The Role of Foot Structure in Korean Accent Systems*

POPPE, Clemens

Korean dialects show quite an amount of variation in their prosodic systems. While some dialects have 'pitch accent' systems with many accentual/tonal distinctions (Kyengsang Korean), other dialects have no lexical accent distinction at all (the accentless dialect of Seoul). Still, even in accentless dialects, tone plays an important role at the level above the word. An interesting question is whether the different accent and tone patterns observed in Korean dialects reflect differences in metrical structure. The main purpose of this paper is to examine what evidence there is for foot structure playing a role in the accent/tone systems of Korean dialects. It is shown that by introducing foot structure, new light can be shed on some long-standing issues in Korean prosody, both diachronic and synchronic. Concretely, it is proposed that from the viewpoint of foot structure, there are two types of dialects in Korean: those with a preference for iambic feet (Middle Korean, Yanbian Korean, Seoul Korean), and those with a preference for trochaic feet (Kyengsang Korean). Furthermore, it is shown how the Kyengsang accent shift can be accounted for in terms of a shift from a preference for iambic feet to a preference for trochaic feet. Finally, the variation in foot structure that appears to exist in Korean is discussed from a cross-linguistic typological perspective.

1. Introduction

Korean dialects show quite an amount of variation in their prosodic systems. While some dialects have 'pitch accent' systems with many accentual/tonal distinctions, other dialects have no lexical accent distinction at all (Fukui 2003). Still, even in unaccented dialects, tone plays an important role at the phrasal level (S-A Jun 1996, Utsugi 2013).

Keywords: accent and tone, foot structure, Korean dialects, Middle Korean, word prosodic typology

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Studies on Korean intonation have provided a lot of insights into higher-level prosodic structure above the word level (S-A Jun 1996, 2005, O. Kang 1992, Silva 1990, Utsugi 2013). However, word-internal prosodic structure, and especially foot structure, has received less attention. An interesting question is whether the different accent and tone patterns observed in Korean dialects reflect differences in prosodic or metrical structure. For many languages, it has been shown that it is necessary to posit an intermediate level between the syllable and the phonological word: the foot. This idea is expressed in the prosodic hierarchy (Nespor and Vogel 1986) in (1).

\[
\begin{align*}
\omega & \quad \text{phonological word (prosodic word)} \\
F & \quad \text{foot} \\
\sigma & \quad \text{syllable} \\
\mu & \quad \text{mora}
\end{align*}
\]

The main purpose of this paper is to examine existing evidence and look for new evidence for foot structure playing a role in the accent/tone systems of Korean dialects. The goal is not to present a full account of the accent/tone systems of the different dialects, but to focus on the role that foot structure may play in such analyses.

This paper is organized as follows. Section 2 is about Middle Korean, a historical variety of Korean whose phrasal tonal system has been proposed to be iambic (Ito 2013). Following this, in section 3 the Kyengsang dialects are taken up. It is argued that the Kyengsang accent shift (Ramsey 1978) can be analyzed as a shift from iambic to trochaic feet. This is shown to have interesting consequences for the synchronic analysis of the dialects of North and South Kyengsang, both of which have been claimed to make use of feet in loanword accentuation (Kenstowicz and Sohn 2001, J. Kim 2009, D. Lee 2006, 2009, Davis 2010, Davis et al. 2012). In section 4, it is discussed what a foot-based analysis of Yanbian Korean may look like. It is argued that while there is no strong evidence for foot structure playing a role in the accent system of Yanbian Korean, the accent and tone patterns of this dialect are not incompatible with an iambic analysis. Next, in section 5, it is shown that the phrasal tone patterns of Seoul Korean become less arbitrary if we posit iambic feet. Finally, in the conclusion, the variation in foot structure that appears to exist in Korean is discussed from a cross-linguistic typological perspective.

1) Exceptions are the studies by S-H Kim (1999) and Hwangbo (2003). S-H Kim (1999) adopts a model in which unbounded feet and ‘open feet’ (feet that have only a single boundary) are allowed. Hwangbo (2003) proposes ‘tonal domains’ which could also be interpreted as open, unbounded feet. A discussion of the analyses proposed by S-H Kim (1999) and Hwangbo (2003) lies beyond the scope of this paper.
2. Middle Korean

Middle Korean was a tonal language in which monosyllabic, disyllabic, and trisyllabic words showed three, four, and five distinct tone patterns, respectively (see Ceng 1971, W-C Kim 1973, S-O Lee 1978, Ramsey 1978, Fukui 1985, 2013, Ito 2013). Examples adapted from Son and Ito (2016) are given in (2), where ‘H’ stands for high tone, ‘L’ for low tone, ‘R’ for a rising tone in a long syllable (which can be analyzed as consisting of a L and a H tone), and ‘X’ for a tone value that is predictable and depends on the number of syllables (σ) of the whole phrase. The H tone between parentheses indicates that if the noun is followed by another morpheme, the first syllable of this morpheme will be H-toned. In the examples, acute accents stand for H-toned syllables, grave accents for L-toned syllables, and circumflexes indicate a rising tone (in a lengthened syllable). Syllables that surface with different tones depending on the length of the phrase are left unmarked.

(2) MK tone patterns

<table>
<thead>
<tr>
<th>σ</th>
<th>σσ</th>
<th>σσσ</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>LL(H)</td>
<td>LLL(H)</td>
</tr>
<tr>
<td>LH</td>
<td>LLH</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>HX</td>
<td>HXX</td>
</tr>
<tr>
<td>R</td>
<td>RX</td>
<td>RXX</td>
</tr>
</tbody>
</table>

Examples

<table>
<thead>
<tr>
<th>σ</th>
<th>σσ</th>
<th>σσσ</th>
</tr>
</thead>
<tbody>
<tr>
<td>mòk</td>
<td>pə̀jàn</td>
<td>pòksjɑŋhwɑ</td>
</tr>
<tr>
<td>‘neck’</td>
<td>‘wind’</td>
<td>‘peach’</td>
</tr>
<tr>
<td>màṇ</td>
<td>mîṇ</td>
<td>mîṇ</td>
</tr>
<tr>
<td>‘garlic’</td>
<td>‘parsley’</td>
<td>‘daughters-in-law’</td>
</tr>
<tr>
<td>mil</td>
<td>kûrum</td>
<td>mìčikj</td>
</tr>
<tr>
<td>‘water’</td>
<td>‘cloud’</td>
<td>‘rainbow’</td>
</tr>
<tr>
<td>mál</td>
<td>sãram</td>
<td>šlusin</td>
</tr>
<tr>
<td>‘language’</td>
<td>‘person’</td>
<td>‘esteemed elder’</td>
</tr>
</tbody>
</table>

It has been pointed out that Middle Korean (MK) can be analyzed as a pitch accent system—which for the purposes of this study I take to be an accentual system in which pitch is the only phonetic correlate of accent—in which the leftmost H tone functions as an accent (Ramsey 1978, S-O Lee 1978, Fukui 1985, 2013, Ito 2013). All syllables before the leftmost H-toned one are L-toned.

The syllables following the accentual H tone are assigned rhythmic phrasal tones (Ceng 1971, W-C Kim 1973, S-O Lee 1978, Ramsey 1978, Fukui 1985, 2013, Ito 2013). Ito (2013) proposes that the phrasal tone patterns are the result of iambic feet built from right to left. The relation between phrasal tone patterns and metrical structure that Ito (2013) proposes for phrases of different lengths (two, three, four, and five syllables) starting with the same disyllabic noun is shown in (3). Note that Ito (2013) does not indicate the foot structure of syllables from the start of the word up to the accented syllable. In (3), brackets denote foot boundaries, periods mark syllable boundaries, grave accents stand for H tones, and hyphens indicate morpheme boundaries.
The foot structure posited by Ito (2013) explains the rhythmic tonal pattern in which a H tone appears on every odd-parity syllable counted from the right edge up to the accented syllable or, in the case of words of the LL class, up to the right boundary of the noun. While Ito’s proposal (2013) is insightful, I would like to propose a number of revisions that enable us to make the generalization that not only phrasal H tones, but also lexical H tones mark the head of a foot. In Ito (2013), foot structure is only discussed in the context of the phrasal tone patterns that follow the lexical accent and the relation between the accentual H tone and foot structure is not considered. Furthermore, in LL forms the final L-toned syllable does not form a foot with the following H-toned syllable when such words are followed by a particle. To enable a more consistent analysis, I propose the revised analysis in (4). The revised analysis is based on the assumptions that (i) accentual H’s are linked to the rightmost syllable of a foot (the head syllable of an iamb), and (ii) the final syllable of LL words forms a foot with the following syllable (at least when such a syllable is available). The additions and changes made are highlighted in grey.

