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<u>The Grammar of Pitch in South Gyeongsang Korean</u>

Abstract

Most Korean dialects are non-tonal, and one way of knowing that is that is to ask, say, a woman from Incheon about the tones of the word 사람 *saram* "person." She will not have any notion of them. However, her tonal indifference does not mean that she will always produce the same general F0 pattern for all sentences of a given structure, even if corresponding words in the different sentences have the same number of syllables, and even in an elicitation setting. Particular phonemes can cause a lot of variation.

We see lexical tone in the Korean of 경상 (Gyeongsang), a southeastern region of South Korea, and again, a persuasive diagnostic is just the fact that we can ask speakers about tone and see that they associate information with it. A Gyeongsang woman would tell us that the first syllable of *saram* has low tone and the second high tone. We expect more, though. We can, of course, find minimal pairs for tone, and other pairs close enough to definitively show contrast, which we would be unable to do in other regions. Yet resulting from environmentally conditioned variation, we do not always easily find any one pitch contour at the narrow phonetic level that is exclusively characteristic of a certain speaker-perceived tonal configuration. Can it be true that the phonetic behavior of tone is too elusive to be of any straightforward, independent worth in informing our idea of the phonology underlying it? Can tonal phonology only emerge through internal comparison within the morphological paradigm? If we had to define high tone phonetically, could we? Perhaps we could define it for a certain language, but not in general. If that's the case, if it's so variable, should we even be using the terminology of high and low tone at all?

Consider another issue. Adjacent nominal roots can band together so that they exhibit tonal behavior as a unified prosodic phrase. When this occurs, it is sometimes true that the lexical tone of both original nominal roots affects the tonal pattern of the unified prosodic phrase—that's as we would expect. However, noun roots with certain tonal patterns invariably neutralize the tonal influence of the roots following them, insisting on deciding the tonal contour of the prosodic phrase by themselves. These roots seem to strip the tones from the subsequent root.

There is a certain category of root that is only one syllable long, yet without fail, it dismantles the tonal specification of any root that follows it. Here is just such a root:

물
mul

The underline indicates that the root's one syllable forms a *summit approach*, which basically means that it's fairly high-pitched, though we'll spend a lot of time defining that more clearly later.

Now here is another root, much bigger than *mul*.

사마귀
samagwi

   Again, the underlined syllables constitute a summit approach and are higher-pitched.
   When *mul* precedes *samagwi* in a prosodic phrase, not only does *mul* strip *samagwi* of its pitch approach, it imposes a tonal pattern on the syllables of *samagwi* that is the exact opposite of the original tonal pattern.

물사마귀
mul-samagwi

   What determines which nouns trigger this neutralization? It seems that nouns like *mul* have the power both the strip the tones off a following root and to govern a specific tonal pattern that extends beyond the scope of their own syllables, such that they can impose it on the roots they have neutralized. We ask how we might connect those two phenomena.
   The most I can say about Gyeongsang tonal phonology without adopting a certain ethos of interpretation is that there are some tonal classes wherein one syllable is encoded, at least at the surface level, as having high tone, and other tonal classes that do not conform to that system. In deciding how to pin Gyeongsang tonal phonology down from there, I will compare two thoroughly different analyses, both focusing on South Gyeongsang Korean.
   Russell G. Schuh and Jieun Kim (2008) propose a segmentally-minded scheme wherein each lexical item is encoded with a certain number of high tones on syllables, with a default tonal category encoding zero high tones. The placement and behavior of these underlying tones is divined mostly through a view of what happens to each syllable across the morphosyntactic paradigm. Akira Utsugi (2007), on the other hand, is more concerned with word-level tonal behavior and is willing to use word-boundary tones as an element in the tonal phonology.
   I will thus undertake my own reconciliation of their approaches, based on their data. I will consider other scholarship in the process, and will give more attention than they have to figuring out just what they mean when they assign high tone to syllables.

Introduction to the Topic

   Our subject is the South Gyeongsang dialect of Korean. We are looking at lexical

tone in the dialect. Korean is generally not a tonal language at all. However,

Gyeongsang Korean has contrastive tonal patterns that operate at the word level.

   Being a word-level tonal paradigm, the South Gyeongsang system has sometimes

been described as a *pitch accent* system: a system where one syllable in each word is

assigned a high pitch, or a "tonal accent," and the rest of the word forms a pitch contour

around the high-pitched syllable. The Japanese of Tokyo is a pitch accent language; Norwegian and Swedish are frequently described as pitch accent languages. Anne Cutler and Tashi Otake (1998) describe the relationship of a word to its pitch accent specification this way: "A Japanese word spoken in isolation has a characteristic prosodic pattern: its pitch-accent pattern." If we accept this classification, we must at least specify that South Gyeongsang is an unconventional case. Unlike a typical pitch accent system, which singles out one syllable per word for tonal specification, South Gyeongsang tone is characterized at the surface level by the presence in each word of one continuous period of high-toned syllables. This period is of variable length and placement; it can apply to up to two syllables in a word and can begin on either the first or second syllable. Thus, rather than being defined by one syllable, South Gyeongsang tonal patterns are defined by two: the syllable where the high-toned period starts and the period where it ends. In order to illustrate the unitary nature of this period of apparent consecutive high tones, I introduce a new term of my own invention, the *summit approach*, to describe it; a significant amount of my paper will be devoted to defining, justifying and explaining this new piece of terminology.

