

The interplay between lexical and postlexical tonal phenomena and the prosodic structure in Masan/Changwon Korean*

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1. INTRODUCTION

In some languages, such as Korean and Japanese, some theoretically interesting postlexical tonal phenomena have been observed. The phenomena include, for example, downstep and edge tones in Tokyo Japanese (e.g. Kawakami 1961b, Pierrehumbert and Beckman 1988) and downstep and upstep in Northern Gyeongsang Korean¹ (Kenstowicz and Sohn 1997, Jun et al. 2006).² Also, some phenomena have shown the interplay between lexical and postlexical tonal phenomena. For example, in Tokyo Japanese, downstep is only observed after a lexically accented word under some syntactic conditions and/or focus conditions. In previous literature, these findings have been motivators to posit the prosodic structure. This paper deals with these issues with special reference to Masan/Changwon Korean (hereafter, MCK), whose postlexical tonal phenomena have not been studied well.

MCK is spoken in two neighbouring cities, Masan and Changwon, located in the south central region of Southern Gyeongsang Province, South Korea. In Korean dialectology, it is widely known that dialects spoken in Northern and Southern Gyeongsang Province of Korea have lexical tonal phenomena, as opposed to most of the other dialects, such as Seoul dialect, which only have postlexical tones.

In this paper, Masan dialect and Changwon dialect are regarded as one dialect, MCK, since these two cities are in the same living sphere and have shown no dialectic differences so far. Some other Southern Gyeongsang dialects such as Busan dialect seem to have a similar tonal system to that of MCK reported in this paper. On the other hand, dialects in the Northern Gyeongsang Province (e.g.

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¹ In this paper, Korean is Romanized in the following ways;

- examples and references: the Yale system;
- place-names: the Revised Romanization of Korean, released by South Korea's Ministry of Culture and Tourism in 2000;
- names of people: following their own usages.

² As a matter of fact, referring to dialects in a way like "Northern Gyeongsang Korean" is not appropriate when prosody is concerned since it has been known that there is a variety of tonal system in Northern Gyeongsang Korean. For example, the tonal system of the Chilgok dialect reported by Umeda (1961) differs from that of the Daegu dialect reported by Moon (1969, cited by Hayata 1976) and Rah (1974) (see Hayata 1976 for a review). Although Kenstowicz and Sohn's (1997) and Jun et al.'s (2006) data show Daegu-like patterns, it is not explicitly shown which dialect they are dealing with. Thus, we use "Northern Gyeongsang Korean" when their studies are referred to.

Daegu) and the western part of Southern Gyeongsang Province (e.g. Jinju) have different tonal characteristics from MCK in several ways. See Hayata (1976), Gim (2002), and Fukui (2003) for reviews.

Even though there are many previous studies about the lexical tone of MCK and its neighbouring dialects (e.g. Gim 1970, Kang 2005), little has been known about postlexical phenomena and the prosodic structure of this dialect. Thus, this paper aims at (i) re-examining the lexical tonal system of MCK, (ii) examining the interaction between lexical and postlexical tonal phenomena and (iii) proposing a prosodic model, especially focusing on the prosodic structure.

To deal with these issues, field research was conducted. The research consisted of two sessions made on different days. The first session was a basic survey aiming at point (i). In most of the session, several words without any postpositional particles and with postpositional particles were recorded in the citation form. Words with postpositional particles were used since it has been known that several word pairs are only distinguished when they are followed by particles. The results of this section are briefly summarized and discussed in Section 3.

The second session was a production experiment aiming at point (ii). In this experiment, focus was used since, in languages such as Korean and Japanese, various postlexical tonal phenomena have been found under different focus conditions and, thus, focus has been considered as the major factor in prosodic phrasing. This experiment is summarized in Section 4. The results are interpreted in the prosodic model (point (iii)) proposed in Section 5.

Before these sections, the next section describes general methods common in the two sessions of the research.

2. GENERAL METHODS

2.1. Consultants

The consultants were four native speakers of MCK. All of them were students of Chang-Shin College. In this paper, the results of two consultants, LYH and CGY, was mainly reported since the data of other consultants has not been analyzed yet. The details of these consultants are as follows;

- LYH: male, born in 1982, born and grew up in Masan
- CGY: female, born in 1986, born and grew up in Changwon

2.2. Research procedures

The research was conducted in vacant rooms of Chang-Shin College. As is stated in Section 1, the research consisted of two sessions made on different days.

In the first session, several words without any postpositional particles and with postpositional particles *-i/-ga*³ (nominative) and *-kkaci* ('until', 'up to') were recorded in the citation form. Also, several sentences were recorded.

In the second session, most of the time was spent for the production experiment on focus. The procedure of this experiment is described in Section 4.1. After the experiment, some words and sentences which were not recorded in the first session were also recorded.

In both the sessions, the recordings were made on a digital audio tape (DAT), using a DAT-recorder (Sony TCD D-8) and an electret condenser microphone (Sony ECM-MS957).

³ The alternation between *-i* and *-ga* depends on whether or not a noun has a word-final coda. If it has the coda, *-ga* is attached; otherwise, *-i* is attached.

3. LEXICAL TONAL PHENOMENA

3.1. Lexical tonal system and tonal classes

The lexical tonal system of MCK identified in the data of the citation form in the present research is shown in Table 1.⁴ Note that this table shows a tentative description that is not identical with the interpretation of the surface tone patterns. The surface tone patterns are to be interpreted in the whole model proposed in Section 5.

Table 1: The lexical tonal system of MCK. Acute accents stand for high pitch. Parenthesized σ 's stand for postpositional particles.

		Number of Syllables		
		1	2	3
Class A	Nonfinal		$\acute{\sigma}\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}\acute{\sigma}(\sigma)$
	Final	$\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}\acute{\sigma}(\sigma)$
Class B	I(nitial)-Double	$\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}\acute{\sigma}(\sigma)$
	M(edial)-Double	$\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}(\sigma)$	$\acute{\sigma}\acute{\sigma}\acute{\sigma}(\sigma)$

The system has two major classes (“Class A” and “B”). Class A has a tonal fall whose alignment is lexically specified on any syllable boundary in the phonological word. The syllable immediately before the fall is interpreted as having lexical pitch accent. In this class, we call the pattern that has a tonal peak in the final syllable “Final” and others “Nonfinal.” This sub-classification is due to the peculiarity of Final in compounding and postlexical tonal phenomena.

