

Prosodic Phonology of Old Korean Regulated Poems*

Sunhee Han**

ABSTRACT

Old Korean regulated poems have a typical prosodic structure characterized by a pitch contour. This work applies Jun's finding in Seoul Korean (Jun 1993, 2000, 2005) to old Korean regulated poems, and reports some other significant phonetic characteristics, arguing that old Korean regulated poems have a regular rhythm based on the pitch contour implementing the typically hierarchical prosodic structure. The major prosodic units defined are a foot, a phrase, and a line. Next, this work proposes pitch contour characterizing prominence in a unit, boundary tones, and pauses at the boundary position, as the basic and significant cues of rhythm of a Korean poem. Specifically, some significant characteristics are discussed as follows: first, the tonal pattern of a foot is HL, starting high and ending low; second, the lowering boundary tones of HL% and L% are perceived at the end of a phrase and a line; and finally, a gradient degree of pause is observed at each unit-final position.

Keywords: Korean poems, prosodic phonology, pitch, boundary tones, pause

1. Introduction

Old Korean regulated poems counts over 1,500 recorded poems from the late Koryo Dynasty (917-1392 AD) through the Chosun Dynasty (1392-1910 AD). Many of these are still fondly recited, and the poets today have added countless verses of their own to make them an ever present rhyme on Korean's lips. It is interesting that Korean speakers recite old Korean regulated poems in the same rhythmical way, although they do not have any consciousness of prosody.

The previous works regarded the rhythm of old Korean regulated poems (henceforth Korean poems) as syllable-based, that is, they characterized the rhyme of Korean poems by counting the average number of syllable in each of the three lines and fixed them at the order of 3 4 4 4 for the first, 3 4 4 4 for the second and 3 5 4 3 for the last line. Kim(1981), however, argues that

* For useful comments and judgements in this work, I thank Prof. Patrice Beddor and audience at University of Michigan, where the earlier version of this paper was presented. Special thanks to Prof. Duanmu San, whose corpus study of Chinese regulated verse motivated my work, and whose delicate comments have been especially helpful. Finally, I want to thank some anonymous reviewers for their insightful comments. All remaining errors are my own.

** Dept. of English, Daelim College

the rhyme does not derive from the syllable-counting, but from the hierarchically organized structure of the phrases whose metricality is determined by the relative strength of each phrase in a line (Kim 1981:325).

This study is the first experimental attempt to introduce some hierarchical prosodic units that are marked by tone and pitch range and present an autosegmental-metrical model of prosodic phonology of Korean poems. In section 2, I suggest the prosodic structure of Korean poems based on an analysis of a corpus of eight Korean poems, and outline a brief description of the intonational structure of Seoul Korean proposed in Jun (1993, 2000, 2005). In section 3, I will discuss intonational structure of old Korean poems, based on the phonetic properties of prosodic units. Finally, in section 4, I offer concluding remarks.

2. Background

2.1 Prosodic structure of old Korean regulated poems.

Korean poems have a typical prosodic structure characterized by a pitch contour and the intonational structure reflects the prominence relation among words and the hierarchical prosodic structure.

To begin with, we should note that the prosodic units suggested here are based on recitation, which Korean students read aloud in a choral voice in their classrooms. They seem to have some unconscious linguistic knowledge of prosodic structure, on which they intuitively agree. Here we can speculate that in recitation the syntactic break is the most essential unit to make up an intonational constituent, that is, a foot. The syntactic boundary corresponds to that of a foot, a phrase and a line. Here is an example.

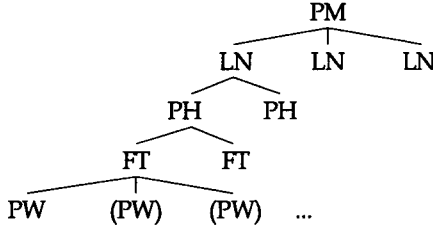
- (1) ganora/ sangaksana// dasiboja/ hangangsuya///
 goguk/ sancenoul// ddenagoja/ haryamanoun///
 sijeri/ hasusanghani// oldongmaldong/ hayiera///

*Let me leave, mountains; see you again, Han river.
 Though I'm leaving my mother country and home,
 Things are so complex; I'm not sure if I can come back.*

<Kim, Sanghen>

This rhythmic pattern shown may be good evidence for deciding the presence of prosodic units in Korean regulated poems. Now I suggest that the prosodic structure of Korean poems is schematically represented in (2).

(2) Prosodic structure of Korean regulated poems



(PW: Phonological Word FT: Foot PH: Phrase LN: Line PM: Poem)

Here, the definition of each prosodic unit is in order. A phonological word (PW) is the smallest prosodic unit in a Korean poem, and it is a lexical item plus a case marker or a postposition. A foot (FT) is the next highest prosodic unit, which is similar to an Accentual Phrase (AP) of Seoul Korean as in Jun (1993, 2000, and 2005). It is the same as or larger than a phonological word. It should be noted that the foot in Korean poems is different from the one defined as a stress-bearing rhythm unit in metrical phonology. This foot is the most important prosodic unit that crucially determines the rhythm of Korean poems. Next, a phrase (PH) is the higher prosodic unit, a combination of two consecutive feet, which corresponds to an Intermediate Phrase (ip), proposed in Jun’s (2005) revised prosodic model of Seoul Korean. Next, a line (LN) is the higher prosodic unit, a combination of two consecutive phrases, or four consecutive feet, which corresponds to Jun’s highest prosodic unit, Intonational Phrase (IP). Finally, a poem (PM) is composed of three lines. Among the five hierarchical prosodic units, our discussion will be mainly on the three major prosodic units; a foot, a phrase, and a line.