Lexical items in South Gyeongsang also exhibit some unusual tonal behavior when adjacent to an affix or another tone-bearing word within a prosodic phrase: we especially see effects wherein specific words seem to impose some tonal pattern on the affixes or words that follow them. Any proposal for the underlying representation of tone in the language must take these phonological effects into account. In this thesis, I propose that many shorter South Gyeongsang roots are encoded with tonal patterns encompassing more syllables than the words themselves contain, and that certain leftover summit-approach tones impose themselves on the following word. This

accounts for some of the interactions.

Many tonal classes of words also greatly reduce the pitch of summit-approach tones from the words following them. Rather than explaining this as the imposition of excess non-summit-approach tones encoded by the earlier word, I propose that words that <u>do</u> contain enough syllables for their entire underlying tonal pattern to play out subsequently trigger a downstep whereby all underlying summit-approach tones are reduced and all underlying non-summit-approach tones removed in the following word. This aspect of my analysis is novel.

Background

경상도 (Gyeongsang-do) comprises southeastern South Korea, and is one of six major geographical and dialectal regions of the country, with a population of about 13 million. It encompasses the major cities of 부산 (Busan), 울산 (Ulsan), 창원 (Changwon), and 대구 (Daegu). The Gyeongsang dialect is typically identifiable to speakers from other parts of South Korea, as well as certainly being intelligible. Its most relevant rough subdivision is into North Gyeongsang Korean and South Gyeongsang Korean, the latter of which is our focus.

The standard variety of Korean, which is close to Seoul dialect, and most regional dialects derive their pitch contours only from prosody. In addition to Gyeongsang Korean, the Korean of 함경도 (Hamgyeong-do), a region of North Korea, is in fact also tonal, but understandably harder to obtain scholarship and data on, due to North Korea's political isolation. Gyeongsang's tones are thoroughly attested, though, with each word having a tonal profile falling into one of multiple tonal categories. North Gyeongsang dialect and South Gyeongsang dialect, the two major groups, are both tonal,

and, as defined by prominent differences in lexical tone, are roughly divided by the boundary between the provinces of 경상북도 (Gyeongsangbuk-do, North Gyeongsang) and 경상남도 (Gyeongsangnam-do, South Gyeongsang). The independent city of Busan is certainly within the South Gyeongsang dialect region, but another independent city, Daegu, is decidedly not—it has the distribution of tonal categories that characterizes the North Gyeongsang dialect.

Schematic

I'm only looking at the tone of nouns in the South Gyeongsang dialect. The tonal categories for nouns are different than those for verbs. Since the Korean verb inflectional paradigm is so complicated, looking at nominal tone is probably much easier than looking at verbal tone, though Russell G. Schuh and Jieun Kim (2009), two of my main sources, did a thorough job of analyzing verbal tone more recently.

My work heavily incorporates the scholarship of Russell G. Schuh and Jieun Kim (2008, S+K for reference) and Akira Utsugi (2007) on South Gyeongsang Korean. Each of those two treatments has a seriously different interpretive viewpoint of tone at both the surface and underlying levels, and my analysis will attempt to acknowledge the phenomena that both of their approaches bring into relief. I begin by presenting an overview of S+K and Utsugi's angles on the work. After that, I'll define my most important terms—*summit approach* being chief among them.

Then I'll launch into the matter at hand by introducing South Gyeongsang Korean's tonal categories and their behavior; after that, I will start with my own way of introducing useful groupings among the categories, using reasoning that I think will clarify the process of sorting them out. Eventually, I will finalize my schemes for

grouping the tonal categories. Finally, I will propose an underlying tonal specification pattern for each group of tonal categories, hoping it will account for all the behaviors we see at the surface.

My Sources

Both Schuh and Kim, in 2008, and Utsugi, in 2007, have written major papers on South Gyeongsang Korean tonal interactions. Generally speaking, S+K's approach to expressing tonal contours is more uniformly syllabically based, while Utsugi's also focuses on word boundaries, pitch peaks, and the pitch change intervening between them.

Schuh and Kim introduce tonal categories using a syllabic system: each syllable is marked with high or low tone, based ostensibly on which vowels have an overall pitch, averaged over their duration, above a certain threshold, but mostly just corresponding to which syllables speakers of South Gyeongsang Korean identify as high and low. They do not weigh this system, or the specific tonal identifications that they make within it, based on whether it corresponds to exact F0 contours, but use it unambivalently in accordance with a longstanding practice of thinking about Gyeongsang tone in that way. They specifically respond to other authors' ideas about using phonetic pitch narrowly to inform the surface-level representation, though Utsugi is not among those whose work they've read: "It cannot be an accident that ALL previous accounts of Korean pitch accent by native speakers of Korean and non-native but tone-wise linguists alike, have assigned discreet H and L tones to individual syllables." We'll discuss their responses more when we define the surface level later. In identifying what is specified at the underlying level, their tonal assignments still all lie with syllables, but they do not insist

that every syllable have an accompanying tone of its own—their proposed scheme is minimal.

Utsugi is comfortable using minimally-specified syllabic notation to cite the lexical tone of words for reference, but his understanding of the true parameters of tone is rather different. Most importantly, he allows an understanding of high tone that does not demand the existence of a peak that attains an absolute pitch threshold: through the concept of *downstep*, he accommodates the notion of relative pitch peaks near the pitch baseline that behave as high tones within a compressed pitch range triggered by tonal features earlier in the prosodic phrase. Thus, at the surface level, though he does associate pitches with syllables, he identifies some syllables as being high-toned that speakers would not, reasoning that they are high within the downstepped pitch paradigm. In characterizing underlying tonal behavior, he diverges even more from a syllabic approach based on absolute pitch. Though he characterizes some categories as having specified high-toned syllables, as do Schuh and Kim, he characterizes others as having contrastive boundary tones, integrating intonational or post-lexical tonal phenomena into his account of phonemic tone, in what he calls a *prosodic model* of lexical tone.