As has been found in the previous studies on Gyeongsang dialects (e.g. Kang 2005), if Final is followed by an accented postpositional particle, only the fall immediately after the accent in the particle is retained, as in (1a). On the other hand, if it is Nonfinal which is followed by an accented postpositional particle, as a general rule, fall by the first accent is retained and the second accent is not realized (1b). (Note that (1b) has important exceptions, discussed in 3.2.) However, the shift of the fall does not take place when Nonfinal/Final is followed by an unaccented particle (2).

- (1) a. Final *namul* $\acute{\sigma}\acute{\sigma}$ (‘vegetable side dishes’) + *-kkaci* $\acute{\sigma}\acute{\sigma}$ → *namul-kkaci* $\acute{\sigma}\acute{\sigma}\acute{\sigma}$
b. Nonfinal *manul* $\acute{\sigma}\acute{\sigma}$ (‘garlic’) + *-kkaci* $\acute{\sigma}\acute{\sigma}$ → *manul-kkaci* $\acute{\sigma}\acute{\sigma}\acute{\sigma}$
- (2) a. Final *namul* $\acute{\sigma}\acute{\sigma}$ (‘vegetable side dishes’) + *-i* σ → *namul-i* $\acute{\sigma}\acute{\sigma}$
b. Nonfinal *manul* $\acute{\sigma}\acute{\sigma}$ (‘garlic’) + *-i* σ → *manul-i* $\acute{\sigma}\acute{\sigma}$

Class B has level high pitch in two syllables of the phonological word. This is further classified into two subclasses, Initial Double (I-Double) and Medial Double (M-Double). The location of high pitch is constant regardless of the number of syllables of the phonological word. It is always on the initial two syllables of the phonological word in I-Double and is on the second and third syllables in M-Double. Thus, they have the following tonal patterns when they are followed by postpositional particles.

⁴ Words marked with high pitch in the above table actually end with falling pitch when it is pronounced in the citation form. However, as many previous studies of Gyeongsang dialects suggest (e.g. Lee 2000, Kang 2005), since those words end with high pitch unless it is in the utterance final position, it is considered that they underlyingly end with high pitch. In this paper, this concept is rephrased from an intonational phonological perspective; in the utterance-final position, both of the lexically specified H tone and the utterance-final L% are realized within the final syllable in those words.

- (3) I-Double
- | | | | |
|----|------------------------|----------|------------------|
| a. | <i>mul</i> | σ́ | (‘water’) |
| | <i>mul-i</i> | σ́σ́ | |
| | <i>mul-kkaci</i> | σ́σ́σ́ | |
| b. | <i>nayngmyen</i> | σ́σ́ | (‘cold noodles’) |
| | <i>nayngmyen-i</i> | σ́σ́σ́ | |
| | <i>nayngmyen-kkaci</i> | σ́σ́σ́σ́ | |
- (4) M-Double
- | | | | |
|----|---------------------|----------|--------------------------------|
| a. | <i>pam</i> | σ́ | (‘chestnut’) |
| | <i>pam-i</i> | σ́σ́ | |
| | <i>pam-kkaci</i> | σ́σ́σ́ | |
| b. | <i>kimpap</i> | σ́σ́ | (‘rice rolled in dried laver’) |
| | <i>kimpap-i</i> | σ́σ́σ́ | |
| | <i>kimpap-kkaci</i> | σ́σ́σ́σ́ | |

Some Class B words are not distinguished from Class A words when they are not followed by particles. However, these words are distinguished when they are followed by particles, as in (5) and (6).

- (5) a. I-Double
- | | | | |
|------------------|--------|-----------|--------|
| <i>mul</i> | σ́ | (‘water’) | = (3a) |
| <i>mul-i</i> | σ́σ́ | | |
| <i>mul-kkaci</i> | σ́σ́σ́ | | |
- b. Final
- | | | | |
|------------------|--------|-------------|--|
| <i>sul</i> | σ́ | (‘alcohol’) | |
| <i>sul-i</i> | σ́σ́ | | |
| <i>sul-kkaci</i> | σ́σ́σ́ | | |
- (6) a. M-Double
- | | | | |
|---------------------|----------|--------------------------------|--------|
| <i>kimpap</i> | σ́σ́ | (‘rice rolled in dried laver’) | = (4b) |
| <i>kimpap-i</i> | σ́σ́σ́ | | |
| <i>kimpap-kkaci</i> | σ́σ́σ́σ́ | | |
- b. Final
- | | | | |
|--------------------|----------|---------------------------|--|
| <i>namul</i> | σ́σ́ | (‘vegetable side dishes’) | |
| <i>namul-i</i> | σ́σ́σ́ | | |
| <i>namul-kkaci</i> | σ́σ́σ́σ́ | | |

M-Double words of more than two syllables have not been observed in the present research because we cannot distinguish three-syllable M-Double from three-syllable Final, and four-syllable M-Double from four-syllable Nonfinal with an accent on the third syllable. This presents a contrast to the previous studies, as discussed in 3.3. However, there is a remaining possibility that these classes show differences in the sentence level. This possibility is examined in Section 4.

3.2. Various patterns of *-kkaci*

When words were followed by the particle *-kkaci*, some different tonal patterns were found. This variation was found in I-Double and M-Double of more than one syllable, Final of more than two syllables, and Nonfinal. There were three patterns, all of which were related to an accent on *-kkaci*: deletion, reduced peak, and not-reduced high peak. The difference between the deletion and the reduced peak was unclear. Whether those are categorically different or the deletion is nothing but an extreme case of the reduced peak is an open question.

The three patterns are related to postlexical tonal phenomena reported in Section 4. This issue is discussed again in Section 5.2.2.