To sum up, as shown in (3), the basic form of a Korean poem is three four-foot lines; each poem contains three lines, each line has four feet, or two phrases, and each phrase has two feet. The template for Korean regulated poems is given in (3).

(3) Template for Korean regulated poems

- a. Two-foot phrases
- b. Two-phrase lines
- c. A three-line poem

Line: []
 Phrase: [] []
 Foot: [] [] [] []

This four-foot line is very common in most classical verse and modern folk verse in Chinese (Duanmu, 2000) and in English (Burling, 1966; Hayes, 1995).

2.2 Intonational phonology of Seoul Korean

Though languages vary in the number of prosodic units above the Word, ranging from one to three, prosodic units higher than a word are often marked by tone, pitch range, and/or final lengthening. In establishing the intonational structure of Seoul Korean, Jun (1993) proposed that Korean has a hierarchical structure of two prosodic units, that is, an Accentual Phrase(AP) and an Intonational Phrase(IP), which are proposed in terms of a pitch contour composed of two distinct tonal targets (High and Low) and their combinations (e.g., LH for a rising contour and HL for a falling contour). An AP is the smallest prosodic unit and the same as or larger than a phonological word, and it is marked by a phrasal tone, THLH (T=H if the AP-initial segment is aspirated or tense, T=L otherwise), but not by final lengthening.

An IP is a group of APs and is marked by a boundary tone and lengthening. A boundary tone is realized in the IP final syllable. Nine boundary tones have been identified according to the shape of F0 contour starting from the onset of the IP final syllable, L%, H%, LH%, HL%, LHL%, HLH%, HLHL%, LHLH%, and LHLHL%.

The first model of intonational phonology of Seoul Korean in Jun (1993 etc.) has only these two tonally defined prosodic units: Intonation Phrase and Accentual Phrase. Later, Jun(2005) added a prosodic unit, lower than an IP and higher than an AP, which is an Intermediate Phrase(ip). The revised prosodic units above the Word in Seoul Korean, from the highest to the lowest, are shown in (4).

- (4) Three tonally defined prosodic units above the Word in Seoul Korean (Jun, 2005):
Intonation Phrase (IP) > Intermediate Phrase (ip) > Accentual Phrase (AP)

Her newly added prosodic unit, an ip, is motivated to serve as the domain of "phonetic" downstep. An ip is a domain within which a downstep-like f0 lowering appears, showing a coherent unit of meaning and/or syntactic structure. The boundary of an ip is perceived either by pitch reset at ip-initial or by a higher AP-final boundary at ip-final. Unlike an IP, it does not show substantial phrase-final lengthening, nor IP boundary tone. A focused AP structure and relative clauses are the motivations given to posit the ip as a new prosodic unit. (See Jun, 2005 in detail)

3. Intonational structure of old Korean poems

3.1 Stimuli

The stimuli in this experiment are eight old Korean regulated poems. They are from a collection of famous Korean poems, most of which were from middle or high school textbooks.

Some of them originated from the end of the Korean Dynasty, but most of them are from the Chosun Dynasty. The full corpus is available in the appendix of this paper. All of them are regulated in that they have a fixed number of syllables per foot, phrase, line, and even poem, and they have a fixed three lines per poem.

I analyzed all 24 lines of the 8 poems to determine their significant prosodic properties and examined some characteristic properties of prosodic structure of a Korean poem in association with the tonal patterns frequently occurring in each prosodic unit.

3.2 Procedures

For this task, I recorded eight poems spoken by a male native speaker of Seoul Korean. The subject is a professional announcer who was born and educated in Seoul and has been working for more than 30 years in a broadcasting corporation in Korea. The eight Korean poems were familiar to him, and thus his reading was relatively natural. Recording was performed with the microphone Sony ECM-MS90 in a sound-proof broadcasting booth. The subject was asked to read the poems twice, and thus a total of 16 tokens were recorded. For analysis, I used the speech analysis program WaveSurfer (Version 1.8.5). The recorded data were digitized at 16,000 Hz. Transcription and labeling were conducted by myself and two graduate students majoring in Linguistics in the United States. This task focused on labeling the individual tones and boundary tones of a foot, a phrase and a line conforming to the surface pitch contour. Besides the tonal patterns, unit-final lengthening and duration of pause at the end of each unit were measured to provide the phonetic characteristics of each prosodic unit of a Korean poem.

3.3 Results and discussion

The hierarchical prosodic units proposed in this discussion are similar to the ones suggested for Seoul Korean; however, they show their own phonological and phonetic properties. In what follows, I will discuss the intonational patterns of three prosodic units of a Korean poem proposed here.

3.3.1 Pitch patterns

The autosegmental-metrical model of Intonational Phonology analyzes pitch contours in terms of two distinct tonal targets (H, L) and their combination (LH, HL). Furthermore, each tone is associated with either a metrically prominent syllable or the edge of a prosodic unit. Thus, intonational structure captures the prominence relation among words and the hierarchical structure of prosodic units.

The foot is proposed as the basic unit in Korean regulated poems. It consists of one or more phonological words and is characterized by a falling tonal pattern, which means that the foot-initial tone is High and the foot-final tone is Low. However, we find that the foot is also

characterized as SW, which means that foot-initial is Strong and foot-final is Weak. However, in this paper, I select pitch as the main prosodic element rather than strength, which can be regarded as a subsidiary element. This is supported by the fact that pitch accent is distinctive in old Korean literature and some remaining Korean dialects (Han, 1990).