Terms

I must be sensitive about my terminology with delicate phonological processes at play.

Surface level

The first term I need to clarify, in fact, is the *surface level.* The most obvious definition of the surface level of tonal behavior would be the exact pitch contour of

speech. That is the physical reality corresponding to tone in language. However, we must represent the nature of that pitch contour in some finitely specific way in order to discuss its properties. It is in finding an appropriately sensitive *representation* of the surface level that we encounter decisions about what to take account of, about which characteristics are fundamental as an expression of tone. For one, tone is not to blame for all gradations in pitch: lexical tone specifically acts on top of the prosodic intonation in a language, superimposing itself in contrastive ways on more stable patterns. Is the deviation from neutral prosody what we should represent at the surface level, lexical tone being the sole matter at hand? If there are contexts where we cannot pick out an unmarked tonal category, is it possible to extricate the identity of the tonally unadorned prosodic contours of the language?

Here S+K differ markedly from Utsugi. S+K insist that on taking all prosodic or allophonically conditioned pitch variations for granted as phenomena extraneous to lexical tone, assuming that such variations never factor into speakers' perceptions of the distinctive pitch of syllables. They keep phonemic tone and prosodic pitch quite starkly separate: "...I would question the extent to which details of intonation are relevant to the issue of Gyeongsang lexical prosody. *Intonational phonology*, which accounts for overall melodies at phrasal levels, is distinct from *tonal phonology*, which accounts for lexically associated pitch phenomena." He mentions that the effects of various consonants on pitch can make the actual F0 contours of a word of one tonal category correspond most closely to the normal tonal profile of a different tonal category, making it entirely misleading to try to rely on actual pitch: "Vowels that follow a tense or aspirated consonant have higher F0 than vowels following a lax consonant" (Kenstowicz and Park, 2006). Michael Kenstowicz and Chiyoun Park discuss

such effects fully in a 2006 paper.

Utsugi, however, advocates for a "prosodic model" of lexical tone, where distinctive tones are discussed within the prosodic system of the dialect. He makes one assertion in particular about intonational behavior that causes a discrepancy between lexical tone and speaker perception, involving downstep that causes future peaks to occur near the baseline within a compressed pitch range.

In general, S+K equate the level at which they represent surface phenomena with the level of speaker knowledge about tone, which seems to suppose that any truly salient features will register with speakers. Utsugi, on the other hand, suggests that some of surface-level tone's most important characteristics elude the shorthand speakers have for talking about it. Where I place surface-level representation will be based tentatively on reconciling the general regional delineations that these authors make within phrases in Gyeongsang Korean and seeing which phonetic details my resulting chronological divisions can match up with.

The major disconnect between S+K's and Utsugi's rules for assigning surface-level pitches to syllables is that Utsugi allows for a second peak of high-toned syllables within a prosodic phrase, albeit downstepped ones, within a prosodic phrase, while S+K do not, allowing only one such sequence per prosodic phrase. All agree, however, that the location of the regions in prosodic phrases where non-downstepped high tones occur are important and interesting.

In order to provide room to entertain, specifically, the schemes of analysis of S+K and of Utsugi, I will use a system that indicates that region of interest—the section of a prosodic phrase containing syllables that our authors would consider to be high and that Utsugi would not consider to be downstepped—but does not make a determination as to

whether or not those are the only high syllables in the prosodic phrase. To maintain this ambiguity, we must distinguish these groups of syllables by something other than their height. This is why we indicate *summit approaches* in each phrase. A summit approach equates to the period of non-downstepped, uncontroversially high-toned syllables within a prosodic phrase. Each prosodic phrase only has one, and that one may consist of multiple syllables. We could proceed through the rest of this thesis without introducing the term "summit approach" while maintaining almost identical argumentation, as just discussing each summit approach in terms of its constituent high-toned syllables would be materially the same thing, but I think that the term and its application are sufficiently illustrative of the surface-level and phonetic nature of the tonal system as to warrant my adopting it.

<u>*Summit approach*</u>

Now that we are not using conventional tonal terminology, we must define our terms very precisely. It is all right to identify high tones without explicit qualification, even if what they correspond to is more complicated than just absolute phonetic pitch, as long as, within the scholarship on a language, there is a traditional conception of high tone and what marks its realization. However, our new term, *summit approach*, does not come with the same assumptions about what features it might entail, even though it will end up encompassing many of the factors that characterize high tone and is expressly conceived to incorporate syllables that would be analyzed as having high tone. Nor can it be defined simply as being applied to syllables of a certain overall pitch any more than high tone can.

I thus define the *summit approach* precisely below.

I define a *summit approach* as a sequence of as many adjacent syllables as possible

satisfying the following conditions:

Condition 1. The summit approach must contain high pitches.

Condition 2. All syllables within the summit approach must contain mid pitches or higher.

Condition 3. Syllables with consistently high pitch are included in the summit approach.

Condition 4. All syllables within the summit approach that are not consistently high-pitched must exhibit a continuous rise in pitch over their duration.

Pitch refers to F0 values.

Why do I define the summit approach in this way? Going by the data S+K and Utsugi give in their work on South Gyeongsang Korean, I wouldn't have much to go on: the syllables I am consolidating into the summit approach are ones that they would all classify as being high-toned, but as they are riding on something of a historical consensus about such classifications, they do not specifically elaborate on what differentiates those syllables in terms of actual phonetic pitch. However, Utsugi and Hyejin Jang (2008) have written in more exacting phonetic detail on South Gyeongsang Korean's sister dialect, North Gyeongsang Korean.