3.3. Comparisons with the previous studies

The system shown in 3.1 is comparable with the previous studies about the tone of MCK and the neighbouring dialects, such as Kang (2005) and Gim (1970).

Kang (2005) researched the tone of several dialects in the eastern part of Southern Gyeongsang Province, mostly based on the interviews with elderly speakers. Her results on the neighbouring dialects of MCK, such as Haman and

Jindong, are very similar to the present results.⁵ The only systematic difference with the present results is about the distinction between Final and M-Double in three-syllable words. According to her, these two differ when they are followed by two-syllable postpositional particles, *-pota* ('rather than'), as in (7).⁶ That is, Final involves the fall shift while M-Double does not.

- (7) a. Final *taynamu* ㅅㅅㅅ ('bamboo') + *-pota* ㅅㅅ → *taynamu-pota* ㅅㅅㅅㅅ
 b. M-Double *holangi* ㅅㅅㅅ ('tiger') + *-pota* ㅅㅅ → *holangi-pota* ㅅㅅㅅㅅ

My results are not straightforward. In a phonological word consisting of a lexical word of more than two syllables and a particle *-kkaci*, the particle has both flat and non-flat (ㅅㅅ) patterns regardless of the tonal class of the lexical word, as is stated in 3.2. Thus, Final and M-Double in three-syllable words can not be distinguished in the present results.

Gim's (1970) research on Changwon Korean of the older generation has some differences with the present research and Kang's (2005). In his results, Class A and B show the difference of tonal registers. That is to say, Class A has M and H tones, while Class B has L and M tones.

Further research is needed to examine whether these differences are due to generational changes or due to some other reasons.

4. POSTLEXICAL TONAL PHENOMENA

To examine the postlexical tonal phenomena, the production experiment using focus was conducted. As stated in Section 1, focus was used since it has been known as a factor that affects prosodic phrasing in many languages such as Seoul Korean (Jun 1993), Northern Gyeongsang Korean (Kenstowicz and Sohn 1997, Jun et al. 2006) and Tokyo Japanese (Pierrehumbert and Beckman 1988). Especially, a post-focus word was considered since it is the place where the previous studies have found interesting postlexical tonal phenomena, such as downstep in Tokyo Japanese and upstep in Daegu Korean, that motivate to posit the prosodic model.

An example of materials used in the experiment is shown in (8). In this sentence of the quotative structure, the first and second phonological words, forming embedded clause of object-verb structure, are concerned in the present study. The last word is added to avoid creaky voice in the utterance-final position.

- (8) *Manul mek-nun-ta-ko hay-ss-ta.*
 garlic eat-NPAST-DC-QUOT say-PAST-DC⁷
 'I said I would eat garlic.'

We examined what took place in the verb (*meknuntako*) when it was on the post-focus position. In other words, the experiment examined the phenomena that were identified in the verb when the object (*manul*) was focused (hereafter, the object-focused utterance). To identify the phenomena in a clear way, the object-focused utterance was compared with another utterance in which the verb was focused (hereafter, the verb-focused utterance).

⁵ Jindong town, located in the southwest of Masan city, was incorporated into Masan city in 1995.

⁶ Kang (2005) shows words followed by *-pota* as the examples of words followed by a two-syllable particle. Since she also uses *-kkaci* and does not mention the tonal difference between *-pota* and *-kkaci*, *-pota* in her results can be substituted with *-kkaci* and, thus, we can compare her results with the present results.

⁷ Abbreviations used in this paper are as follows: ACC: accusative postpositional particle, NPAST: non-past tense ending, PAST: past tense ending, DC: declarative ending, WH: wh-interrogative ending, QUOT: quotative ending.

4.1. Methods

4.1.1. Materials

The following two carrier sentences were used.

- (9) a. ___ *mek-nun-ta-ko* *hay-ss-ta.*
 eat/drink-NPAST-DC-QUOT say-PAST-DC
 ‘I said I would eat ___.’
 b. ___ *mek-ess-ta-ko* *hay-ss-ta.*
 eat/drink-PAST-DC-QUOT say-PAST-DC
 ‘I said I had eaten ___.’

The tonal patterns of the second phonological word in (9) are as follows.

- (10) a. *meknuntako* σσσσ / σσσσ
 b. *meksstako* σσσσ

(10a) has two possible tonal patterns, but these variations are not concerned in the present analysis.

In the part of ___ above, various words were embedded, as shown in Table 2.

Table 2: Materials

	Number of Syllables			
	1	2	3	4
Nonfinal		<i>manul</i> σσ ‘garlic’	<i>minali</i> σσσ ‘dropwort’	<i>sakwaphai</i> σσσσ ‘apple pie’
		<i>kalpi</i> σσ ‘rib’	<i>santtalki</i> σσσ ‘mountain berries’	<i>yelmukimchi</i> σσσσ ‘young radish kimchi’
Final	<i>sul</i> σ ‘alcohol’	<i>namul</i> σσ ‘vegetable side dishes’	<i>pokswunga</i> σσσ ‘peach’	
	<i>pay</i> σ ‘pear’	<i>sakwa</i> σσ ‘apple’	<i>khongnamul</i> σσσ ‘bean sprout’	
I-Double	<i>mul</i> σ ‘water’	<i>naŋngmyen</i> σσ ‘cold noodles’	<i>mulnaŋngmyen</i> σσσ ‘cold noodles’	
	<i>pha</i> σ ‘Welsh onion’	<i>phacen</i> σσ ‘pancake’	<i>pulkoki</i> σσσ ‘grilled beef’	
M-Double	<i>pam</i> σ ‘chestnut’	<i>kimpap</i> σσ ‘rice rolled in dried laver’	<i>sokoki</i> σσσ ‘beef’	<i>ttalkiwuyu</i> σσσσ ‘strawberry milk’
	<i>kam</i> σ ‘persimmon’		<i>kokwuma</i> σσσ ‘sweet potato’	<i>pamkokwuma</i> σσσσ ‘sweet potato’

As can be seen from this table, the nouns have two factors, the tonal subclass and the number of syllables. For each tonal subclass × number of syllables, two nouns are used. In words of more than two syllables, Class A with an accent on the third syllable and M-Double are regarded as different tonal class even though they show no tonal difference when pronounced in the citation form, as stated in the

section 3. This is due to the exploratory purpose to find the difference in postlexical phenomena. The identification of the tonal class to these words is based on the compound rule and presumption from other dialects such as Daegu dialect. In words of four syllables, only Nonfinal with an accent on the third syllable and M-Double were used. This is because it is assumed that the major results of words of more than three syllables are the same as the results of three syllable words and the only aim of examining words of four syllables were in the comparison of Nonfinal with an accent on the third syllable and M-Double.