(4) Middle Korean (revised analysis):

<table>
<thead>
<tr>
<th>Class</th>
<th>Example</th>
<th>Gloss</th>
<th>2σ</th>
<th>3σ</th>
<th>4σ</th>
<th>5σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH</td>
<td>mà.nül ‘garlic’</td>
<td>σ[œ] σ[œ]-[œ] σ[œ]-[σœ] σ[œ]-[σ][σœ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HX</td>
<td>kú.rum ‘cloud’</td>
<td>σ[œ] σ[œ]-[œ] σ[œ]-[σœ] σ[œ]-[σ][σœ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL</td>
<td>pʌ.rım ‘wind’</td>
<td>σ[œ&lt;œœ&lt;œœ] σ[œœ&lt;œœ] σ[œœœ&lt;œœ]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Some comments are in order. First, as in the foot-based analysis proposed by Ito (2013), monosyllabic feet are allowed as long as they contain a H tone. Second, note that the disyllabic (isolation) form of pʌ:rım ‘wind’ is given with a word-final foot that includes a ‘catalectic’ (Kager 1995) empty syllable marked by ‘< >’. The reason for this is that in words like this no H tone appears as long as it is not followed by other material. When a particle follows, an accent is realized on the first syllable of this particle, which suggests the final syllable of the noun and the first syllable of the particle form a foot together as in the trisyllabic and longer forms in (4). We could assume that the catalectic syllable is deleted if it is not filled with material, the result of which is that no H tone appears: pʌ:rım. Alternatively, we could assume that the catalectic syllable is actually part of the phonological surface form, but fails to be interpreted phonetically: pʌ[rım<œœ>. Whenever the nucleus is filled

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2) Although Ito (2013) argues in favor of an iambic analysis in the descriptive part of the paper, in the formal analysis she proposes, it turns out that constraints on tonal clashes and lapses obviate direct reference to metrical foot structure. Still, this does not necessarily mean that foot structure is not relevant.
with (or merges with) material from the particle, the H tone can be realized on the second 
syllable of the foot, as in the nominative form pɨʳ.[ɾ.ʆ.m-.]. If we choose the first analysis, the 
absence of a H tone on the surface can only be accounted for if we follow Ito (2013) and 
posit a L tone that is linked to the final syllable (and a floating H tone that associates to 
the first syllable of a following particle when present). In either case, words like pɨ쓰.ɾ imposes some sort of special treatment. The same holds for words of the R-class, which are not dealt 
with in detail in this paper. Note, however, that a lengthened syllable with a rising tone 
(which consists of a sequence of a L and a H tone) can be thought to constitute an iamb 
by itself. The only peculiar thing about such a structure is that the H tone is linked to the 
second mora rather than the first mora of the syllable that heads the foot.

In this section, I have only shown that not only the phrasal tone patterns, but also the 
accentual H tones can be assumed to be located inside feet. However, the only evidence 
in favor of foot structure still comes from the phrasal tone patterns. In the next section, it 
is shown though how the proposed revisions have interesting consequences for both the 
change from a MK-type system to Kyengsang Korean, as well as for the synchronic analysis 
of Kyengsang Korean.

3. Kyengsang Korean

3.1. North Kyengsang Korean

In this section, we will focus on North Kyengsang Korean (NKK) and its relation 
to MK. Before we take a look at the synchronic system of NKK, let us take a look at the 
diachronic correspondences between the tone patterns of disyllabic words in MK and NKK.

(5) Middle Korean:         RX         HX        LH   LL(-H) 
North Kyengsang:      H:H(L)   HH(L)   HL   LH

As can be seen in (5), the reflexes of MK LH and LL(-H) are HL and LH. Words of the 
MK HX and RX classes are realized with a word-initial double high tone pattern in NKK. 
In the reflexes of the RX class, the first syllable has inherited the long vowel which was 
necessary in MK to accommodate the rising tone. Based on the fact that words of the MK 
LH and LL classes in NKK have a H tone one syllable to the left of that in MK, as well 
as the fact that in compounds words of the HX and RX classes behave as ‘pre-accenting’, 
Ramsey (1978) proposes that the accent system of Kyengsang dialects results from a 
leftward shift of the distinctive H tone. More recently, the accent patterns of Sino-Korean 
words have been shown to form additional evidence for this diachronic analysis (Ito 2013).

While the analysis based on the Kyengsang accent shift is convincing, it also raises 
a number of interesting questions that merit further attention. First, it has been pointed 
out that leftward or ‘anticipatory’ movement of H tone is less common than rightward 
or ‘perseverative’ movement of H tone. Importantly, H tone anticipation is said to only 
occur in particular cases (Hyman and Schuh 1974, Hyman 2007), and generally involves
the “attraction of a tone to a metrically strong position and avoidance of H before pause” (Hyman 2007: 20). An important question thus is what circumstances motivated the leftward Kyengsang accent shift. Second, we need to account for the peculiar forms with an initial sequence of two H-toned syllables in Kyengsang Korean, both diachronically and synchronically. Examples of such ‘double-H’ words can be found in (6), where the distinctive accent/tone classes of NKK words of one to three syllables with representative examples are given (adapted from Son and Ito 2016; see also G-R Kim 1988, Chung 1991, Gim 1994, N-J Kim 1997, Son 2007). Note that only H-toned syllables are marked in the examples in (6).

(6) NKK tone patterns

<table>
<thead>
<tr>
<th>σσ</th>
<th>σσσ</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>H(L)</td>
<td>LH(L)</td>
<td>LLH(L)</td>
</tr>
<tr>
<td>HL</td>
<td>LHL</td>
<td>mánil ‘garlic’</td>
</tr>
<tr>
<td>HLL</td>
<td>múl ‘water’</td>
<td></td>
</tr>
<tr>
<td>H(H)</td>
<td>HH(L)</td>
<td>HHL(L)</td>
</tr>
<tr>
<td>H.H(L)</td>
<td>H.H(L)</td>
<td>sá:rám ‘person’</td>
</tr>
</tbody>
</table>

According to Kenstowicz et al. (2008), the Kyengsang accent shift can be seen as a push chain shift in which the change from LL to LH triggered a shift from LH to HL, and the latter shift in turn triggered a shift from HL to HH (LL > LH > HL > HH). This interesting proposal is based on the idea that LL changed to LH because of the introduction of a requirement that a word must have a pitch peak. Kenstowicz et al. (2008) argue that the choice for a final H tone in LH was motivated by the fact that the final syllable was the most popular location of H tone in terms of frequency. However, it is not completely clear how a change from LL to LH can be motivated by the default status of final H tone, while at the same time the default status of the final H tone is lost by the shift of words with default final H tone to penultimate H tone (HL). What is more, the idea of a push shift suggests that the HH pattern was entirely new to the system, while in reality the pattern could be observed in words of the HX class in the MK system already, as can be seen in the examples in (3) and (4).