According to their findings, the North Gyeongsang dialect's tonal paradigm differs mainly in lacking certain tonal categories, although it does have one that South Gyeongsang dialect lacks. For tonal categories that the two dialects share, we assume that Utsugi and Hyejin's findings on tone contours in North Gyeongsang dialect have some application for South Gyeongsang dialect.

What they find is that, as pitch descends across multiple syllables from a non-downstepped pitch peak to the baseline, it takes two syllables to get to the bottom and flatten out:

In a word like *myeoneuri*, the first of the three syllables is considered to have high tone and the others are not. However, when the word is pronounced in isolation, there is a pretty steady descent in pitch over the course of the last two syllables, and while the final syllable is actually phonetically low, the second syllable is not—rather, it has mid pitch or higher. In addition, over the course of the first syllable, the pitch is rapidly rising from an initial low pitch that characterizes the onset of all prosodic phrases in Gyeongsang, no matter their tonal category, manifesting a prosodic feature called a *boundary tone*. As those syllables cover the entire pitch range from low to high, it makes sense to call them phonetically mid as well. In fact, the actual phonetic pitch peak in words with high tone on the first syllable usually comes just <u>after</u> the boundary between the first and second syllables. Nevertheless, despite the fact that the second syllable contains the pitch peak and may even have a higher overall pitch, high tone is only associated with the first syllable. This applies to descents within a compound prosodic phrase as well.

Utsugi and Hyejin also find that, in prosodic phrases with multiple adjacent non-downstepped high-toned syllables, only the last of those syllables attains a truly high pitch:

See Figure 2 on page 14.

The first high-toned syllable in the sequence is really just another example of a syllable with mid pitch, although the pitch increases constantly from there to the peak. Here we see mid-pitched syllables that <u>do</u> correspond to non-downstepped high tone.

Finally, an extremely important component of how lexical pitch plays out in Gyeongsang Korean is *downstep*, whereby certain tonal patterns cause all future tonal peaks within the prosodic phrase to be severely attenuated, so that they never rise higher than mid pitch:

Thus, downstepped high-toned syllables provide yet another case of syllables with mid pitch in Gyeongsang Korean.

We have four situations that yield syllables with mid pitches, and three different ways that those syllables are classified tonally:

Case 1. There are lone non-downstepped high-toned syllables in prosodic-phrase-initial position that have mid pitch.
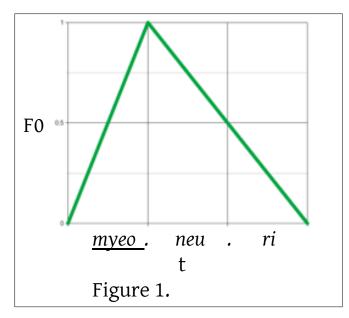
Case 2. There are also non-downstepped high-toned syllables that have mid pitch preceding adjacent non-downstepped high-toned syllables.

Case 3. There are downstepped high-toned syllables that have mid pitch serving as a relative peak.

Case 4. There are low-toned syllables immediately following non-downstepped high-toned syllables that have mid pitch.

As our intention in identifying summit approaches is to include all the non-downstepped syllables that are traditionally classified as having high tone, we must define the summit approach in such a way that the definition includes the mid-pitched syllables that are associated with non-downstepped high tone—Cases 1 and 2—while excluding other mid-pitched syllables, or Cases 3 and 4. Therefore, our definition cannot rely on the overall pitch of syllables alone.

The last syllable in a sequence of adjacent high-toned syllables is always the one
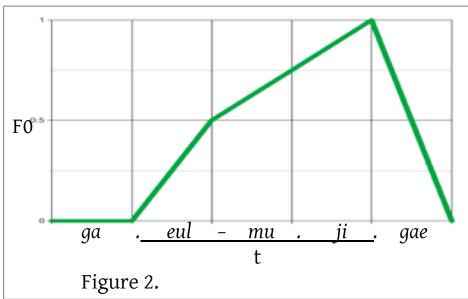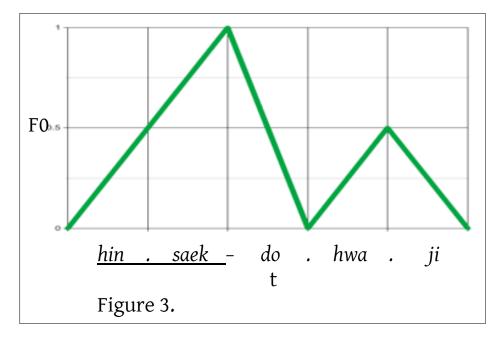
Figure 1.

Pitch track schematics

Key:

Summit approach
represented with underline

On y-axis, 0 = baseline pitch
1 = pitch peak

Figure 2.

Figure 3.

that contains the highest pitches. Either the phonetic peak occurs just after the end of the last high-toned syllable, as in Case 1 and sometimes elsewhere, or it occurs in the middle of the last high-toned syllable, making that syllable's pitch consistently high. Either way, the last high-toned syllable attains a pitch that we would deem high by the end of its duration. Thus, all sequences of non-downstepped high-toned syllables do contain high pitches. However, as we've been discussing, they do not only contain high pitches, and many high-toned syllables are phonetically mid.