As for two-syllable M-Double, two words, *kimpap* and *ttalki* ('apple'), were used. However, since two subjects pronounced *ttalki* as Final in the survey of lexical tonal phenomena, this word was excluded from the present analysis.

4.1.2. Manner of reading

Each sentence was read in three ways: object-focused, verb-focused, and "neutral".

The object-focused and verb-focused utterances were elicited by giving them questions and ask them to read materials as answers to the questions. (11) and (12) show examples of questions to elicit object-focused and verb-focused utterances, respectively.

- (11) a. *Mwe mek-nun-ta-ko hay-ss-no?*
 what eat/drink-NPAST-DC-QUOT say-PAST-WH
 'What did you say you would eat?'
 b. *Mwe mek-ess-ta-ko hay-ss-no?*
 what eat/drink-PAST-DC-QUOT say-PAST-WH
 'What did you say you had eaten?'
- (12) a. *Manul ucca-n-ta-ko hay-ss-no?*
 garlic how-NPAST-DC-QUOT say-PAST-WH
 'What did you say you would do with garlic?'
 b. *Manul uccay-ss-ta-ko hay-ss-no?*
 garlic how-PAST-DC-QUOT say-PAST-WH
 'What did you say you had done with garlic?'

In addition, subjects were asked to read sentences naturally without any questions. Hereafter, we call this utterance "neutral".

4.1.3. Recording procedures

In the recordings, subjects read each sentence shown on the screen of a laptop computer. For the object-focused and verb-focused utterance, the question was played from the computer at the same time as the sentence was shown. The questions were recorded in advance by another native speaker at the sound attenuated room in the Korea University, Seoul. The details of this speaker are as follows.

- SMY: female, born in 1981, born and grew up in Changwon

The experiment consisted of twelve blocks: 2 carrier sentences × 3 manners of reading × 2 repetitions. The first six blocks used the carrier sentence (9a) and the order was as follows: neutral, object-focused, verb-focused, verb-focused, object-focused, and neutral. The latter six blocks used the carrier sentence (9b) and the order was the same.

Each block covered a set of materials. Also, in each block, the first and last three tokens were dummies. Materials were presented at random. Before each block, a practice block was conducted.

4.2. Results

As expected, different focus patterns showed different tonal patterns. These results are summarized below.

Some words were occasionally pronounced with lexical tonal patterns that were different from what were expected. These cases were excluded from the analysis.

4.2.1. *Verb-focused utterances*

In the verb-focused utterances, each phonological word showed essentially the same tonal pattern as was read in the citation form. In other words, each verb-focused utterance was comparable with the sequence of the citation forms. In each token, the F0 peak of the verb was equal to, or higher than, that of the object.

4.2.2. *Object-focused and neutral utterances*

The object-focused and neutral utterances showed essentially similar phenomena to one another. In these utterances, three phenomena were found. The first phenomenon was a reduced peak in the verb (hereafter, reduced peak). Except for the peak height of the verb, the tonal patterns found in the citation forms were retained. Figure 1 shows this phenomenon and the counterpart in the verb-focused utterance. The second phenomenon was a contour without an F0 valley in the first syllable of the verb (hereafter, no-valley). The location of the fall in the verb was retained. Figure 2 shows this phenomenon and the counterpart in the verb-focused utterances. The third phenomenon was the forward shift of the fall in the verb along with the no-valley (hereafter, shift + no-valley). Figure 3 shows this phenomenon and the counterpart in the verb-focused utterances. Upstep, which was found in Northern Gyeongsang Korean (Kenstowicz and Sohn 1997, Jun et al. 2006), was not found in MCK.

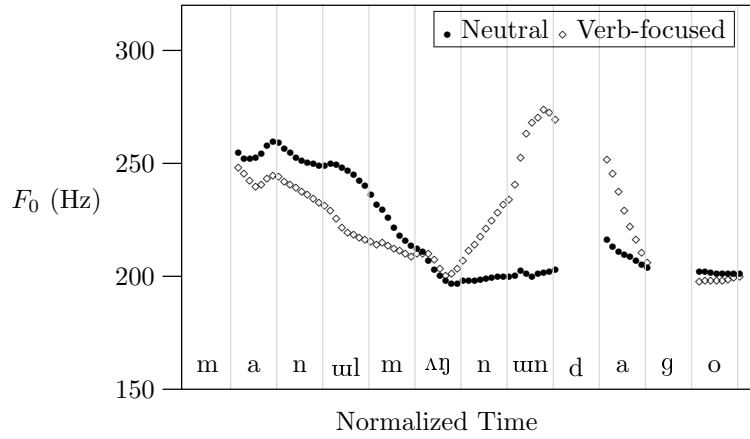


Figure 1: Reduced peak in the neutral utterance and its counterpart in the verb-focused utterance. Sentence: *Manul meknuntako hayssta*. ('I said I would eat garlic.') Only the part of "manul meknuntako" is shown.