This fall (HL) pattern is different from the rise (LH) pattern of an AP in Seoul Korean. Specifically, Seoul Korean is marked by THLH, that is, the phrase-initial tone is High or Low depending on the phrase-initial segment: High (H) if tense, aspirated consonants, /s/ or /h/, but Low, otherwise (Jun, 2000). Thus, phrase-final rising is the most significant pattern in Seoul Korean. However, in a Korean regulated poem, the intonational pattern of foot-initial High and foot-final Low is typically observed, and thus this High-Fall is one of the most important characteristics in a Korean regulated poem.

In our discussion, High at the onset of a foot is more salient than Low at the foot offset. Contrary to the Seoul Korean, a Korean regulated poem shows that foot-initial tone is always High regardless of the tenseness or aspiration of the consonants, and /s/ or /h/ segment. According to our phonetic analysis of the corpus of eight poems, only 31 % (30/96) of all the feet begin with the segments which are said to trigger the High tones. However, we could not find any realization of Low in the beginning of a foot; the foot-initial tone is always High.

Here, we should note that the pattern HL is not the only surface realization in a Korean poem. According to our phonetic analysis, an HL pattern is the most common, so it has higher percentages (83%, 80/96) than the other two patterns, Straight High (H) (7%, 7/96) and two consecutive High-Fall (HL-HL) (10%, 9/96).

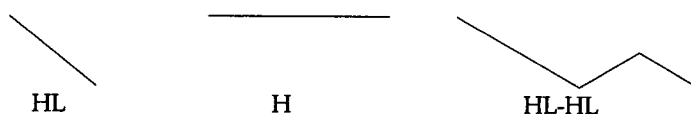
The HL-HL pattern frequently occurs in a heavy foot with more than four syllables, as in the second foot of the third line. It can also sometimes occur in a foot composed of only two syllables. Some examples are found in the first foot of the second line, where an HL-HL pattern is realized in the form of a contour tone on each syllable. It seems to result from a kind of rhythmical adjustment for a short foot with only two syllables.¹⁾

As we discussed, the HL pattern occurs most commonly in a foot of a Korean poem regardless of the number of syllables in the foot. Finally, although it is not frequent, in the pattern of Straight High, H sometimes occurs. In this case, H is thought to be H(L) in which Low tone is not realized, that is, undershot. The H pattern is frequently realized in a foot composed of only one uninflected lexical word.

Now, we posit HL patterns, which occur most commonly, as a basic one in this discussion. Thus, we posit a general tonal pattern for a Korean regulated poem, H(L)(HL) to include HL, H, and HL-HL. The following provides surface realization of foot tonal patterns in a Korean poem.

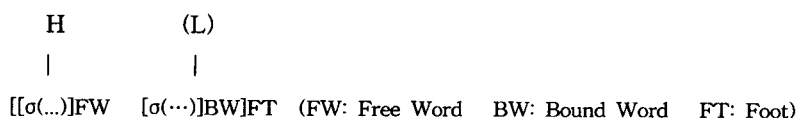
1) Interestingly, an uninflected lexical word foot as in 'go.guk' (home country) with only two syllables is realized HL-HL in our phonetic analysis, in spite of its small syllable number. In this case, the second High is a little downstepped.

(5) Foot tonal patterns in a Korean regulated poem



Now, I posit a correspondence rule for a Korean poem as in (6). At this point, we note that the correspondence rule for a Korean poem associates a position with more than one syllable, which differs from the metrical phonology of English or Chinese (Duanmu 2004). Thus, a correspondence rule for a Korean poem is needed in which a position can incorporate more than one syllable.

(6) Correspondence rule for foot of a Korean poem



The rule (6) is sensitive to the morphological structure of a foot. To be specific, the first H is associated with the free lexical word (Stem) irrespective of the syllable count, and the next L is associated with the grammatical word (Root) which is bound to the free lexical word. When a foot is an inflected word foot, composed of a lexical word and a grammatical word, both tones are realized, but when a foot is uninflected, that is, it has only one lexical word without any grammatical word, the second tone L is not realized, that is undershot. In that case, we posit a tonal pattern of H(L). Assumption of this undershot L is necessary to build the template for an uninflected lexical word in a Korean regulated poem. In the case of a compound word foot, the subcomponents of the compound are assigned H and L in that order. When a foot is from a rather heavy phrase, i.e., a maximal projection composed of more than four syllables, it may have an HL-HL pattern depending on the word composition.²⁾ The HL-HL pattern occurs most commonly in the second foot of the third line.

The correspondence rule (6) says that a position corresponds to a syllable or a sequence of adjoining syllables within the same morphological boundary. Examples of the HL pattern of the foot are shown in (7).

2) Of course, when a foot is composed of more than four syllables, if it is a composition of a lexical word and an inflected word (e.g., *mwe.-i.ro.da* 'is a mountain,' *bal.gan.-nou.nya* 'be lightened-INT'), then HL (not HL-HL) is realized.