Case 4 syllables, by contrast, do not end with a high pitch: even when the syllable after the last high-toned syllable contains the phonetic pitch peak, its pitch always descends to around the midline by the end of its duration. On the other hand, one thing that Case 1 syllables and Case 2 syllables have in common, whatever their overall pitch, is that they are continuously ascending in pitch over their duration. In fact, the only time that a high-toned syllable does not continuously ascend in pitch is when the last high-toned syllable in a word contains the phonetic pitch peak, producing a consistently high-pitched syllable.

Finally, all high-toned pitches elevate to at least the midline range; they are never entirely low.

We define the summit approach in such a way that our definition coincides with all the characteristics that unify the sequences of non-downstepped syllables that are traditionally classified as being high-toned, so that summit approaches are always coextensive with those sequences.

Now let's go back through our definition of summit approach and see what each

of its conditions serves to do.

We have defined a *summit approach* as a sequence of as many adjacent syllables as possible satisfying the following conditions:

Condition 1. The summit approach must contain high pitches.

This rules out downstepped high tones, which may resemble summit approaches in shape, but which operate within a compressed pitch range and never top mid pitch.

Condition 2. All syllables within the summit approach must contain mid pitches or higher.

This rules out syllables that are quite simply low, not participating in any movement from the pitch baseline.

Condition 3. Syllables with consistently high pitch are included in the summit approach.

This covers the cases where the pitch peak lies within the last of a group of high-toned syllables, making sure that syllable is included, but leaves out Case 4 syllables that contain the pitch peak but subsequently descend to mid pitch.

Condition 4. All syllables within the summit approach that are not consistently high-pitched must exhibit a continuous rise in pitch over their duration.

This serves to include the Case 1 and 2 mid syllables preceding the pitch peak while ruling out the Case 4 syllables that descend in pitch following the peak.

As we've seen, of the traditionally high-toned pitches contained in each summit approach, it is the last that has the highest overall pitch; the summit approach generally consists of a sometimes gentle slope leading up to the point of highest pitch. This is what I meant to illustrate in choosing the term *summit approach*: I wanted the term to be suggestive of the final phase of a mountaineer's ascent, when she sets off from the highest camp and makes her approach to the summit.

Tonal Categories

The tonal categories in Gyeongsang Korean are different paradigms for how the tone of nouns plays out—not just within a word, but also in its environment. They basically differ in terms of where higher pitch starts to kick in among the syllables and where it stops, but their properties are not totally straightforward. The tonal category a noun is in affects the tone of the suffixes it takes and, in many cases, the word it precedes. When a word's tonal pattern overlaps with a subsequent word's own lexical tone, the interactions can be complex.

If I am as generous as possible in delineating separate tonal categories for nouns in Gyeongsang Korean, there are twelve. Under this system, I've made categories exclusive to words of a certain number of syllables: all the categories for one-syllable words are separate from all the categories for two-syllable words, and so on.

You will note that not all tonal categories distinguish themselves in isolation. Words in Categories 1 and 2, along with words in Categories 4 and 5, are tonally identical on their own. Only through their effects on their morphological and syntactical surroundings do they show the differences between the patterns they encode.

The twelve categories follow, with nouns from the lexicon as examples.

In the initial table just below, I indicate each category's surface-level tone in citation form using two notation systems. The first is my own notation system based on the location of the summit approach. Under this system, words are transliterated using Revised Romanization, and the summit approach is indicated with an underline. In this notation system, I mark vowel length with a simple colon; an underline under just the

colon means that only the second mora of the vowel is in the pitch approach. I also include a syllabic schematic for each tonal category in the summit-approach notation system, with "σ"s representing syllables.

The second notation system is the IPA, with high or low tone specified for each syllable. I'm providing it for an initial comparison, in order to see how the summit-approach notation scheme matches up with conventional tonal notation, but I'll be sticking with just the first notation scheme from here on out. Generally, I'll provide the *han'geul* whenever I introduce new roots in the data. When using the transliterated orthography, I mark vowel length with a simple colon; an underline under just the colon means that only the second mora of the vowel is in the pitch approach.

Note that, in general in this these, my data comes from the findings of S+K unless otherwise specified. This is because S+K have collected data on prosodic phrases of two consecutive noun roots, whereas Utsugi has collected data on prosodic phrases of a noun followed by a verb. S+K's data allow me to see the behavior of nominal roots from certain tonal categories in both first and second position in the prosodic phrase, plus they have more data altogether.

However, as we will see, one major hole in S+K's data will lead me to turn to Utsugi's data.

Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
σ̱	σ̱	σ:	σσ̱	σσ̱	σ̱σ	σ̱σ̱
말 *mal* [mál] "horse"	눈 *nun* [nún] "eye"	새 *sae:* [sɛ̌ː] "bird"	가지 *gaji* [kàdzí] "eggplant"	사람 *saram* [sàrám] "person"	머리 *meori* [mʌ́rì] "head"	모기 *mogi* [mógí] "mosquito"
Category 8	Category 9	Category 10	Category 11	Category 12		

σơ̱σ	σơ̱σ	ơ̱σσ	ơ̱σσ	ơ̱σσσ		
미나리 *mi<u>na</u>ri* [mìnárì] "parsley"	복숭아 *bok<u>sung</u>a* [pòksúŋá] "peach"	며느리 *<u>myeo</u>neuri* [mjʌ́nùrì] "daughter-in-law"	무지개 *<u>mu</u>jigae* [múdʑígɛ̀] "rainbow"	해바라기 *hae<u>ba</u>ragi* [hɛ̀bárágì] "sunflower"		

We notice that the summit approach exactly matches up with the presence of high tone in traditional tonal notation, as we intended.