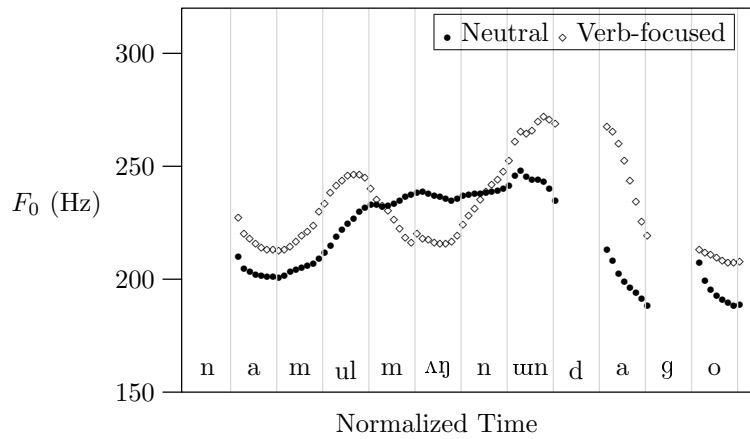


Figure 2: No-valley in the neutral utterance and its counterpart in the verb-focused utterance. Sentence: *Namul meknuntako hayssta*. ('I said I would eat vegetable side dishes.') Only the part of "namul meknuntako" is shown.

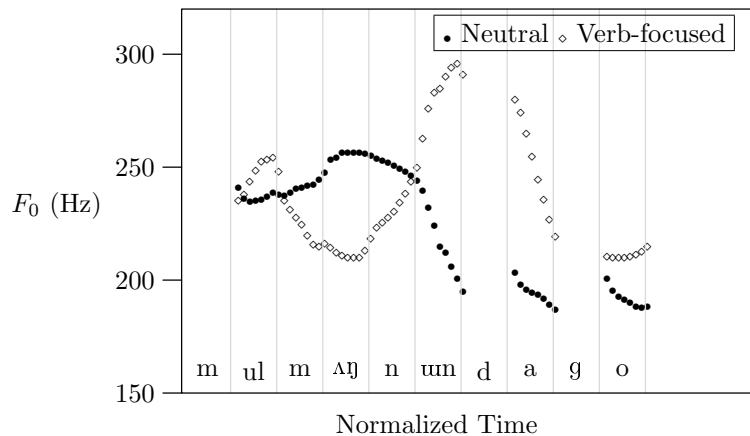


Figure 3: Shift + no-valley in the neutral utterance and its counterpart in the verb-focused utterance. Sentence: *Mul meknuntako hayssta*. ('I said I would drink water.') Only the part of "mul meknuntako" is shown.

The occurrence of these three phenomena in the object-focused and neutral utterances is shown in Table 3-6.

Table 3: Results of the object-focused utterances (“___ meknuntako hayssta.”). R: reduced peak, N: no-valley, S: shift + no-valley.

	Number of Syllables			
	1	2	3	4
Nonfinal		<i>manul</i> R	<i>minali</i> R	<i>sakwaphai</i> R
		<i>kalpi</i> R	<i>santtalki</i> R	<i>yelmukimchi</i> R
Final	<i>sul</i> N	<i>namul</i> N	<i>pokswunga</i> R	
	<i>pay</i> N	<i>sakwa</i> N	<i>khongnamul</i> R	
I-Double	<i>mul</i> S	<i>nayngmyen</i> R	<i>mulnayngmyen</i> R	
	<i>pha</i> S	<i>phacen</i> R	<i>pulkoki</i> R	
M-Double	<i>pam</i> N	<i>kimpap</i> N	<i>sokoki</i> R	<i>ttalkiwuyu</i> R
	<i>kam</i> N		<i>kokwuma</i> R	<i>pamkokwuma</i> R

Table 4: Results of the object-focused utterances (“___ mekesstako hayssta.”). R: reduced peak, N: no-valley, S: shift + no-valley.

	Number of Syllables			
	1	2	3	4
Nonfinal		<i>manul</i> R	<i>minali</i> R	<i>sakwaphai</i> R
		<i>kalpi</i> R	<i>santtalki</i> R	<i>yelmukimchi</i> R
Final	<i>sul</i> N	<i>namul</i> N	<i>pokswunga</i> R	
	<i>pay</i> N	<i>sakwa</i> N	<i>khongnamul</i> R/N	
I-Double	<i>mul</i> N	<i>nayngmyen</i> R	<i>mulnayngmyen</i> R	
	<i>pha</i> N	<i>phacen</i> R	<i>pulkoki</i> R	
M-Double	<i>pam</i> N	<i>kimpap</i> N	<i>sokoki</i> R	<i>ttalkiwuyu</i> R
	<i>kam</i> N		<i>kokwuma</i> R	<i>pamkokwuma</i> R

Table 5: Results of the neutral utterances (“___ meknuntako hayssta.”). R: reduced peak, N: no-valley, S: shift + no-valley.

	Number of Syllables			
	1	2	3	4
Nonfinal		<i>manul</i>	<i>minali</i>	<i>sakwaphai</i>
		R	R	R
Final	<i>mul</i>	<i>namul</i>	<i>pokswunga</i>	
	N/R	N	R	
I-Double	<i>pay</i>	<i>sakwa</i>	<i>khongnamul</i>	
	N/R	N/R	R	
M-Double	<i>mul</i>	<i>nayngmyen</i>	<i>mulnayngmyen</i>	
	S/R	R	R	
M-Double	<i>pha</i>	<i>phacen</i>	<i>pulkoki</i>	
	S/R	R	R	
M-Double	<i>pam</i>	<i>kimpap</i>	<i>sokoki</i>	<i>ttalkiwuyu</i>
	N/R	N	R	R
M-Double	<i>kam</i>		<i>kokwuma</i>	<i>pamkokwuma</i>
	N		R	R

Table 6: of the neutral utterances (“___ mekesstako hayssta.”). R: reduced peak, N: no-valley, S: shift + no-valley.