Ito (2013) makes the important observation that the double-H pattern can be accounted for if we assume that the Kyengsang accent shift involved a “leftward H tone shift in an LH sequence” (Ito 2013: 185) rather than a shift of an accentual H tone or a H tone in any environment. Based on the revised analysis proposed in (4), I propose that the ‘Kyengsang accent shift’ involved a change from iambic to trochaic feet, as in (7).
(7) a. Middle Korean: iambic feet

<table>
<thead>
<tr>
<th>Class</th>
<th>Example</th>
<th>Gloss</th>
<th>2σ</th>
<th>3σ</th>
<th>4σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH</td>
<td>mà.n ál</td>
<td>‘garlic’</td>
<td>[σό]</td>
<td>[σό]-[ό]</td>
<td>[σό]-[σό]</td>
</tr>
<tr>
<td>HX</td>
<td>kú.rum</td>
<td>‘cloud’</td>
<td>[ό][ό]</td>
<td>[ό][ό-ό]</td>
<td>[ό][ό-σό]</td>
</tr>
<tr>
<td>LL</td>
<td>pà.rám</td>
<td>‘wind’</td>
<td>σ[σ&lt;σ&gt;]</td>
<td>σ[σ-σ]</td>
<td>σ[σ-σ][ό]</td>
</tr>
</tbody>
</table>

b. NKK: leftward foot-internal H tone shift + culminativity

<table>
<thead>
<tr>
<th>Class</th>
<th>Example</th>
<th>Gloss</th>
<th>2σ</th>
<th>3σ</th>
<th>4σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL</td>
<td>má.nal</td>
<td>‘garlic’</td>
<td>[όσ]</td>
<td>[όσ]-[σ]</td>
<td>[όσ]-[σσ]</td>
</tr>
<tr>
<td>HH</td>
<td>kú.ɪm</td>
<td>‘cloud’</td>
<td>[ό][ό]</td>
<td>[ό][ό-σ]</td>
<td>[ό][ό-σσ]</td>
</tr>
<tr>
<td>LH</td>
<td>pa.rám</td>
<td>‘wind’</td>
<td>σ[σ&lt;σ&gt;]</td>
<td>σ[σ-σ]</td>
<td>σ[σ-σ][σσ]</td>
</tr>
</tbody>
</table>

Before we take a look at the change in foot type in more detail, let us first turn to the important question of what could have caused such a change in the first place. Building on proposals made in the Korean literature (cf. Y-C Ceng 1971, W-C Kim 1973), I propose that the change from iambic feet to trochaic feet was initiated by the association of a final L boundary tone to the final syllable. As a result of this, the phrase-final default H tone that frequently appears phrase-finally in Middle Korean shifted one syllable to the left in final binary feet. In order to keep the rhythmic tonal alternations, other H tones, including lexically specified accentual ones, by analogy also shifted to the left within the foot. Furthermore, following Ito (2013), I assume that the introduction of a constraint on culminativity of H tone (‘maximally one pitch peak per prosodic word/phrase’) was responsible for the removal of H tones following the first drop in pitch from high to low within a word or phrase. In other words, it became impossible for a tonal contour HLH to appear in a word or phrase.

Let us now turn to the changes in the different types of words in more detail. The changes in the words corresponding to the MK LH and LL classes do not require much further explanation. In both classes, the change in foot type from iambic to trochaic and the introduction of the culminativity constraint explain all forms. The case of words of the HX class, however, deserves some more attention. First of all, the fact that forms like kú.ɪm did not become *kú.ɪm suggests that in final monosyllabic feet, the boundary L tone was not able to associate to the final syllable. This makes sense if MK had a ‘foot-head prominence’ constraint according to which every foot, or more specifically, every foot head must contain a H-toned syllable. A foot-head prominence constraint like this is also discussed below in the synchronic analysis of the NKK accent system. In words of the HX class followed by a monosyllabic particle, the change from [ό][ό-σ] to [ό][ό-σ] requires no further explanation. However, when it comes to forms with a disyllabic particle,
we need to explain why we find the form \([\acute{\alpha}]\tilde{\alpha}[\sigma\sigma]\) rather than \(* [\acute{\alpha}]\tilde{\alpha}[-\sigma\sigma]\). Actually, there is no problem with assuming that this form actually did exist at some intermediate stage. However, this form eventually changed to \([\acute{\alpha}]\tilde{\alpha}[-\sigma\sigma]\), presumably because forms with a sequence of three H-toned syllables did not appear in words of one, two, or three syllables of the same accent class. In other words, the change can be thought to be a case of analogical levelling. The prohibition of three adjacent H-toned syllables can be directly translated into the constraint *HHH, as in Ito (2013). Alternatively, if we analyze adjacent H-toned syllables as a single multiply linked H tone, the prohibition of a sequence of three H-toned syllables can be expressed in terms of a constraint against linking a H tone to more than two syllables (Binary-H; Zec 2009).

The changes discussed above can be summarized as in (8), where three hypothetical stages are posited. The proposed changes, which are highlighted in grey, are very similar to those proposed by Ito (2013), the main difference lying in the role attributed to foot structure. Stage 1 is a stage that is identical to the Middle Korean accent system. In stage 2, the change from iambic to trochaic feet occurred, presumably caused by the introduction of a L boundary tone. Finally, in stage 3, the culminativity constraint and a constraint against three successive H-toned syllables was introduced, resulting in the present-day Kyengsang-type accent system.\(^5\)

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Stage 1} & \text{Stage 2} & \text{Stage 3} \\
\hline
\text{LH} & [\sigma\sigma] & [\tilde{\sigma}\sigma] & [\acute{\sigma}] \\
\text{+ 1 σ morpheme} & [\sigma\sigma][-\acute{\alpha}] & [\tilde{\sigma}\sigma][-\acute{\alpha}] & [\acute{\sigma}][\sigma\sigma] / [\tilde{\sigma}\sigma][-\tilde{\alpha}] \\
\text{HX} & [\tilde{\sigma}][\acute{\alpha}] & [\tilde{\sigma}][\tilde{\alpha}] & [\tilde{\alpha}][\tilde{\sigma}] \\
\text{+ 1 σ morpheme} & [\tilde{\sigma}][\tilde{\alpha}][-\sigma\sigma] & [\tilde{\alpha}][-\sigma\sigma] & [\tilde{\alpha}][-\sigma\sigma] / [\tilde{\alpha}][\tilde{\sigma}] \\
\text{LL} & \sigma[\sigma,-\sigma,\sigma] & \sigma[\tilde{\sigma},\sigma,-\sigma] & \sigma[\tilde{\sigma},\sigma,-\sigma] \\
\text{+ 1 σ morpheme} & \sigma[\sigma,-\sigma] & \sigma[\tilde{\sigma},-\sigma] & \sigma[\tilde{\sigma},-\sigma] \\
\text{+ 2 σ morpheme} & \sigma[\sigma,-\sigma][\tilde{\alpha}] & \sigma[\tilde{\sigma},-\sigma][\tilde{\alpha}] & \sigma[\tilde{\sigma},-\sigma][\tilde{\alpha}] / \sigma[\tilde{\sigma},-\sigma,\tilde{\sigma}] \\
\hline
\end{array}
\]

The foot-based analysis of the Kyengsang tone/accent shift is welcome from a typological perspective. As I already mentioned, it has been shown that H tone anticipation only occurs in particular cases (Hyman and Schuh 1974, Hyman 2007), and generally involves the “attraction of a tone to a metrically strong position and avoidance of H before pause” (Hyman 2007: 20). The Kyengsang accent shift may be seen as a combination of the two. Because of the introduction of a final L boundary tone, feet with non-lexical tones changed from iambs into trochees. By analogy, other H tones, including lexically specified

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5) Because it is not clear whether syllables following the accented foot are parsed into feet, for some forms in stage 3 two different options are given in (8). In the remainder of this paper, syllables preceding and following the accented feet will be left unparsed. This somewhat arbitrary assumption seems to be supported by the tone patterns of loanwords, which will be discussed below.
accentual ones, also shifted to the left within the foot.

The foot-based analysis of the Kyengsang accent shift has interesting consequences for the synchronic analysis of double-H words in NKK. If words of the double-H class inherited the foot structure of the Middle Korean forms, they must have a word-initial monosyllabic foot. An interesting question is whether these feet are lexically specified, or whether they are derived from a lexical tonal representation of double-H words that crucially differs from the representation of words with a single H tone.

