarticulation exerted significantly stronger influence on the pitch variations of a syllable. From Experiment 2, we found, except for the items with [lɔ21] as the target syllable, about one-third of the items were misperceived when the preceding or following syllable was replaced. And from this preliminary examination of the data, it seems that, again, the replacement of the first syllable seemed to have more effect than the replacement of the third syllable. This also confirms the finding of Experiment 1 where perseverative coarticulation was found to be stronger.

Our examination of three-syllable phrases is a first step toward understanding the prosodic influences of tonal production and perception in Taiwan Min. This kind of study will hopefully contribute to such practical areas as speech recognition and speech synthesis.

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韻律結構對台閩語聲調的影響

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　　本研究探討台閩語中韻律結構如何影響聲調的調值。本研究包括兩個實驗。第一個實驗爲產生實驗，受試者唸出「阿發 <u>ABC</u> 做等路」的台閩語句子，其中 A 音節有低調及高調；B 音節有代表四個變調；C 音節也有兩個低調及高調。我們觀察這些音節的基頻 (F0)，發現順向共同發音的效應較逆向共同發音爲強。實驗二爲一聽覺實驗。實驗刺激項爲將實驗一的 ABC 三個音節分別切下，與其他兩個音節做不同的組合，讓受試者聽第二個音節 (B) 是哪個字。實驗結果約有三分之一的音節聽錯。造成聽錯的主要原因是第一個音節 (A) 的因素。也就是說，順向共同發音造成的聽覺錯誤佔最大原因，與實驗一的結果相同。

關鍵詞：台閩語，韻律效應，聲調，順向共同發音，逆向共同發音