	Number of Syllable			
	1	2	3	4
Nonfinal		<i>manul</i>	<i>minali</i>	<i>sakwaphai</i>
		R	R	R
Final	<i>mul</i>	<i>namul</i>	<i>pokswunga</i>	
	N	N	R/N	
I-Double	<i>pay</i>	<i>sakwa</i>	<i>khongnamul</i>	
	N	N	R	
M-Double	<i>mul</i>	<i>nayngmyen</i>	<i>mulnayngmyen</i>	
	N	R	R	
M-Double	<i>pha</i>	<i>phacen</i>	<i>pulkoki</i>	
	N	R	R	
M-Double	<i>pam</i>	<i>kimpap</i>	<i>sokoki</i>	<i>ttalkiwuyu</i>
	N	N	R	R
M-Double	<i>kam</i>		<i>kokwuma</i>	<i>pamkokwuma</i>
	N		R/N	R

These results are summarized as follows.

- When the object was Nonfinal or I-Double, the reduced peak occurred.
 - Exception: when the object was monosyllabic I-Double, the whole sentence was often pronounced as a “σσσ...” pattern. This resulted in the shift + no-valley when the original location of the peak in the verb was not the first syllable, and resulted in the no-valley when the original location of the peak in the verb was the first syllable.
- When the object was Final or M-Double, either the reduced peak or the no-valley took place.

- When the object consisted of more than two syllables, the reduced peak was more frequent.
- Comparing the neutral and the object-focused utterances, the neutral utterances had more occurrence of the reduced peak than the object-focused utterances did.

4.3. Discussion

The postlexical tonal phenomena found in the experiment are interpreted in the next section. Here, we briefly discuss on other two peripheral issues: (i) similarity between the object-focused and neutral utterances and (ii) the M-Double of more than two syllables.

As shown in the results, the neutral and object-focused utterances showed similar phenomena to one another. This similarity suggests that these two are the same in terms of prosodic phrasing. This is not surprising since, in some other languages/dialects, the syntactic structure of object-verb normally forms a single prosodic phrase, resulting in the same pattern as the structure with focus on the object. For example, in Tokyo Japanese sentences (13), which correspond to the materials of the present experiment, an object of the first word and a verb of the second word normally form one intermediate phrase in the sense of Pierrehumbert and Beckman (1988) or one tonal phrase in the sense of Kawakami (1961a, 1961b).⁸ (As a matter of fact, the third word is also included in this phrase.)

- (13) a. *Ninniku-o tabe-ru-to it-ta.*
 garlic-ACC eat-NPAST-QUOT say-PAST
 'I said I would eat garlic.'
- b. *Niku-o tabe-ru-to it-ta.*
 meat-ACC eat-PAST-QUOT say-PAS
 'I said I would eat meat.'

This phrasing can be interpreted by an approach of syntax-prosody interface (e.g. Kubozono 1989, Selkirk and Tateishi 1990), or by an approach of semantics-prosody interface (e.g. Kori 1992). Since it is beyond the scope of this paper, we do not discuss this issue further.

As for the M-Double of more than two syllables, they did not show any differences from the counterpart in Class A. That is, the three-syllable M-Double was identical to the three-syllable Final, and the four-syllable M-Double was identical to four-syllable Nonfinal with the accent on the penultimate syllable. This suggests that the M-Double of more than two syllables is completely merged into the counterparts in Class A.

5. PROSODIC MODEL AND THE INTERPRETATION OF THE PHENOMENA

In this section, the prosodic model of MCK is first proposed in 5.1. The phenomena described so far are then interpreted under the model in 5.2. Some issues related to the model are discussed in detail in 5.3.

5.1. Prosodic model

The prosodic model of MCK proposed here consists of five parts:

- lexical pitch accent and lexical edge tone;
- +L deletion;
- prosodic structure;

⁸ This is based on an introspective intuition by the author, who is a native speaker of Tokyo Japanese.

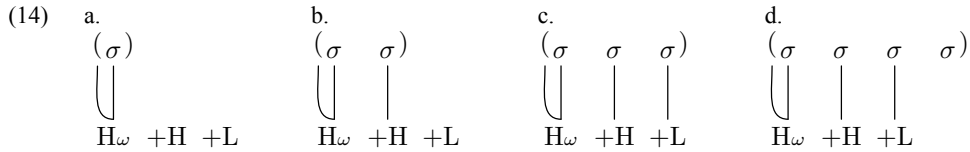
- tonal characteristics of the prosodic phrase;
- prosodic phrasing.

5.1.1. Lexical pitch accent and lexical edge tone

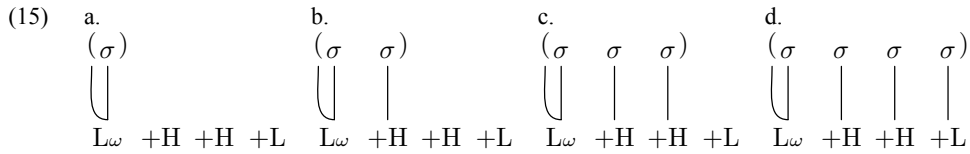
One lexical pitch accent, H*+L, and two types of lexical edge tones, H_ω+H+L and L_ω+H+H+L, are introduced.

The lexical pitch accent, H*+L, is introduced for Class-A words. The H* of H*+L is associated with any one syllable of each word in this class. Nonfinal has H* on any one non-final syllable; the next syllable is associated with +L. Final has H* on the final syllable.

Lexical edge tones, H_ω+H+L, associate with the left edge of the phonological word of I-Double. Each tone constituting H_ω+H+L links each syllable from the left by a secondary association, as in (14). (Round brackets, “()”, stand for the edges of a phonological word.)



The other type of lexical edge tones, L_ω+H+H+L, associate with the left edge of the phonological word of M-Double. This type also involves the secondary association, as in (15).



5.1.2. +L deletion

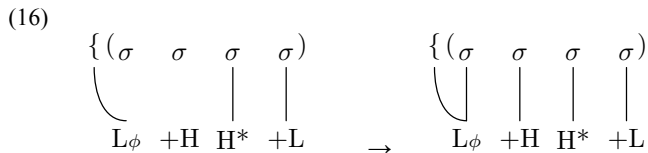
+L of H*+L and L_ω+H+H+L is deleted when it does not have syllables to associate with within the phonological word. For example, in *namul* (‘vegetable side dishes’, Final), +L is deleted unless the word is followed by postpositional particles. +L of H_ω+H+L does not involve this deletion. See 5.3.2 for further discussion.