(7) Foot patterns in a Korean poem

| Foot Patterns | Examples | |
|----------------------------------|---|--|
| a) Uninflected lexical word foot | $\begin{array}{c} H \quad (L) \\ \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \emptyset \\ \text{go.guk} \\ \text{'home country'} $ | $\begin{array}{c} H \quad (L) \\ \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \sigma \quad \sigma \quad \emptyset \\ \text{no.go. ji. ri} \\ \text{'lark'} $ |
| b) Inflected lexical word foot | $\begin{array}{c} H \quad L \\ \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \sigma \\ \text{Tai. sa. ni} \\ \text{'Taisan-NOM'} $ | $\begin{array}{c} H \quad L \\ \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \sigma \quad \sigma \\ \text{jo.hong.ga.mi} \\ \text{persimmon-NOM} $ |
| c) Compound word foot | $\begin{array}{c} H \quad L \\ \quad \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \sigma \\ \text{bem. na. bi} \\ \text{tiger butterfly'} $ | $\begin{array}{c} H \quad L \\ \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \sigma \quad \sigma \\ \text{ol.dong.mal.dong} \\ \text{'come or not'} $ |
| d) Phrase foot | $\begin{array}{c} H \quad L \quad H \quad L \\ \quad \quad \quad \\ \sigma \quad \sigma \quad \sigma \quad \sigma \\ \text{ne. do. ga. ja} \\ \text{'Let's go, you also'} $ | $\begin{array}{c} H \quad L \quad H \quad L \\ \diagdown \quad \diagup \\ \sigma \quad \sigma \quad \sigma \quad \sigma \\ \text{ssa. u. noun.go. re} \\ \text{'quarreling-valley- LOC'} $ |

For all the examples above, the HL is posited as a basic pattern of a foot. This says that prominence in a Korean poem always occurs in the first lexical part. (7b) illustrates an especially important point. According to Duanmu(2004) dealing with Chinese metrical phonology, stress maximum depends mainly on the inflected lexical word, compound, and phrasal stress. Thus, syntactic non-head is stressed, while a syntactic head is unstressed. Syntactic non-heads include content words such as nouns, verbs, adjectives, adverbs, and syntactic heads include functional and grammatical words like case-markers, inflectional suffix, postposition, etc. As evidenced by the examples in (7b) above, it can be also applied to the stress assignment of a Korean poem. These examples involve the combination of noun and case-marker (NOM, ACC, DAT, POSS, and LOC, etc.), noun and postposition, verb and inflectional suffix, adjective and inflectional suffix, etc. All the first elements in these examples are content words, that is, non-heads, so they have prominence in pitch pattern. In compound words composed of two lexical words, the first word is prominent owing to its non-headness, and it applies in the same way in the phrases. Accordingly, the template for a line of a Korean regulated poem is HLHLHLHL, that is, a trochaic four-foot line.

A foot composed of a single lexical word as in (7a) does not have internal syntactic structure, so it occupies only one position, which is H. In other words, for an uninflected foot, an empty (L) is assumed, which maps to the \emptyset position of the template. It is similar to empty (W)s proposed by Duanmu(2004) to make branching metrical structure in Chinese verses. Considering

disyllabic words in the corpus of Korean poems, there are a number of potential uninflected disyllabic words having empty (L)s. Most disyllabic feet in the corpus are in this category, so it is very productive. Interestingly, most of these are Sino-Korean words; 'ildo' (arriving), 'banjung' (on the plate), 'goguk' (home country), 'yuja' (citron). On the contrary, there is a small number of uninflected trisyllabic and quadrisyllabic words. They are unproductive, but they are also assumed to have empty (L)s.³⁾ These rather long uninflected lexical word feet like 'Cengsalli' (Cengsan village), and 'nogojiri' (lark) are phonetically realized HL by a postlexical tonal adjustment rule.⁴⁾

<Figure 1> illustrates the pitch tracks of a foot in a Korean poem. It shows H for an uninflected word foot 'yuja'(citron) and HL for inflected word feet, 'anirado'(even if be not), 'hadamanoun' (be but), and HL-HL 'pumoumjikdo' (worth cherishing), showing that all the foot-initial tones are High and foot-final tones are Low.

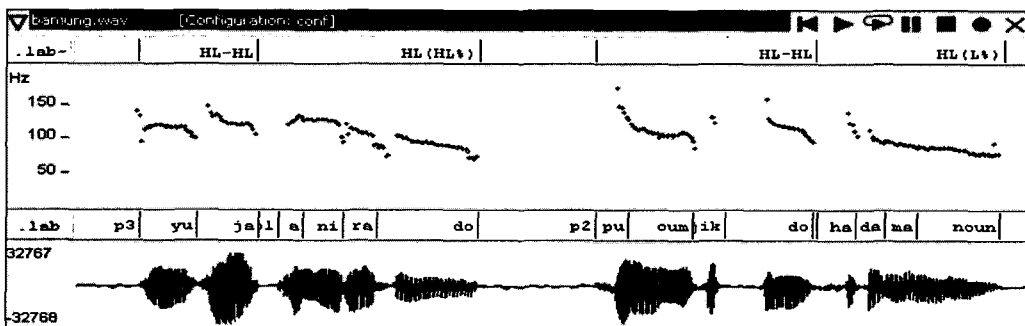


Figure 1. Pitch track of a line composed of four feet, ((yu.ja) (a.ni.ra.do)) ((pu.moum.jik.do) (ha.da.ma.noun)) 'although it is not a citron, it is worth cherishing.' The first foot (yuja) shows an HH pattern, and the others show HL patterns.