<center>**Behavior of Tonal Categories with Affixes Attached**</center>

Below are the patterns that the twelve tonal categories exhibit when modified with a series of common monosyllabic nominal inflectional suffixes that are not independently specified for tone; three adjacent suffixes attached to each root are required for all the lexical tonal patterns to play out. Here, we will see categories that behaved identically for a root in isolation distinguish themselves.

The three consecutive suffixes are 들 *-deul,* an optional plural marker; 만 *-man,* which marks a noun as "only;" and 이 *-i,* which marks nominative case. The *l* in *-deul* assimilates to *n* before the *m* of *-man.*

Category 1	Category 2	Category 3
<u>mal</u> ơ̱	<u>nun</u> ơ̱	*sae:* σ:
<u>mal</u>-deun-man-i ơ̱-σ-σ-σ	<u>nun</u>-deun-man-i ơ̱-σ-σ-σ	*sae-<u>deun-man</u>-i* σ-ơ̱-ơ̱-σ
Category 4	**Category 5**	**Category 6**
gaji σơ̱	*sa<u>ram</u>* σơ̱	*meori* ơ̱σ
ga<u>ji</u>-deun-man-i σơ̱-σ-σ-σ	*sa<u>ram</u>-deun-man-i* σơ̱-σ-σ-σ	*<u>meo</u>ri-deun-man-i* ơ̱σ-σ-σ-σ
Category 7	**Category 8**	**Category 9**

mogi σσ	*minari* σσσ	*boksunga* σσσ
mogi-deun-man-i σσ-σ-σ-σ	*minari-deun-man-i* σσσ-σ-σ-σ	*boksunga-deun-man-i* σσσ-σ-σ-σ
Category 10	**Category 11**	**Category 12**
myeoneuri σσσ	*mujigae* σσσ	*haebaragi* σσσσ
myeoneuri-deun-man-i σσσ-σ-σ-σ	*mujigae-deun-man-i* σσσ-σ-σ-σ	*haebaragi-deun-man-i* σσσσ-σ-σ-σ

<u>Discussion and tentative grouping schemes</u>

First of all, we notice that in the uninflected roots, summit approach exactly matches up with the presence of high tone under the other, syllabic system, which is S+K's notation—in fact, the idea of summit approach was contrived to do this while still validating Utsugi's conceptions about the behavior in question.

We also notice that in the inflected forms, distribution of the summit approach among the root syllables is the same whether or not affixes are present, with the exception of Category 3, which only has one mora and does not participate in the summit approach when it's followed by affixes, but takes up two mora in one syllable when it's alone, the second of which is in the summit approach. In most cases, the suffixed syllables are all not included in the summit approach. However, with words of Categories 2, 3, and 5, some of them are. This would seem to be a useful grouping scheme among the categories for reference. Each group is named for the number of suffixed syllables it extends the summit approach to:

Approach Extension grouping scheme

+0 Group	+1 Group	+2 Group
Categories 1, 4, 6-12	Categories 2, 5	Category 3

We may be able to get more out of it, though. We note for one that a third suffix is never part of the summit approach. Also, all the tonal categories for roots of three

syllables or more are in the +0 Group: only words of two or fewer syllables can extend the summit approach to suffixes, and only *one*-syllable words—those in Category 3—can extend it to two adjacent suffixes. These features connect to a larger commonality: the fourth syllable of a word is never included in the summit approach, including in four-syllable roots, nor is any syllable afterward. Differences, it seems, are only encoded in the first three syllables.

My positive identification of summit approaches, with no negative counterpart—I oppose them only to the absence of summit approaches—insinuates, more than S+K's simple high-low syllabic notation does, that summit approaches equate to "important tonal behavior," such that in their absence there would be presumed to be nothing going on. Given that the region of a many-syllable word where tonal contrast never applies is not part of the summit approach, that attitude seems to have some validity. We'll say, then, that the default thing for tonally unspecified suffixes to do, unless they are otherwise influenced by a root, is not to be part of the summit approach. Since the first three syllables of words is where all tonal variation occurs, and since roots shorter than three syllables can affect the tone of attached suffixes up to the third overall syllable, perhaps we should say that every root encodes a three-syllable pattern in terms of the placement of the summit approach, whether the root has the syllables to express the pattern or not. If there is some of the pattern left over after the end of the root, it expresses itself on suffixed syllables when they are available.

In that case, we can identify the patterns that the first three syllables of words in various categories take, suffixes and all, and make a grouping for the categories accordingly. We see four patterns: the summit approach can consist of the first syllable alone, the second syllable alone, the first and second syllables, or the second and third

syllables. The groups are named for the syllables included.

Approach Pattern grouping scheme

1 Group	2 Group	1-2 Group	2-3 Group
Categories 1, 6, 10	Categories 4, 8	Categories 2, 7, 11	Categories 3, 5, 9, 12

This grouping looks quite different from the other one. We'll keep them both in play.

We'll note one thing before we move along: it looks like Category 3 roots are inclined for some reason to take on two syllables' worth of their encoded 2-3 Group Pattern, despite only having one syllable. This leads the vowel to elongate: that way, the second half of it can constitute a summit approach. Perhaps the behavior is motivated by a requirement in the language that all prosodic phrases must have a summit approach.

Behavior of Tonal Categories in Composite Prosodic Phrases

There are many combinations of lexical categories that can unify prosodically when in sequence, resulting in prosodic phrases that can incorporate multiple words from content categories. I refer to a prosodic phrase containing more than one root as a *composite* prosodic phrase. If two elements in a prosodic phrase are separately encoded for lexical tone, they can affect each other tonally at the surface level. These processes of interaction are not dependent on lexical categories, but are certainly dependent on tonal categories.