For instance, we may posit an underlying H tone for words of the double-H class as opposed to an accentual H*(L) tone for words of the single-H class. Alternatively, we may follow the analysis of SKK by Kim and Jun (2009) and posit a H+H tone for double-H words, and a H+L tone for words of the other classes. In both approaches, differences in foot structure could be derived from the rules or constraints that regulate the interaction between tones and foot structure. For the purposes of this paper, however, I will assume that double-H words differ from single-H words in terms of foot structure rather than in terms of type of H tone. This means that for either or both of the classes of words, the foot structure must be indicated in the lexicon. Because monosyllabic feet are cross-linguistically marked, it seems more natural to assume that at least words of the double-H class have a lexically specified foot, as in (9a). If this is the case, words of the single-H class can be marked with only an underlyingly linked H tone, as in (9b).

(9) Underlying | Surface
a. [kú]rìm → [kú][rìm] ‘cloud’
[mù]cìkɛ → [mù][cìkɛ] ‘rainbow’
b. máñìl → [máñìl] ‘head’
mjònìrì → [mjònìrì] ‘daughter-in-law’

It is also possible to push the foot-based approach to its limits, and assume that the accentual/tonal behavior of all word classes is determined by lexically specified foot structure. In such an analysis, words with an initial double H tone will have the representations in (10a), and those with a single initial H tone the representations in (10b).

(10) Underlying | Surface
a. [ku]rìm → [kú][rìm] ‘cloud’
[mù]cìkɛ → [mù][cìkɛ] ‘rainbow’
b. [matñìl] → [máñìl] ‘head’
mjònìrì → [mjònìrì] ‘daughter-in-law’

In an analysis based on (9), the foot structure in words of the single-H class can be derived from a preference for H tones to be ‘licensed’ by a foot head (11a). In an analysis based on (10), on the other hand, the H tone can be analyzed as marking the head of a foot, making it prominent (11b).
(11) a. H-licensing: A H tone is linked to a foot head.
   b. Foot-Head Prominence: A foot head is marked by a H tone.

Regardless of the analysis we adopt, the leftmost foot that surfaces with a H tone will have some form of lexical specification. The additional foot and its H-toned head syllable in words of the double-H class, on the other hand, need not to be lexically specified. Therefore, the next question we must answer is where the additional foot and H-toned syllable in words of the double-H class come from. The simplest answer seems to be that there is a general rule or constraint that triggers the construction of feet, but that feet are only built if the tonal structure that results from this does not involve a HLH sequence.

In other words, a word may have multiple feet with an H-toned head as long as there is no violation of the culminativity constraint. This rules out a form like *[mjɔni][rɪj] ‘daughter-in-law’ which has two pitch peaks.

Next, let us turn to words with an accent on the final syllable. For such words, we may either posit a lexically specified H tone on the final syllable, e.g. parám ‘wind’, or a lexical foot ending in a catalectic syllable, e.g. pa[ram<σ>] ‘wind’. In either analysis, when a monosyllabic particle follows, this particle will be included in the same foot, as in pa[ram-i] ‘wind-nom’.

Now that we have discussed the relation between tone and foot structure in simplex nouns, let us turn to the pre-accenting behavior of words of the double-H class. As pointed out by Ramsey (1978), in the Kyengsang dialects, in compounds consisting of a first member with a final H tone and a second member of the double-H class, an accent appears on the final syllable of the first noun, and the second noun is realized with an all-low pitch. According to Ramsey (1978), this can be explained if words with a final H tone are unaccented, and words of the double-H class have a ‘pre-accent’. Because this pre-accent is absent in a compound that consists of two members of the final-H class, in such compounds the second member will have a H tone on its final syllable. Relevant examples of compounds are given in (12).

(12) Compound tone patterns (data from G-R Kim 1988)

   a. i. Final H + Double H   kúk-pap       ‘soup and rice’ (pre-accenting)
       ii. Final H + Final H    k’och-cíp    ‘flower shop’
   b. i. Double H + Double H  póm-pí      ‘spring rain’
       ii. Double H + Final H  páp-cíp      ‘meal house’

The pre-accenting behavior of words of the double-H class can be accounted for if we assume the representations in (13), where the difference between final-H and double-H words is that the former have a lexically specified foot with catalexis, while the latter are specified with a degenerate monosyllabic foot.

6) Alternatively, we may assume that there is a rule or constraint that promotes the spreading of the H tone, which in turn triggers the construction of a foot. The spreading of this H tone would not apply when a foot dependent intervenes between two foot heads.
Foot structure and compound tone patterns

a. 
1. \([kuk<\sigma>] + [pap]\) → \([\text{kūk-pap}]\)  ‘soup and rice’
2. \([k’och<\sigma>] + [ci<p<\sigma>]\) → \([\text{k’och-[cíp]}]\)  ‘flower shop’

b. 
1. \([pom] + [pi]\) → \([\text{póm}-[pí]}\)  ‘spring rain’
2. \([\text{pap}] + [ci<p<\sigma>]\) → \([\text{páp}-[cíp]}\)  ‘meal house’

The idea behind the analysis is that when a monosyllabic foot follows an empty catalectic syllable, it will merge with this syllable (13a-i). However, this does not happen when a foot with a catalectic syllable is followed by another foot with a catalectic syllable (13a-ii). Furthermore, two adjacent monosyllabic feet are not merged into a single foot (13b). Under this analysis, compound accentuation can be accounted for in terms of the informally stated rules in (14).

(14) Compound foot structure rules:

a. The underlying foot of the left member is preserved, except if it contains a catalectic syllable and is followed by another underlying branching foot.

b. The underlying foot of the right member is preserved if it can be assigned a H tone without violating the H culminativity constraint.

While alternative analyses based on underlying tones and derived foot structure may be available, in such analyses the relation between the surface tone patterns and the surface foot structure will be the same.7

Interestingly, it turns out that the foot-based analysis also makes sense from the point of view of loanword accent. As in native words, in loanwords the default accent falls on the penultimate mora (Kim N-J 1997). In Kenstowicz and Sohn (2001) and J. Kim (2009), it is proposed that this penultimate accent is the result of a word-final bimoraic trochee. Before introducing the foot structure that has been proposed for loanwords, let us first take a look at the tonal patterns assigned to loanwords with different types of syllable structure.

As shown in (15a), a word with an initial syllable with a long vowel (CVV) takes the double-H pattern.8

7) The general rule of (phrasal) compound accent in Kyengsang Korean is that the tone pattern of the first member will survive, except if the first member belongs to the final-H class and is not followed by a word of the double-H class (for North Kyengsang compound accent, see G-R Kim 1988, N-J Kim 1997, S-H Kim 1999, among others). If we posit a difference between two types of H tone (‘non-accentual H tone’ vs. ‘accentual H* tone’, or ‘floating tone’ vs. ‘linked tone’, as in N-J Kim 1997), it is possible to derive the tone patterns of compounds by means of two basic rules: one that deletes any H tone following another H tone in the same word or phrase, and one that deletes a stem- or word-final accentual H* (or linked H) tone followed by another accentual H* (or linked H) tone in the same word or phrase.

8) It should be pointed out that monosyllabic loanwords always have a falling tone (ѲІІ ‘key, щім ‘team’; see Chung 2006), and do not take the double-H pattern even when followed by a particle. This suggests that such loanwords are actually disyllabic words.
one syllable follows, the first two syllables are H-toned (15b). On the other hand, when only a syllable of the shape CV follows, only the word-initial CVC syllable is associated with a H tone, resulting in the penultimate pattern (15c). In words starting and ending in a syllable of the shape CV, a H tone goes to the penultimate syllable (15d). Finally, in words ending in a closed syllable preceded by an open syllable, the final closed syllable gets a H tone (15e).