Discussion of the realization and location of H, HL, HL-HL tones is in order. First, as we discussed before, HL is the most common foot tone. H marks an H tone on the first syllable of a foot. This label should be aligned with the f_0 peak on the first syllable of a foot. The second tone L in HL pattern is aligned with an actual pitch drop on the foot final syllable. The trivial fall-rise change on the medial syllables is ignored. Next, H of Full High pattern marks an H tone on the first syllable of a foot and is aligned with the f_0 peak on the first syllable of a foot,

3) The assumption of empty (L)s is supported by the fact that case markers and postpositions are sometimes missing in Korean. For example, in 'goguk sancenoul' (home country's mountain and rivers-ACC) 'goguk' is the uninflected form of the inflected 'goguk-oui(POSS),' in 'yuja anirado' (although it isn't a citron) 'yuja-ga(NOM), and in 'nogojiri ujijinda' (a lark sings) 'nogojiri' is 'nogojiri-ga(NOM).

4) Straight High for rather long uninflected words is changed to HL by a postlexical tonal adjustment rule which lowers the latter part of the foot.

and it continues over the following syllable(s) when there is no pitch drop but only a high plateau on them. Finally, in the HL-HL tone pattern, the first H is aligned with the f_0 peak on the first syllable and the first L is placed on the actual pitch drop on the second syllable. The second H is placed on the f_0 peak on the penult of a foot and the second L marks an L tone aligned with an actual pitch drop on the final syllable of a foot.

Now, let's consider a phrase, the next higher prosodic unit. In a Korean poem, a phrase consists of two feet and is an intermediate prosodic unit, lower than an IP and higher than an AP. It is similar to the Intermediate Phrase (ip) proposed by Jun.

A phrase has some intonational characteristics showing a coherent unit of meaning and/or syntactic structure. First, a phrase has two feet, so it is marked by an HL-HL tonal pattern, when we posit HL as the basic foot tonal pattern. Here, the second H shows a phonetic downstep like f_0 lowering. Accordingly, it is perceived by pitch reset at phrase-initial position. In conclusion, an HL-HL tonal pattern, its phonetic downstep-like f_0 lowering and phrase-initial pitch reset are the most significant cues for a phrase in a Korean poem.

A pitch track example of a phrase is shown in <Figure 2>. In <Figure 2>, the phrases show downstepped HL-HL, that is, the first foot-initial H tone is higher than the second foot-initial H tone, and the second phrase shows phrase-initial pitch reset, so the beginning point of the first foot of the second phrase shows a higher f_0 peak than the preceding foot.

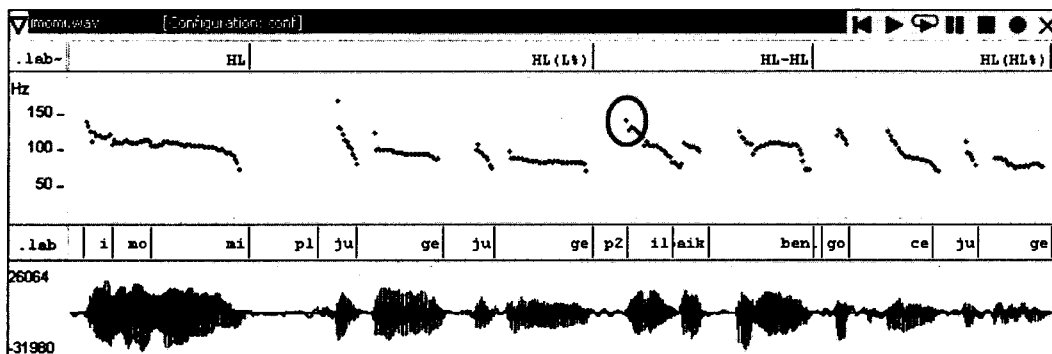


Figure 2. Pitch track of a line, composed of two phrases, {(i.mo.mi) (ju.ge.ju.ge)} {(il.baik.ben) (go.ce.ju.ge)} 'Even if I die and die, and die one-hundred times'

A line is the highest prosodic unit comparable to the Intonational Phrase (IP) of Seoul Korean. As shown in the discussion of the prosodic structure of a Korean poem, a line has four feet, which in turn has two phrases. Therefore, a line is marked by HL HL HL HL and by a boundary tone at the end. The four successive HL (starting high and ending low) foot line is similar to the trochaic four-foot line of Chinese poems (Duanmu, 2004). To summarize, the tonal pattern of a Korean poem is as in <Table 1>.

Table 1. Tonal pattern of a Korean poem

| Unit | Tonal Pattern | Characteristics |
|--------|---------------|---|
| Foot | HL | High-Fall |
| Phrase | HL HL | downstepped 2 nd HL |
| Line | HL HL HL HL | two ip's, pitch reset in the 2 nd phrase-initial |

3.3.2 Boundary tones

In Seoul Korean, the boundary tone is realized in the IP-final syllable, and sometimes in the ip-final syllable (Jun, 2000, 2005).⁵⁾ Specifically, depending on the shape of f₀ contour starting from the onset of the IP-final syllable, nine boundary tones have been identified (L%, H%, LH%, HL%, LHL%, HLH%, HLHL%, LHLH%, LHLHL%). However, in a Korean poem, the boundary tone is always realized in the phrase-final syllable as well as in the line-final syllable, and among the nine boundary tones suggested by Jun, only L% and HL% are identified.

HL% and L% are the same in that they are very common in declarative, but differ in the timing of falling; HL% is a falling boundary tone which rises to a F₀ peak before the last syllable of a foot, and then falls during the last syllable. This tone is common in wh-questions in addition to declaratives. L% is a level ending, or a gently falling boundary tone which is spread over much of the phrase-final foot. This tone should be placed at the end of the phrase aligned with the minimum f₀ value. HL% falls later than L%, showing an f₀ valley at the beginning of the phrase-final syllable. Schematic f₀ contours of HL% and L% are shown in <Figure 3>. The vertical line shown in each contour marks the beginning of the phrase-final syllable.