In the table below, we have a row for each tonal category showing the different possible tonal patterns of composite prosodic phrases that start with a root of that tonal category. Some rows have only one cell. For example, the row for Category 2 only has one cell, showing a σ-σ(σ)(σ) tonal pattern. (The parentheses in the patterns account for the variable length of the second root, which may have fewer than the three syllables

shown.) The fact that this is the only cell in the row means that all composite prosodic phrases that start with a Category 2 root end up with that tonal pattern. Thus, the presence of an initial Category 2 root in a composite prosodic phrase effectively neutralizes all tonal differences in the subsequent root, making the subsequent root conform to a certain tonal pattern no matter what.

Some rows, however, have multiple cells. For example, the row for Category 4 has three cells, each with a different tonal pattern. This means that the tonal pattern of composite prosodic phrases containing an initial Category 4 root changes depending on the tonal category of the subsequent root. Each cell lists the tonal categories that produce the tonal pattern shown in the cell when they follow a Category 4 root in a composite prosodic phrase. So, one of the cells in the row for Category 4 shows a σσ-σ(σ)(σ) tonal pattern. One of the tonal categories listed in that cell is Category 9. That means that when a Category 4 root is followed by a Category 9 root in a composite prosodic phrase, the entire composite prosodic phrase will have a σσ-σσσ tonal pattern. The following data are taken from S+K; gaps correspond to where they do not offer data.

Category 1 followed by **Category 2, 3, 7**	**Category 1** followed by **Category 5, 11**	
σ-σ(σ)(σ)	σ-σσ(σ)	
Example:	Example:	
Category 1 followed by **Category 7**	**Category 1** followed by **Category 11**	
술단지 *sul*-*danji* "wine jug"	앞정 바기 *ap*-*jeongbagi* "front of head"	

Category 2 followed by **All Categories** $\underline{\sigma}\text{-}\underline{\sigma}(\sigma)(\sigma)$ Example: **Category 2** followed by **Category 9** 물사마귀 _mul-samagwi_ "praying mantis"		
Category 3 followed by **Category 10** $\sigma\text{-}\underline{\sigma}(\sigma)(\sigma)$ Example: **Category 3** followed by **Category 10** 섬아지매 _seom-ajimae_ "island wife"	**Category 3** followed by **Category 1-9, 11, 12** $\sigma\text{-}\underline{\sigma}(\underline{\sigma})(\sigma)$ Example: **Category 3** followed by **Category 8** 돈주머니 _don-jumeoni_ "money pocket"	
Category 4 followed by **Category 2, 7** $\sigma\underline{\sigma}\text{-}\sigma(\sigma)(\sigma)$ Example: **Category 4** followed by **Category 7** 너거자식 _neogeo-jasik_ (~ _neogeo-jasik_) "your children"	**Category 4** followed by **Category 1, 6, 10** $\sigma\underline{\sigma}\text{-}\underline{\sigma}(\sigma)(\sigma)$ Example: **Category 4** followed by **Category 10** 너거며느리 _neogeo-myeoneuri_ "your daughter-in-law"	**Category 4** followed by **Category 3-5, 8, 9, 11, 12** $\sigma\underline{\sigma}\text{-}\underline{\sigma}(\underline{\sigma})(\sigma)$ Example: **Category 4** followed by **Category 11** 가을무지개 _gaeul-mujigae_ "autumn rainbow"

Category 5 followed by **Category 1, 6, 10** σσ̱-σ̱(σ)(σ) Example: **Category 5** followed by **Category 10** 서울며느리 *Seo̱ul-myeo̱neuri* "Seoul daughter-in-law"	Category 5 followed by **Category 2-5, 7-9, 11, 12** σσ̱-σ̱(σ̱)(σ) Example: **Category 5** followed by **Category 8** 서울아저씨 *Seo̱ur-a̱jeossi* "Seoul uncle"	
Category 6 followed by **All Categories** σ̱σ-σ(σ)(σ) Example: **Category 6** followed by **Category 8** 여름소나기 *ye̱oreum-sonagi* "summer rain shower"		
Category 7 followed by **All Categories** σ̱σ̱-σ(σ)(σ) Example: **Category 7** followed by **Category 8** 힌색도화지 *hinsaek-dohwaji* "white sketch paper"		

Category 8 followed by **All Categories** σσ̲σ-σ(σ)(σ) Example: **Category 8** followed by **Category 9** 어머니장례식 *eo<u>me</u>oni-jangnyesik* "mother's funeral"		

S+K offer no data on composite prosodic phrases that begin with roots from Categories 9 through 12. We look to Utsugi's data.

The great majority of the composite prosodic phrases S+K provide in their data are compounds of two adjacent nominal roots. All Utsugi's data on composite prosodic phrases cover a different type of composite prosodic phrase that consists of a noun followed by a verb. In Korean, an object-verb sequence can form a composite prosodic phrase, showing unified tonal behavior, as long as the verb is not given focus. Utsugi gives data on the resulting tonal patterns when nouns from various tonal categories precede two verb forms in particular:

먹는다고
meong-<u>neun</u>-da-go
"eat/drink"-NPST-DECL-QUOT
σσ̲σσ

Utsugi mentions that *meongneundago* can also exhibit a σσ̲σσ tonal pattern, but he doesn't make much of it.

먹었다고

meog-eot-da-go
"eat/drink"-PST-DECL-QUOT

σσσσ

NPST refers to non-past tense.
PST refers to past tense.
DECL refers to the declarative mood.
QUOT refers to the quotative.