5.1.3. Prosodic structure

MCK has a “prosodic phrase” level between the utterance level and the phonological word level in the prosodic hierarchy.

5.1.4. Tonal characteristics of the prosodic phrase

The left edge of the prosodic phrase is associated with L_φ+H. This type of edge tones also involves the secondary association if there are any syllables which are not associated with the lexical pitch accent or the lexical edge tones, as in (16). (Braces, “{ }”, stand for the edges of a prosodic phrase.)



Also, within the prosodic phrase, +L triggers downstep. That is, H tones after +L becomes lower than those which do not follow +L, unless there is a prosodic phrase boundary between the +L and H tones.

The prosodic phrase boundary blocks downstep and the secondary association of the lexical pitch accent, the lexical edge tones, and the prosodic-phrase-edge tones.

5.1.5. Prosodic phrasing

The prosodic phrase is initiated by a focused word. Post-focus words involve either of the following two patterns. (i) They are wrapped in the prosodic phrase that starts with the focused word. (ii) They form their own prosodic phrases, where the pitch range is compressed.

5.2. Interpretation of the phenomena

This subsection mainly shows the interpretation of the phenomena described in Section 4. Also, the phenomena related to Section 3 are discussed in 5.2.2.

5.2.1. Reduced peak, no-valley, and shift + no-valley

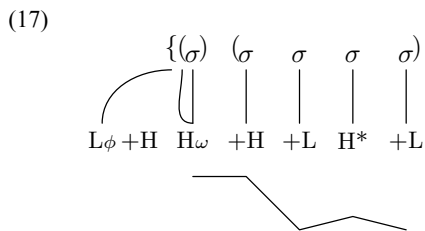
Under the model proposed above, the reduced peak found in the results is divided into two phenomena, downstep triggered by the +L and pitch range compression. On the other hand, no-valley is attributed to the lack of the prosodic-phrase-edge tone due to the wrapped phrasing. Also, no-valley lacks +L; thus, downstep is not triggered.

Examples of a two-syllable object followed by a four-syllable verb are schematically shown in Table 7. In this table, the reduced peak corresponds to the cases of A1, A3, B1, B2, B3, and B4. This is further divided into downstep triggered by +L (A1, A3) and pitch range compression which is not triggered by +L (B1, B2, B3, B4). The no-valley corresponds to A2 and A4.

Table 7: Prosodic phrasing, surface representation, and expected pitch contours for the two-syllable object followed by the four-syllable verb. Round brackets, “()”, stand for the edges of a phonological word and braces, “{ }”, for those of a prosodic phrase.

	Object-focused and Neutral		Verb-focused
	Wrapped	Compressed	
Nonfinal	<p>A1</p>	<p>B1</p>	<p>C1</p>
Final	<p>A2</p>	<p>B2</p>	<p>C2</p>
I-Double	<p>A3</p>	<p>B3</p>	<p>C3</p>
M-Double	<p>A4</p>	<p>B4</p>	<p>C4</p>

Shift + no-valley is also interpreted by the present model. As stated in 4.2.2, shift + no-valley was only found when an object is monosyllabic I-Double. This phenomenon is interpreted as the secondary association of $H_{\omega}+H+L$ that is applied over the phonological word boundary within a phonological phrase, as in (17). H^* in the verb is downstep because of $+L$.



This model explains why Nonfinal shows constant patterns while others show various phenomena. In the model, every tonal class involves two types of prosodic phrasing in the object-focused and neutral utterances. The reason why Nonfinal

seems to have at first blush constant patterns is that the two types of prosodic phrasing result in almost the similar contours in Nonfinal.

5.2.2. *Words in the citation form*

Tonal patterns of words in the citation form described in Section 3 are also interpreted in the model. The word in the citation form is considered as an utterance consisting of a prosodic phrase. Thus, they involve an utterance-final L% (see Footnote 4), a prosodic-phrase-initial $L_{\phi}+H$, and one of the lexically specified tones such as H^*+L , $H_{\omega}+H+L$, and $L_{\omega}+H+H+L$.

It is considered that some postpositional particles often form independent phonological words and even independent prosodic phrases. This explains the various patterns of *-kkaci* described in 3.2. Since the environment of reduced peaks in *-kkaci* almost corresponds to that in 4.2.2, it is explained in the same way, i.e. the wrapped type or the compressed type in Table 7. Not-reduced peaks are interpreted as either of no-valley (A2, A4) or not-compressed type (Column C). Even though it is not clear whether or not the deletion and the reduced peak can take place in the same environment and they differ phonologically, if they differ, the interpretation will be that the deletion takes place when the particle does not form an independent phonological word.

5.3. Some issues

5.3.1. *Pitch accent or edge tone?*

As stated in 5.1, the present model posits two types of the lexical edge tones. In this subsection, we discuss why they must be lexical edge tones rather than lexical pitch accents.

Another analysis would be to introduce another lexical pitch accent, H^*+H+L , instead of the lexical edge tones. That is, in I-Double, H^* of H^*+H+L is associated with the first syllable and, in M-Double, it is associated with the second syllable. The fact that there are no words that have H^* on the third syllable or later is accounted for in such a way that they are merged into Class A.

However, H^*+H+L cannot account for the monosyllabic M-Double shown in (4a). If M-Double has H^*+H+L whose H^* is associated with the second syllable, it means that a monosyllabic M-Double has an accent on the absent second syllable.

From a more general perspective, this issue is related to a concept of a “word tone” (Hayata 1976, 1999a, 1999b, etc.), or an almost equivalent concept, an “N-pattern accent” (Uwano 1984, 1989, 1999, etc.), that has developed in typological studies of lexical tonal phenomena in dialects of Japanese. The word tone/N-pattern accent is a type of the lexical tonal system, which is found e.g. in Kagoshima Japanese, that contrasts with another type, “accent” (Hayata 1976, 1999a, 1999b, etc.) or “multi-pattern accent” (Uwano 1989, 1999, etc.), e.g. Tokyo Japanese. Roughly speaking, the word tone/N-pattern accent system has a constant number of tonal patterns irrespective of the number of tone bearing units (TBU), while, in the accent/multi-pattern accent system, the number of possible tonal patterns is relative to the number of TBUs of a word.