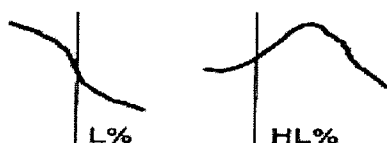


Figure 3. Schematic f₀ contours of boundary tones (HL% and L%)

For example, <Figure 4> shows HL% boundary tone at the first phrase-final position, and L% boundary tone at the second phrase-final position.

5) Lee(1990) called this boundary tone the nuclear tone, following the British tradition of intonational analysis. Here, he established nine nuclear tones; Low-Level, Mid-Level, High-Level, High-Fall, Low-Fall, Full-Rise, Low-Rise, Rise-Fall, and Fall-Rise.

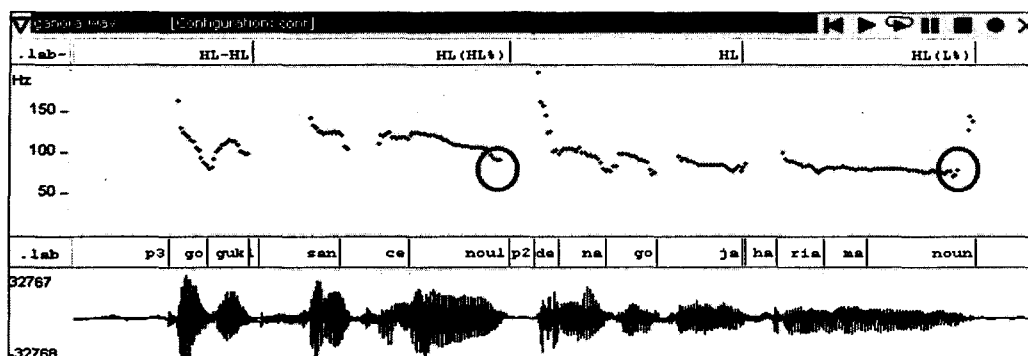


Figure 4. Example of HL% and L% boundary tones: {(go.guk) (san.ce.noul)} {(dde.na.go.ja) (ha.rya.ma.noun)} 'How can I leave my home land, mountain and river?'

Here we should note that a phrase boundary tone in a line-final position is overridden by a line-final boundary tone, and so only line-final boundary tone will be labeled at the end of a line. Thus, the distribution of boundary tones is in the phrase-final positions not in the line-final position, and boundary tones in line-final positions are shown below. A total of 48 cases of boundary tones are analyzed from eight Korean poems(6 boundary tones x 8 poems = 48 boundary tones).

Table 2. Distribution of boundary tones

| Position | Cases (total:48) | |
|--------------|------------------|-----|
| | L% | HL% |
| Foot-final | 0 | 0 |
| Phrase-final | 10 | 14 |
| Line-final | 23 | 1 |
| Total | 33 | 15 |

This table shows that there is not any boundary tone at the end of a foot, and both HL% and L% can occur in a phrase-final and a line-final position. However, they are different in their distribution; at the end of a phrase, HL%(58%) is more common than L%(42%), however, at the end of a line, L%(96%) is the more predominant boundary tone than HL%(4%).

3.3.3 Pre-boundary lengthening and pause

Besides the tonal pattern of HL and boundary tones, I analyzed pre-boundary lengthening and pause at the end of each unit. These two acoustic phenomena are dealt with as significant boundary effects in Korean continuous speech (Han 1998), and it was shown that they acted as much clearer acoustic cues at boundaries in a gradient increase as the unit becomes higher. In Seoul Korean, at the AP-final position, these two phenomena do not appear(Jun, 2000).

<Table 3> is an example poem (Poem 2: Cengsalli) showing the places of which the durations are measured, and <Table 4> is an overall statistical analysis of eight poems on average duration of each syllable according to its position, that is, non unit-final (S0), foot-final (S1), phrase-final (S2), and line-final (S3), and each pause at the end of a foot (P1), a phrase (P2), and a line (P3). <Figure 5> is to show clearly the gradient increase of syllable and pause duration in each unit-final position.⁶⁾

Table 3. The positions of syllable duration and pause in the poem of Cengsalli

| | | | | | | | | |
|----------|-------------|----|--------------------|----|-----------------|----|---------------|----|
| 1st line | ceng.sal.li | | biek.gei.su.ya | | su.i.ga.moul | | ja.rang.ma.ra | |
| | S0.S0.S1 | P1 | S0.S0.S0.S2 | P2 | S0.S0.S0.S1 | P1 | S0.S0.S0.S3 | P3 |
| 2nd line | il.ddd | | cang.hai.ha.myen | | da.si.o.gi | | e.rye.u.ni | |
| | S0.S1 | P1 | S0.S0.S0.S2 | P2 | S0.S0.S0.S1 | P1 | S0.S0.S3 | P3 |
| 3rd line | myeng.wo.ri | | man.gong.san.ha.ni | | swi.ie.gan.doul | | e.dde.ri | |
| | S0.S0.S1 | P1 | S0.S0.S0.S0.S2 | P2 | S0.S0.S0.S1 | P1 | S0.S0.S3 | P3 |