(15) Loanword Tone Assignment (based on Kenstowicz and Sohn 2001, J. Kim 2009)

a. Initial CVV → double H
   ró:.má 'Rome', ó:.tʰó 'auto'

b. Initial CVC → double H
   rón.dón 'London', ín.tó.net 'internet'

c. Initial CVC, final CV (disyllabic word) → penultimate H
   té.m.pʰo 'tempo', mé.m.ba 'member'

d. Initial CV, final CV → penultimate H
   si.né.ma 'cinema', o.rén.ci 'orange'

e. Initial CV, final CVC → final H
   ri.bón 'ribbon', pi.tʰ.a.mín 'vitamin'

J. Kim (2009) shows that these patterns can be analyzed under the assumptions summarized in (16): words preferably end in a right-aligned moraic trochee (following Kenstowicz and Sohn 2001) and coda consonants show variable weight-by-position (following Y-H Chung 2002). 9)

(16) a. Words have a foot at their right edge.
    b. Foot type: moraic trochee
    c. CVV = 2 moras; CVC = 1 or 2 moras (variable)

The foot structure and variable assignment of moras interact as follows. Because long vowels always count as two moras, in words with a long vowel in the first syllable this syllable will be treated as heavy and will form a bimoraic foot. Because a word must end in a foot, the following material is also parsed into a foot, even if this results in a monomoraic foot as in [ró:.má] ‘Rome’ (17a). In the case of initial CVC syllables, on the other hand, a mora is assigned to the coda consonant only if the resulting heavy syllable will not be followed by a monomoraic foot (17b). Thus, in forms like [té.m.pʰo] ‘tempo’ (17c), no mora to the coda of the CVC syllable is assigned because this would yield the form *[té.m.[pʰ]o], which ends in a monomoraic foot (bold type indicates a moraic coda). Furthermore, a structure like *[té.m.pʰo] is not allowed because the foot must be a moraic trochee. For the same reason, no mora is assigned to the coda in o.[rén.ci] ‘orange’ (17d), which takes the penultimate

9) Variable weight-by-position has also been proposed for other languages (see Rosenthal and van der Hulst 1999).
pattern. The other example in (17d), \( \text{si}.[\text{né}.\text{ma}] \) ‘cinema’, shows that the penultimate pattern is also the default pattern of forms ending in two light open syllables. Finally, in forms ending in a sequence of an open light syllable followed by a closed syllable, assigning a mora to the coda of the closed syllable is preferred to including the preceding light syllable inside the foot (17e).\(^{10}\)

(17) Foot structure in loanwords

a. \([\text{ró}:].[\text{má}], [\text{ó}:][\text{t}^h\text{ó}]\)

b. \([\text{rón}.][\text{dám}], [\text{in}][\text{tős.net}]\)

c. \([\text{té}ṃ.p^h\text{ó}], [\text{mém.bó}]\)

d. si.[\text{né}.\text{ma}], o.[\text{rén.cí}]\)

e. ri.[\text{bón}], pi.\text{t}^a.[\text{mín}]\)

The foot-based analysis of loanwords supports the foot-based analysis of the double-H pattern in native Korean words: in both lexical strata, this tone pattern occurs when the word-initial foot consists of a single syllable. As in native words, the double-H patterns in (17a/b) can be accounted for by the foot prominence constraint in (11b). An important difference between native words and loanwords is that in native words an initial light syllable may form a foot by itself, whereas in loanwords the word-initial syllable only forms a foot by itself if it is heavy. The reason for this is historical; word-initial monosyllabic feet were inherited from Middle Korean or some closely related historical variety of Korean.

Davis et al. (2012), who also discuss the analyses of Kenstowicz and Sohn (2001) and J.Kim (2009), point out that even if we accept that foot structure in loanwords is (partly) motivated by the default penultimate accent in native words, loanwords differ from native words in that the foot is sensitive to the mora. However, it might be the case that codas are variably moraic in native words as well. This may actually explain why the syllable weight effect reported for NKK is of a gradient rather than a categorical nature (H-J Kim 2012). While H-J Kim (2012) presents an analogy-based analysis of NKK default accent in which metrical structure plays no role, there is no reason to think that the foot-based approach and the analogy-based approach are incompatible. Therefore, an interesting topic for further research is to investigate whether the analogy-based approach to loanword accent can be improved by adopting metrical foot structure and variable weight-by-position.

3.2. South Kyengsang Korean

The accentual and tonal system of South Kyengsang Korean (SKK), descriptions of which can be found in Gim (1970, 2002), Y. Kang (2008), and Utsugi (2009), among others,\(^{10}\) Note that the foot structure assigned to the forms in (17) may be subject to modifications when a particle follows, as is the case with syllable structure. For instance, when the nominative marker \(-i\) is attached to a word like \( \text{ri}.[\text{bón}] \) ‘ribbon’ or \( \text{pi}.\text{t}^a.[\text{mín}] \) ‘vitamine’, the consonant that functions as a coda in the isolation form will become the onset in a syllable shared with the nucleus \(-i\). This syllable will form the second half of a foot together with the preceding syllable, as in \( \text{ri}.[\text{bó}.\text{n-i}] \) ‘ribbon-nom’ or \( \text{pi}.\text{t}^a.[\text{mí-n-i}] \) ‘vitamine-nom’.

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\(^{10}\) Note that the foot structure assigned to the forms in (17) may be subject to modifications when a particle follows, as is the case with syllable structure. For instance, when the nominative marker \(-i\) is attached to a word like \( \text{ri}.[\text{bón}] \) ‘ribbon’ or \( \text{pi}.\text{t}^a.[\text{mín}] \) ‘vitamine’, the consonant that functions as a coda in the isolation form will become the onset in a syllable shared with the nucleus \(-i\). This syllable will form the second half of a foot together with the preceding syllable, as in \( \text{ri}.[\text{bó}.\text{n-i}] \) ‘ribbon-nom’ or \( \text{pi}.\text{t}^a.[\text{mí-n-i}] \) ‘vitamine-nom’.
is quite similar to that of North Kyengsang Korean. The tonal patterns of words of one to three syllables with representative examples given in (18) are again adapted from Son and Ito (2016). In the examples, acute accents stand for H-toned syllables, and a circumflex indicates a lengthened syllable with a rising tone. L-toned syllables are left unmarked.

### (18) SKK tone patterns

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<tbody>
<tr>
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<tr>
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<td>LHL</td>
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<td>HHL(L)</td>
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<tr>
<td>R:</td>
<td>LH(H)</td>
<td>LHH(L)</td>
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### Examples

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<tr>
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<tbody>
<tr>
<td>mób</td>
<td>parám</td>
<td>poksúŋá</td>
</tr>
<tr>
<td>mánil</td>
<td>minári</td>
<td>mjóniri</td>
</tr>
<tr>
<td>mbúl</td>
<td>kúrím</td>
<td>múćík</td>
</tr>
<tr>
<td>mál</td>
<td>sarám</td>
<td>orísín</td>
</tr>
</tbody>
</table>

An important difference between NKK and SKK lies in the reflexes of the Middle Korean R-class. Whereas in NKK these words are pronounced with a H-toned long syllable, in SKK, they are pronounced as a rising tone in a long monosyllable, and with a fixed LH(HL) pattern in multisyllabic words (19).

### (19) Example   Isolation   1σ particle   2σ particle   Gloss

<p>| | | | |</p>
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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>a. ma(:)l</td>
<td>R</td>
<td>LHH</td>
<td>LHHL</td>
</tr>
<tr>
<td>b. saram</td>
<td>LH</td>
<td>LHH</td>
<td>LHHL</td>
</tr>
<tr>
<td>c. orísín</td>
<td>LHH</td>
<td>LHHL</td>
<td>LHHLL</td>
</tr>
</tbody>
</table>

Now, if we assume that H-toned syllables are foot heads, as in the analysis of NKK, the following foot structure may be posited for SKK words of the R-class. Note that the particle is assumed to be parsed into a foot, either by itself or together with the final syllable of its host noun.