Here, the author’s argument is twofold. First, the word tone/N-pattern accent can be attributed to the lexical edge tone. Second, MCK has a mixed system of the word tone/N-pattern accent with the accent/multi-pattern accent; Class A is the lexical accent system and Class B is the lexical edge tone system. The idea that MCK has a mixed system is also suggested by Kang (2005). In the present model, it is rephrased as a mixed system of the lexical edge tone and the lexical pitch accent. However, it is different from the tonal system of Osaka Japanese, which

also has both of the lexical pitch accent and the lexical edge tone (Pierrehumbert and Beckman 1988), in that the pitch accent and the edge tone are not independent in MCK; that is, the lexical edge tone does not coexist with the lexical pitch accent in each word.

It will be interesting to discuss the typology of lexical tonal phenomena in terms of lexical pitch accents and lexical edge tones even though it is beyond the scope of this paper.

5.3.2. +L: *deleted, unlinked, or absent?*

As stated in 5.1, in the present model, +L of H*+L and L_ω+H+H+L is deleted when it does not have syllables to associate with within the phonological word. One might consider that the deletion is not needed; rather, it is simply unlinked to the syllable. However, this cannot explain the different behaviour on downstep between Final/M-Double and I-Double. When the number of syllables is less than three syllables, neither I-Double nor Final/M-Double has a syllable to which +L links within the phonological word. However, I-Double always causes the reduced peak while Final/M-Double often causes the no-valley. (Note that shift + no-valley in the monosyllabic I-Double theoretically involves downstep as stated in 5.2.1; thus, it is also a variation of the reduced peak.) This should be interpreted in such a way that I-Double has an unlinked +L that triggers downstep while Final and M-Double do not.

This analysis is similar to the analysis of Northern Gyeongsang Korean by Kenstowicz and Sohn (1997) and Jun et al. (2006), in which Final deletes a L tone while Double does not.⁹ An unsolved problem, both in MCK and Northern Gyeongsang Korean, is why (I-)Double keeps L while other classes delete it, as has already been stated by Kenstowicz and Sohn (1997: 30f.).

Another analysis might be that Final and M-Double are indeed unaccented; they do not have +L to begin with. However, this analysis does not explain the fact that a postpositional particle attaches with low pitch after the Final, as in (18).¹⁰

(18) *sul* $\acute{\sigma}$ ('alcohol')
sul-i $\acute{\sigma}\sigma$

Therefore, we do not adopt this analysis.

5.3.3. *Two patterns of prosodic phrasing in post-focus words*

One of the important parts of the present model is that there are two patterns in the post-focus words: the wrapped pattern in the phonological phrase and the pitch range compression. Interestingly, the similar two patterns have been found in Seoul Korean, which does not have lexical tonal phenomena. The phenomenon corresponding to the former pattern has been called dephrasing of the accentual phrase in the prosodic study of Seoul Korean since Jun (1993). The latter pattern has also been observed in the recent studies of Seoul Korean (Jun and Lee 1998, Utsugi 2005, 2006a, 2006b). Utsugi calls this pattern in Seoul Korean, "Half Independent Connection".

There are two questions concerning these patterns. One question is how these two patterns are functionally different. The author's tentative idea is that the two

⁹ Note that Northern Gyeongsang Korean does not have M-Double class. Double in Northern Gyeongsang Korean corresponds to I-Double in MCK.

¹⁰ We do not have the evidence of +L for the case of M-Double at present. However, it is expected that a monosyllabic M-Double followed by a three-syllable particle shows a $\acute{\sigma}\sigma\sigma$ pattern even though the particle does not originally have an accent on the penultimate syllable. To confirm this, data of three-syllable particles are needed in the future research.

patterns differ in the degree of connection of two phonological words. That is, the wrapped type makes stronger connection than the compressed type does. This explains two factors that affect the prosodic phrasing. One is a factor of the word length. When the object consists of two syllables or fewer, the wrapped pattern is dominant. This is because shorter sentences prefer strong connection. The other is a factor of the focus type, i.e. object-focused or neutral. Object-focused utterances have more occurrences of the wrapped type than neutral utterances. This is because object-focused utterances prefer strong connection.

The other question is how the compressed type is represented in the surface. In the present model, the representation is not different from that of verb-focused utterances. To determine the representation, it should be examined whether the pitch range compression is phonological or not.¹¹ If it is phonological, a solution might be the one that introduces another level of the phrase between the prosodic phrase level and the utterance level, as “intermediate phrase” of Seoul Korean proposed by Jun (2006, forthcoming). However, it should also be noted that it is not the only solution to the phenomenon. Further studies, both experimental and theoretical, are needed.

6. CONCLUSION

This paper reported the results of field research on lexical and postlexical tonal phenomena in MCK. In the experiment, the three postlexical tonal phenomena were found: the reduced peak, the no-valley, and the shift + no-valley. Also, these phenomena were interplayed with lexical tonal phenomena; that is, the postlexical tonal phenomena in the post-focus word depended on the lexical tonal class of the focused word.

Based on these findings, the prosodic model is proposed. Some important points of the model include the following.

1. MCK has a lexical pitch accent and lexical edge tones.
2. It has downstep that is triggered by words having +L, within a prosodic phrase.
3. It has pitch range compression other than downstep.
4. It shows two types of prosodic phrasing in post-focus words.

These points have some similarities to other prosodically similar languages, such as various dialects of Korean and Japanese. For example, the second point is similar to Tokyo Japanese, and the fourth point is similar to Seoul Korean. Further examination of these similarities and differences, along with research of various understudied dialects of Korean, will contribute to typological and theoretical debates on prosody.

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¹¹ This issue was tried to examine by Utsugi et al. (2006) even though the results neither supported nor rejected that the phenomenon is phonological.

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