Table 4. Duration of a syllable and pause according to the position (sec)

| Poems | Syllable | | | | Pause | | |
|--------------------|-----------|------------|--------------|------------|------------|--------------|------------|
| | Non-final | Foot-final | Phrase-final | Line-final | Foot-final | Phrase-final | Line-final |
| 1) banjung | 0.21 | 0.38 | 0.36 | 0.33 | 0.10 | 0.44 | 0.96 |
| 2) Cengsalli | 0.21 | 0.35 | 0.43 | 0.38 | 0.09 | 0.25 | 0.78 |
| 3) dongcangi | 0.22 | 0.33 | 0.50 | 0.3 | 0.05 | 0.18 | 1.29 |
| 4) ganora | 0.20 | 0.28 | 0.39 | 0.31 | 0.03 | 0.20 | 1.10 |
| 5) imomi | 0.25 | 0.43 | 0.40 | 0.42 | 0.13 | 0.28 | 1.07 |
| 6) jalganora | 0.21 | 0.29 | 0.45 | 0.30 | 0.08 | 0.16 | 1.12 |
| 7) nabiya | 0.19 | 0.34 | 0.46 | 0.37 | 0.11 | 0.29 | 1.25 |
| 8) Taisani | 0.20 | 0.29 | 0.44 | 0.35 | 0.06 | 0.29 | 1.07 |
| Average | 0.21 | 0.34 | 0.43 | 0.35 | 0.08 | 0.26 | 1.08 |
| Standard deviation | 0.02 | 0.05 | 0.04 | 0.04 | 0.03 | 0.09 | 0.16 |

The boundary effect of unit-final position was found to be significant in the duration of syllable ($F(4, 35)=2.641, p<0.05$) and pause ($F(2, 21)=3.467, p<0.05$).

6) We did not measure the duration of P3 in the final line because it is placed at the end of a poem.

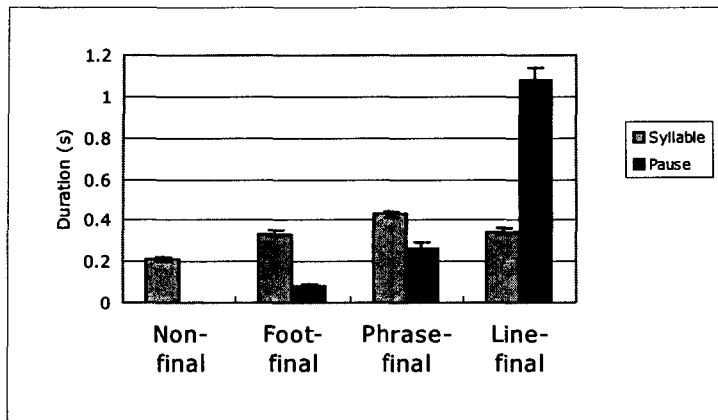


Figure 5. Duration of unit-final syllable and pause

According to <Table 4> and <Figure 5>, although each unit-final syllable is lengthened about two times as the non unit-final syllables, the differences of syllable duration on each unit-final position does not show any particular significance. Contrary to our expectation, the line-final pause is shown shorter than the phrase-final pause. However, the differences of pause duration are meaningful; they show a gradient increase as the unit is higher. Now we may conclude that pause plays a significant role as a cue showing the prosodic boundaries.

In sum, in addition to the tonal pattern and boundary tones, a gradually increasing boundary effect of pause marks prosodic units of a foot, a phrase, and a line.

3.4 Summary

The similar intonational phenomena as in Seoul Korean are found in a Korean poem whose prosodic structure is the same (though the terminology of each unit is different) as that of Seoul Korean, but has a different tonal pattern (HL) from Seoul Korean (THHL)(Jun, 1993, 2000). As the basic and significant cues of rhythm of a Korean poem, I proposed pitch contour characterizing prominence in a unit and boundary tones, and pause at the boundary position. As a result, we saw that the tonal pattern of a foot is HL, starting high and ending low, as seen in the figure of pitch track example. As for the boundary tones, at the end of a phrase, HL% is perceived a little more commonly than L%, and at the end of a phrase. L% is the predominant boundary tone. Finally, a gradient degree of pause is observed at each unit-final position. The boundary effect shown by the pause at final position acts as a phonetic cue of the prosodic unit in a Korean poem. <Table 5> shows a summary of intonational phonology of Korean poems.

Table 5. Summary of Intonational phonology of a Korean poem

| Prosodic units | Foot | Phrase | Line |
|----------------------|------|-------------------|------------------|
| Tonal pattern | HL | HL HL | HL HL HL HL |
| Boundary tones | None | HL%(58%), L%(42%) | L%(96%), HL%(4%) |
| Length of pause(sec) | 0.08 | 0.26 | 1.08 |

4. Conclusion

In this paper, I have introduced an autosegmental-metrical model of intonational phonology of a corpus of eight old Korean regulated poems and offered a phonological and phonetic analysis of the data. Earlier work on intonational phonology of Seoul Korean (Jun, 1993, 2000, 2005) sought Korean prosodic units of AP, ip and IP in terms of pitch pattern. This work applies Jun's finding in Korean regulated poems and reports some other significant phonetic characteristics, and argues that a Korean regulated poem has a regular rhythm based on pitch contour characterized in the typically hierarchical prosodic structure. The major prosodic units defined are a foot, a phrase, and a line, which correspond to Accentual Phrase(AP), intermediate phrase(ip), and Intonational Phrase(IP) respectively, suggested for Seoul Korean in Jun(2005).