### (20) Example   Isolation   1σ particle   2σ particle   Gloss

<p>| | | | |</p>
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</thead>
<tbody>
<tr>
<td>a. ma(:)l</td>
<td>[R:]</td>
<td>[LH]</td>
<td>[LH][H]</td>
</tr>
<tr>
<td>b. saram</td>
<td>[LH]</td>
<td>[LH][H]</td>
<td>[LH][HL]</td>
</tr>
<tr>
<td>c. manura</td>
<td>[LH][H]</td>
<td>[LH][HL]</td>
<td>[LH][HL]L</td>
</tr>
</tbody>
</table>

With the foot structure of the forms in (20) in place, the next question is where the tones and foot structure in these forms come from. Again, several analyses are possible. Let us first see how we may derive the foot structure in the forms in (20) from underlying tonal specifications.
Poppe, Clemens: The Role of Foot Structure in Korean Accent Systems

Based on the fact that in monosyllabic words of this class the H tone is realized either in the first syllable (as the second half of a rising tone in isolation forms) or on the second syllable, it seems natural to assume that the H tone is a default tone, and that the L tone preceding it is specified in the lexical representation. However, by positing a L tone, we have not explained why words corresponding to the MK R-class have a word-initial foot. Therefore, we need to either specify a word-initial foot as well, or derive the foot structure from the tonal specifications. The foot structure can be derived from the underlying L tone is we extend the idea of H-tone licensing from lexical H tones to any lexically specified tone (‘lexical tone licensing’). In other words, we may posit a rule or constraint that builds a foot that is aligned with the left edge of the syllable to which a lexical tone is linked. The H tone on the foot-final syllable can then be thought to be inserted in order to make sure that every foot contains a H tone. If we follow D. Lee (2006, 2009) and Davis (2010) and analyze the word-initial foot in SKK as an iamb (see below), the H tone in this foot can be accounted for by means of the foot-head prominence constraint in (11b). Furthermore, because the H tone is final in the foot, it is possible to construct a trochaic foot following the initial iambic foot without violating the culminativity constraint. Thus, the LHHL pattern can be accounted for in terms of an underlying L tone and surface foot structure requirements. Examples of the analysis are given in (21). In order to express the docking of the lexical L tone on the first syllable, the surface tones are given in superscript to the right of the vowel(s) in the different syllables.

(21)    Underlying   Isolation            -nom                        Gloss
a. ¼mal      [ma phones] [ma phones]   ’speech’
   b. ¼saram    [sa phones] [sa phones] [m phones]   ’person
   c. ¼manura   [ma phones.[ra phones]] [ma phones.[ra phones] [ga phones]   ’wife’

As pointed out by D. Lee (2006, 2009) and Davis (2010), by positing a word-initial iambic foot, it is possible to account for the fact that in loanwords the initial syllable is H-toned when heavy, as in /am.phe.in/ HHL ‘champagne’, but L-toned when light and followed by another syllable. In the latter case, the second syllable is assigned the H tone instead, as in /ri.mu.cin/ LHH ‘limousine’.

(22)a. [ʃám.][phé.in] HHL ‘champagne’
   b. [ri.mú.][cín] LHH ‘limousine’

Although D. Lee (2006, 2009) and Davis (2010) only consider word-initial iambic feet in SKK, I propose that while iambic feet are allowed, the trochee is the preferred foot type. By allowing word-initial iams, it is possible to parse syllables preceding the accented foot into a foot that contains a H-toned head syllable without violating the culminativity constraint. By positing an initial iambic foot we can also explain another important difference between SKK and NKK. In the former dialect, in words of the non-double H group
syllables to the left of the accented syllable up to the second syllable from the left edge of the word are H-toned.: e.g. satari ‘ladder’ LHH rather than LLH. The tonal structure of such forms could be as in (23a), where there is a distinction between an accentual (H*) and a phrasal H tone, or as in (23b), where the H tone is linked to both the accented syllable and the second syllable.

(23) a. [sata][ri] b. [sata][ri]

\[ \begin{array}{ccc}
| & | & | \\
L & H & H^* \\
\end{array} \]

Both types of analyses have been proposed for SKK. For instance, Utsugi (2009) distinguishes between phrasal and lexical H tones, while Lee and Zhang (2014) propose a rule of leftward H spreading of the accentual H tone. Regardless of the analysis we adopt, in a foot-based approach, the difference between NKK and SKK may be accounted for in terms of foot structure. That is, iambic feet are allowed in SKK (24a), but not in NKK (24b).

(24) a. SKK: [satá][ri] b. NKK: sata[ri] (*[satá][ri])

Note that if the word-initial feet starting with a L-toned syllable in SKK are analyzed as iambs, it becomes possible to omit the initial L tone from the lexical representation of words of the R-class, and specify the word-initial foot as an iambic foot. However, in such an approach it seems necessary to analyze monosyllabic words with a long vowel as comprising two syllables, the latter of which is specified as the head of an iamb. The mapping of underlying forms to surface forms will then be as in (25).

(25) Underlying Isolation -nom Gloss
a. [mal<σ>] [mà ál] [mà.r-i] ‘speech’
b. [saram] [sà.rám] [sà.rá.][m-i] ‘person’
c. [manu]ra [mà.nú.[rá] [mà.nú.][rá.-gà] ‘wife’

Regardless of whether we adopt the analysis in (21) or (25), the surface foot structure will be the same.

Summarizing, in this section we have seen that by assuming the Kyengsang dialects have a trochaic metrical accent system, we can account for both the historical change from Middle Korean to Kyengsang Korean, as well as for the peculiar behavior of words belonging to the double-H class. An interesting difference between the two varieties of Kyengsang Korean discussed in this section is that whereas in SKK iambs are allowed in word-initial position, these are not allowed in NKK. As a result, the two dialects show different tonal patterns.

An issue that deserves further research is whether there is independent evidence for
foot structure from other phonological processes or from the interaction of phonology with morpho-syntax. For instance, it could be that the prosodic phrasing of phonological words or phrases depends on foot count. While to the best of my knowledge such evidence has not been reported for the Kyengsang dialects, in section 5 it will be shown that foot structure does seem to play such a role in Seoul Korean.

4. Yanbian Korean

The Hamgyeng dialect (Ramsey 1978) and the closely related Yanbian dialect (Ito 2008, 2014) did not undergo a leftward accent shift. Therefore, we may hypothesize that if these dialects have inherited the foot structure from Middle Korean, the preferred foot would be the iamb. In this section only Yanbian Korean is discussed, because for this dialect data from both native and loanwords is available (Ito 2014).

Yanbian Korean has an accent system in which a word can be accented on any syllable, or unaccented. The Yanbian data in (26) is adapted from Ito (2014). In the examples, H-toned syllables are indicated by an acute accent, and L-toned syllables are left unmarked. As we can see, unaccented words in isolation get a final H tone, but when followed by a particle this H tone falls on the particle instead.

(26) YK tone patterns

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<tbody>
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<td>HLL(L)</td>
<td>mál</td>
<td>mál~</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘language’</td>
<td>‘horse’</td>
</tr>
<tr>
<td>LH(L)</td>
<td>LHL(L)</td>
<td>manil</td>
<td>param~</td>
<td>parám-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘garlic’</td>
<td>‘param-ô’</td>
</tr>
<tr>
<td>LLH(L)</td>
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<td></td>
<td>myôniri</td>
<td>mûcîke</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘daughter-in-law’</td>
<td>‘rainbow’</td>
</tr>
<tr>
<td>L(H)</td>
<td>LL(H)</td>
<td>LLL(H)</td>
<td>sathurí</td>
<td>muriphák~</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘dialect’</td>
<td>‘muriphâk-ô’</td>
</tr>
</tbody>
</table>

According to Ito (2014), in Yanbian Korean words, accent falls on the word-final syllable by default. In disyllabic words, 3,241 out of 4,714 words have final accent, as opposed to 1,119 words with penultimate (initial) accent. In trisyllabic words, 1,262 out of 1,623 words have final accent, while 241 words have penultimate accent, and 84 words have antepenultimate (initial) accent. Thus, in disyllabic and trisyllabic words, final accent is dominant. This is not incompatible with the idea that iambs are the favored foot type in Yanbian Korean. If we add to this the idea that the final default H tone in unaccented words reflects an iamb that is right-aligned with the word (or phrase) boundary, the idea that Yanbian Korean foot structure is similar to that of Middle Korean may not be too far-fetched. If we apply the foot structure principles of Middle Korean to Yanbian Korean and build iambic feet from
right to left with the proviso that the accent be located on the right-hand syllable of a foot, disyllabic and trisyllabic words will be parsed as in (27a/b).  

(27) a. Final ma.nɨ́ l [ma.nɨ́ l] ‘garlic’
   Penult sá.ram [sa.ram] ‘person’
   Unaccented pa.rám [pa.rám] ‘wind(-nom)’

b. Final sa.thu.rí [sa.thu.rí] ‘dialect’
   Penult mỳə.nú.ri [mỳə.nú.ri] ‘daughter-in-law’
   Antepenult mú.ci.kɛ [mú.ci.kɛ] ‘rainbow’
   Unaccented müríphák [müríphák] ‘knee’

According to Ito (2014), quadrisyllabic words with penultimate accent outnumber those with final accent: 156 vs. 122 forms. However, this is a small difference, and may have to do with the fact that, at least diachronically, quadrimoraic words (mostly) consist of multiple morphemes. In any case, in both types of words, an iambic foot can be posited: ho.[lɨ.lɛ.ki] ‘whistle’ vs. sa.tha.[kʊ.nɪ] ‘crotch’.

Let us now turn to loanwords to see whether the analysis sketched here makes sense from the point of view of default accent assignment. Ito (2014) shows that loanword accent is basically assigned to a word-final disyllabic window, with a preference for penultimate accent. While this preference for penultimate accent is very strong in disyllabic words, in words of three syllables or longer there is a larger role for syllable weight. That is, when a word ends in a heavy-light sequence, penultimate accent is preferred, whereas final accent is preferred in words ending in a light-heavy sequence. The general preference for penultimate accent as opposed to final accent at first sight seems to be a problem for the iambic analysis. However, this preference may have a simple explanation: words in English are realized with a pitch fall in general, and this feature is faithfully adopted during loanword adaptation. The same mechanism has been proposed to be important in loanword adaptation in (Tokyo) Japanese (Kubozono 2006). Ito (2014) also considers this presence of a pitch fall in the source language as a possible explanation for the fact that in loanwords accented words are preferred to unaccented words. However, the role of pitch falls in the source language may be even greater than this. A pitch fall requires the H tone to be followed by a L tone, which in the case of final accent results in two tones being associated to a single syllable. This can be avoided by associating the accentual H tone to the penultimate syllable instead. Still, as argued by Ito (2014), the actual stress patterns of the original English words also seem to play a role. The fact that penultimate accent is more strongly favored in disyllabic words as opposed to longer words seems to be related to the fact that in English disyllabic words

11) Note that because as in the case of Kyengsang Korean, Yanbian Korean words (and phrases) are subject to a culminativity constraint that demands a single peak in a word/phrase, it cannot be verified whether material following the accented foot is actually parsed into foot structure as in Middle Korean. Also note that, it could be that in order to prevent monomoraic feet, words with initial accent have a trochaic rather than an iambic foot.
penultimate stress is dominant, while this does not hold for longer words (Ito 2014).

In summary, the prosodic system of Yanbian Korean can be analyzed as being dependent on iambic feet. By introducing feet, we have a natural explanation for (i) the preponderance of final-accented nouns in native words, and (ii) the default assignment of a final H tone in unaccented words. Admittedly, though, these facts can also be accounted for in terms of a preference for H tones to be aligned to the right edge of words and/or phrases. Still, we may conclude that if Yanbian Korean makes use of foot structure, there must be a preference for iambics. This makes sense from a diachronic perspective, as Middle Korean had an iambic system as well, and no leftward accent shift has occurred in Yanbian Korean. The difference between the two dialects is that a word in Yanbian Korean may only have a single peak, whereas the accentual H tone in Middle Korean could be followed by other pitch peaks.

Again, an important issue that merits further research is whether there is evidence for foot structure from other parts of the grammar. As we will in the next section, possible evidence of this kind can be found in Seoul Korean.

5. Seoul Korean

The nature of the prosodic system of the Seoul dialect of Korean is somewhat controversial. In recent years, there seems to be growing consensus that it is a so-called ‘accentless’ language (S-A Jun 1996, 2005, Utsugi 2013): there are no lexically or post-lexically designated syllables that are assigned a pitch accent.

Still, at the phrasal level rhythmic tonal patterns can be observed (S-A Jun 1996, 2005). This suggests that metrical structure may actually be involved at a more abstract level, as proposed by Cho and Lee (to appear). Jun (1996) analyzes the prosodic system of Seoul Korean as one in which a tonal melody LHLH (or THLH, where ‘T’ becomes H or L depending on the laryngeal features of the onset of the initial syllable) is assigned to the accentual phrase. Typical tonal patterns that can be observed in phrases of two to four syllables are given in (28).

(28) 2σ 3σ 4σ
LH LHL LHLH
LLH
LHH

As shown by Cho and Lee (to appear), these tone patterns can be analyzed as being the result of assigning H tones to iambic feet. According to Cho and Lee (to appear), the relation between the tonal patterns and foot structure is as in (29).
The disyllabic and quadrisyllabic cases are straightforward, and consist of one and two iambs respectively. In the case of trisyllabic forms, however, variation can be observed. Importantly, the initial foot must be branching, and the leftover syllable forms a foot by itself. Leaving aside the details of why different tonal patterns are possible under the same foot structure, let us focus on the fact that the hypothetical tone pattern HLH is not attested (at least in words that do not start with a long vowel). As argued by Lee and Cho (to appear), in the foot-based account, this can be accounted for in terms of a constraint that says the non-branching foot must be adjacent to the right edge. In the purely tonal account, on the other hand, the absence of the HLH pattern receives no explanation. What is more, in the foot-based approach it is not necessary to posit an underlying THLH melody for phrases. In other words, the tonal pattern is motivated and does not need to be stipulated and posited as underlying for a structure as large as the phrase.

It should be pointed out that the study conducted by Lee and Cho (to appear) is based on a perception experiment in which apart from the tone patterns in (28), the tone patterns LL, LLL, LLLL, LHLL, and LLLH were also judged as ‘natural’. Importantly, however, the patterns HL and HLHL received less favorable judgments. This makes sense if iambs are favored to trochees: *[HL], *[HL][HL]. Interestingly, the results of the experiment suggest that foot head marking by means of a H tone is not obligatory.

While a foot-based analysis seems attractive, one may wonder what the prosodic structure of longer phrases looks like. Let us consider the prosodic structure of longer words or phrases on the basis of data from spontaneous and read speech in 122, 912 phonological phrases in (30), adapted from Shin, Kiaer and Cha (2013: 170).

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12) In the conservative variety of Seoul Korean, words of the RX class are pronounced with an initial long vowel, which has been argued to be realized on a high pitch. This has prompted a number of scholars to posit a basically iambic analysis for Seoul Korean: stress falls on the initial syllable if long, and on the second syllable if short (H-B Jung 1993, H-B Lee 1973, 1989, H-Y Lee 1990). Interestingly, word-initial closed syllables are also treated as heavy by these scholars. See E-S Ko (2013) for further discussion and an alternative approach in which vowel length is derived from underlying accents.
The data in (30) shows that most phrases in Seoul Korean consist of two to five syllables. Why trisyllabic phrases are the most frequent type is not clear, but this may be related to the length of frequently used lexical items and grammatical items. In any case, what matters is that phrases of two to four syllables are the most frequent, which makes sense if a phrase must consist of at least one prosodic word that, preferably, dominates at least one binary foot (which will be word-initial) and at most two feet. Still, phrases of six syllables or more do exist, and since a phrase has maximally two H peaks, it seems that in a foot-based approach we need to assume that a H-tone bearing foot needs to be aligned with either the left or the right edge of a word and/or phrase, as in (31a), as opposed to (31b).