Next, I have shown that Korean poems have certain intonational patterns realized within each prosodic unit: HL in a foot, HL HL in a phrase, HL HL HL HL in a line. It represents that a Korean poem had the cross-linguistically common four-foot lines. I have also shown while HL%, one of two boundary tones, is mainly perceived at the end of a phrase, the other boundary tone L% occurs predominantly at the end of a line. The final remark on intonational phonology in a Korean poem is the boundary effect of a gradient degree of pause at unit-final positions.

In conclusion, this work shows that old Korean regulated poems have a significant intonational phonology in terms of pitch pattern and the boundary effect characterized in their hierarchical prosodic structures.

References

- Burling, R. 1966. "The metrics of children's verse: a cross-linguistic study." *American Anthropologist* 68, 1418-1441.
- Duanmu, S. 2000. *The phonology of Standard Chinese*. Oxford: Oxford Univ. Press.
- Duanmu, S. 2004. "A corpus study of Chinese regulated verse." *Phonology* 21, 43-89.
- Halle, M., & Keyser, S. J. 1971. *English stress: its form, its growth, and its role in verse*. New York: Harper & Row.

- Han, S.-H. 1990. *Prosody in lexical phonology: cases of English and Korean*. Doctoral diss., Kyung Hee University.
- Han, S.-H. 1998. "A Study on phonetic properties of prosodic boundaries." *Journal of the Acoustical Society of Korea* 17(5), 12-22.
- Hayes, B. 1995. *Metrical stress theory: principles and case studies*. Chicago: University of Chicago Press.
- Jun, S.-A. 1993. *The phonetics and phonology of Korean prosody*. Ph.D. Thesis. Ohio State University. Columbus, Ohio. [Published in 1996 by Garland Publishing Inc., NY]
- Jun, S.-A. 1998. "The accentual phrase in the Korean prosodic hierarchy." *Phonology* 15(2), 189-226.
- Jun, S.-A. 2000. "K-ToBI (Korean-ToBI) labeling conventions: version 3." *Speech Sciences* 7, 143-169. [V.3.1. in UCLA WPP 99: 149-173]
- Jun, S.-A. 2005. "Intonational phonology of Seoul Korean revisited." Manuscript, University of California at Los Angeles.
- Kim, J. W. 1981. "The rhythmic structure for Sijo: a metrical account." *Hangeul* 173, 296-326.
- Kim, S. Y. 1968. "A study of metric measure of Sico-poems on the bases of sonograph testing." *Asia Study* 11(4), 1-41. Korea University.
- Lee, H.-Y. 1990. *The structure of Korean prosody*. Ph.D. Thesis. University College London. [Published by Hanshin Publishing Co.]

received: March 13, 2007

accepted: May 30, 2007

▲ Sunhee Han
Department of English
Daelim College
526-7 Bisan-dong, Dongan-gu Anyang
Gyeonggi-do 431-080, Korea
E-mail: shhan@daelim.ac.kr

Appendix 1: Romanization Convention

| Hangul | Roman Letters | Hangul | Roman Letters | Hangul | Roman Letters | Hangul | Roman Letters |
|--------|---------------|--------|---------------|--------|---------------|--------|---------------|
| ㅂ | b | ㄱ | gg | ㅏ | a | ㅑ | ye |
| ㄷ | d | ㅈ | jj | ㅓ | e | ㅕ | yo |
| ㄱ | g | ㅊ | s | ㅗ | o | ㅛ | yu |
| ㅈ | j | ㅌ | ss | ㅜ | u | ㅠ | yei |
| ㅍ | p | ㅎ | h | ㅡ | ou | 애 | yai |
| ㅌ | t | ㄴ | l | ㅣ | i | 와 | wa |
| ㅋ | k | ㅇ | m | 에 | ei | 워 | wo |
| ㅊ | c | ㄹ | n | 애 | ai | 외 | we |
| ㅃ | bb | ㅇ | ng | 의 | oui | 왜 | wai |
| ㄸ | dd | | | 야 | ya | 위 | wi |

Appendix 2: The corpus, 8 poems

- (Park, Illo)
banjung johonggami gowado boinani/ yuja anirado pumoumjikdo hadamanoun/
pumega bangiri epsouni gouroul serwo hanora/
- (Hwang, Jini)
Cengsalli biekgeisuya suigamoul jarangmara/ ildo canghaihamien dasi ogi erieuni/
myengwori mangongsanhani swiegandoul edderi/
- (Nam, Guman)
dongcang.i balgannounya nogojiri ujijinda/ so cinoun a.inoun sanggi ani irennounia/
jai neme sarai gin batoul enjei gallie hanani/
- (Kim, Sanghen)
ganora sangaksana dasiboja hangangsuya/ goguk sancenoul ddenagoja haryamanoun/
sijeri ha susanghani oldongmaldong hayiera/
- (Jung, Mongju)
imomi jugejuge ilbaikben gociejuge/ baikgori jintodwe.e neksirado itggo epggo/ nim
hyanghan ilpyendansimiya gasil juri issourya/
- (Kim, Centaik)
jal ganora datji malmye mot ganora swijimalla/ boudei goutji malgo conoumoul
aggressera/ gadaga jungji got hamyen ani ganman mothanira/
- (Anonymous)
nabiya cengsan gaja bemnabi nedo gaja/ gadaga jemulgedoun ggocei doure jago gaja/
ggoceise pudaijephagedoun ipeisena jago gaja/
- (Yang, Saen)
Taisani nopda hadoi hanoul arai mweiroda/ orougo ddo oroumyen mod oroulli
epgenmanoun/ sarami jei ani orougo mweman nopda hadera/