If phrasal tone patterns are (partly) determined by foot structure, we may wonder whether there is independent evidence for foot structure playing a role in the construction of phonological words and/or phrases. Interestingly, such evidence seems to exist. Jung (2002) shows that whether in Seoul Korean the head noun of the relative clause is phrased into the same phonological phrase (ɸ) as the preceding material depends on the length of the noun. If it consists of a single foot, as in the column ‘short head noun’ in (32), the head noun and the following particle are incorporated in the same phonological phrase. However, when it consists of two feet, as in the column ‘long head noun’ in (32), the noun and particle form a separate phonological phrase. It thus seems that the phonological phrase preferably dominates (a phonological word that branches into) more than a single foot.

<table>
<thead>
<tr>
<th>Length</th>
<th>Spontaneous speech</th>
<th>Read speech</th>
</tr>
</thead>
<tbody>
<tr>
<td>1σ</td>
<td>10.6</td>
<td>2.2</td>
</tr>
<tr>
<td>2σ</td>
<td>24.1</td>
<td>14.9</td>
</tr>
<tr>
<td>3σ</td>
<td>25.3</td>
<td>32.0</td>
</tr>
<tr>
<td>4σ</td>
<td>19.4</td>
<td>21.9</td>
</tr>
<tr>
<td>5σ</td>
<td>12.0</td>
<td>16.8</td>
</tr>
<tr>
<td>6σ</td>
<td>5.4</td>
<td>6.9</td>
</tr>
<tr>
<td>7σ</td>
<td>2.1</td>
<td>3.6</td>
</tr>
<tr>
<td>8σ</td>
<td>0.7</td>
<td>1.4</td>
</tr>
<tr>
<td>9σ</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>10+σ</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Finally, there is some evidence from morphology that ‘balanced’ phonological words that consist of exactly one or two feet are preferred to ‘unbalanced’ phonological words in which one syllable forms a single degenerate foot (or is left unparsed). An example of such a role for foot structure in morphology comes from the addition of the native Korean word *nal* ‘day’ to the names of the days of the week, which consist of three Sino-Korean morphemes (33a). The forms that include *nal* contain two morphemes meaning ‘day’: Sino-Korean *il*, and native Korean *nal*. At first sight, this seems to be a redundant addition of a morpheme for which there is no clear motivation. However, once we consider the role of foot structure, the addition of *nal* makes sense, as it enables a parsing of the whole word into two binary feet rather than a binary foot followed by a degenerate foot (or unfooted syllable). Interestingly, additional evidence for this view comes from a difference in monosyllabic, disyllabic, and trisyllabic names of holidays. In mono- and trisyllabic words (33b/c), *nal* can be optionally added, the result of which is a word consisting of one or two branching feet. In disyllabic words (33d), however, this is not allowed because the word already consists of a branching foot and adding another syllable would yield a form with a non-branching foot (or an unparsed syllable).

<table>
<thead>
<tr>
<th>(33)</th>
<th>short head noun</th>
<th>long head noun</th>
</tr>
</thead>
<tbody>
<tr>
<td>short relative verb</td>
<td>{kɨɡə-l ha-l [e-ga]}_₄  That-Acc do-Rel child-Nom</td>
<td>{kɨɡə-l ha-l}₄ [([əɾ][ni-ga])₄  That-Acc do-Rel child-Nom</td>
</tr>
<tr>
<td>long relative verb</td>
<td>{kɨɡə-l mʊɾə-bə-l [e-ga]}₄  That-Acc ask-Rel child-Nom</td>
<td>{kɨɡə-l mʊɾə-bə-l}₄ [([əɾ][ni-ga])₄  That-Acc ask-Rel child-Nom</td>
</tr>
</tbody>
</table>

All in all, we may conclude that while more research is needed to shed more light on the mechanisms of foot structure assignment and possible variation in foot structure, it seems that apart from evidence from the distribution of phrasal tones, there is also evidence for foot structure playing a role in determining the length of constituents and the higher phrasing of these constituents in Seoul Korean. An important topic for further research is to look for similar evidence for foot structure in other dialects.

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13) As a final note, it should be pointed out that there is no clear evidence for foot structure from Korean prosodic morphology, except for the phenomena in (31). According to J. Jun (1994), partially reduplicated forms make crucial reference to a word-final unbounded right-headed foot. It may be possible to reanalyze the data in terms of a bounded iambic foot that is preferably right-aligned with the right edge of a word.
6. Conclusion

Looking at the basic properties of the prosodic systems of Korean dialects one by one, it often does not seem necessary to posit foot structure. However, if we take a sympathetic stance toward foot structure, and zoom in on both synchronic and diachronic issues that remain unexplained in non-metrical analyses, quite a different picture emerges. By introducing foot structure, new light can be shed on some long-standing issues in Korean prosody, both diachronic and synchronic. Still, many of the proposals made in this paper are of a speculative nature, and need to be examined under closer scrutiny. Keeping in mind that what we may conclude about foot structure in different Korean dialects remains of a tentative nature, preferences regarding foot type and the obligatoriness of a H tone on a foot head in the Korean dialects discussed in this paper are summarized in (34).

| Foot structure and accent/tone in Korean dialects |
|---------------------------------|------------------|
| Seoul Korean                    | Iamb             | No               |
| Middle Korean                  | Iamb             | No/Yes (phrasal H only) |
| Yanbian Korean                 | Iamb             | Yes?             |
| North Kyengsang Korean         | Trochee          | Yes?             |
| South Kyengsang Korean         | Trochee (/Iamb)  | Yes?             |

Different foot types across dialects (and within the same dialect) can also be observed in Japanese (see Poppe 2016). This is not surprising when we realize that in both Korean and Japanese pitch is the only phonetic correlate of prosodic prominence. Stress-accent languages, on the other hand, typically make use of only one foot-type (e.g. Dutch, English, German; see Domahs et al. 2014 for a recent discussion). This suggests that language-internal variation in foot structure is correlated with the phonetic correlates of prosodic prominence. In languages with stress accent, accent has several phonetic correlates, which makes the accent patterns more stable. As a result, there is less language-internal variation in word prosodic systems (although there may be a lot of variation at the level of intonation), and the foot type in these languages is fixed. In non-stress accent languages, on the other hand, pitch is typically the only phonetic correlate of accent, the result of which is that the accent patterns are relatively unstable, causing a larger amount of variation in word-prosodic systems inside the same language or language family. Therefore, foot type may be variable in such languages.14)

The relation between variation in foot structure and 'accentual type' is summarized in (35). Note that the 'typology' in (35) is meant to be 'property-driven' (Hyman 2006, 2009)

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14) As pointed out by an anonymous reviewer, another striking difference with stress accent languages is that the iambic feet posited for Korean in this paper do not show the strong preference for the stressed syllable to be long or heavy (see Hayes 1995) that can be observed in iambic stress languages.
rather than to group languages into one of two different types.

(35) Foot structure in word prosodic typology

<table>
<thead>
<tr>
<th>Phonetic correlates</th>
<th>Stress accent</th>
<th>Non-stress accent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability of accent patterns</td>
<td>stable</td>
<td>unstable</td>
</tr>
<tr>
<td>Variation in prosodic systems</td>
<td>little</td>
<td>much</td>
</tr>
<tr>
<td>Foot type</td>
<td>fixed</td>
<td>variable</td>
</tr>
</tbody>
</table>

Although none of the analyses proposed in this paper can be said to be complete, it is hoped that the present paper will help in clarifying issues concerning foot structure in Korean and the nature of the prosodic systems in Korean and beyond.

References


York: Mouton de Gruyter.


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