Ignoring the internal morphological complexity of these verb forms, we will treat them as simple four-syllable entities and try to compare them to existing tonal categories based on their tonal patterns. Neither of them actually conforms to any nominal tonal pattern: the only four-syllable nominal category is Category 12, with a σσσσ pattern, which is not the primary tonal realization of either verb form. The σσσσ pattern of *meongneundago* most closely resembles Category 8's σσσ pattern, while the σσσσ pattern of *meogeotdago* is closest to the σσσ pattern of Category 10. Both verb forms have an extra non-pitch-approach syllable at the end.

Now let's see how roots from Categories 9 through 12 interact with them in composite prosodic phrases. Utsugi does not always necessarily use nouns that are morphologically unanalyzable, but the nouns he uses all bear a tonal pattern that corresponds to one of the tonal categories for nominal roots.

Category 9 followed by σσ̱σσ σσ̱σ σσσσ Example: 콩나물 먹는다고 *kongnamul meongneundago* "(I said) I would eat bean sprouts."	**Category 9** followed by σ̱σσσ σσ̱σ σσσσ ~σσ̱σ σσσσ Example: 복숭아 먹었다고 *boksunga meogeotdago* *~boksunga meogeotdago* "(I said) I had eaten a peach."
Category 10 followed by σσ̱σσ, σ̱σσσ σ̱σσ-σσσσ Example: 산딸기 먹는다고 *santtalgi meongneundago* "(I said) I would eat mountain berries."	
Category 11 followed by σσ̱σσ, σ̱σσσ σ̱σσ-σσσσ Example: 불고기 먹었다고 *bulgogi meogeotdago* "(I said) I had eaten grilled beef."	

Category 12 followed by σσ̱σσ, σ̱σσσ σσ̱σσ-σσσσ Example: 밤고구마 먹는다고 *bamgo̱gu̱ma meongneundago* "(I said) I would eat sweet potato."	

So composite prosodic phrases that begin with roots from Categories 10, 11, and 12 always have the same tonal pattern, but in composite prosodic phrases starting with Category 9 roots, there is some variation. The one case in this data where a syllable in the verb participates in the summit approach occurs when Category 9 precedes *meogeotdago*, and it doesn't always happen. We attribute this to the fact that longer sequences are less likely to prosodically combine; since we're working with groups of at least 7 syllables, it's quite possible that the noun and the verb just frequently fail to combine into a composite prosodic phrase.

<div align="center">

Discussion and tentative grouping schemes

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We see that words in some tonal categories neutralize all tonal differences among words that they precede within a prosodic phrase, imposing an invariable tonal pattern on the entire prosodic phrase. Words in other tonal categories leave some tonal variation intact among the words that follow. This forms the basis for an obvious grouping scheme:

Neutralization grouping scheme

Neutralizing Group	Non-Neutralizing Group
Categories 2, 6, 7, 8, 10, 11, 12	Categories 1, 3, 4, 5, 9

The Neutralizing Group

Let's look at the Neutralizing Group. We know that each of the 12 tonal categories can be associated with a three-syllable tonal pattern that plays out within a word given enough available syllables, as we diagrammed in the Approach Pattern grouping scheme. We also know that each tonal category in the Neutralizing Group imposes a consistent pitch pattern on the entire prosodic phrase in which it occurs, regardless of the tonal category of the root following it. In the data, we see that the tonal pattern imposed by each neutralizing tonal category on composite prosodic phrases is identical to the tonal pattern it exhibits on its own:

	Category 2	Category 6	Category 7
Root with affixes:	_mul-deun-man-i_	_yeoreum-deun-man-i_	_hinsaek-deun-man-i_
Root followed by another root within a prosodic phrase:	_mul-samagwi_	_yeoreum-sonagi_	_hinsaek-dohwaji_

	Category 8	Category 10	Category 11
Root with affixes:	_eomeoni-deun-man-i_	_santtalgi-deun-man-i_	_bulgogi-deun-man-i_
Root followed by another root within a prosodic phrase:	_eomeoni-jangnyesik_	_santtalgi meongneundago_	_bulgogi meogeotdago_

We recall that the reason a root is able to impose its tonal pattern on affixes is because the affixes are unspecified for tone. Roots are not unspecified for tone, yet the tonal categories in the Neutralizing Group impose their own tonal patterns on following roots nonetheless. Therefore, we propose that the neutralizing categories remove the tonal specification of syllables in the following root, dismantling that root's summit approach and making those syllables available for the neutralizing root's tonal pattern to play out in.

When the second element in a composite prosodic phrase is tonally neutralized, the tonal contour of its post-summit-approach syllables does not completely smooth out

into an uninterrupted descent. The original summit approach of the neutralized second root is still preserved as a downstepped peak. However, after Category 2 roots, which neutralize the subsequent root and extend the summit approach to its first syllable in imposing their own tonal pattern, even syllables where we would expect to see downstepped high tones based on the original tonal pattern of the neutralized word can end up as part of the summit approach. For example, this occurs when a Category 2 root precedes a Category 10 root:

Category 2   Category 10
bap   _ajimae_

Since _bap_ neutralizes _ajimae_'s lexical tone, we would expect the first syllable of _ajimae_ to be a downstepped peak and thus not participate in the summit approach. However:

Prosodically unified:
bab-ajimae

We see that the downstepped high tones are somehow superseded by the distribution of the summit approach in accordance with the Category 2 root's own tonal pattern.

Thus, we must propose that downstepped high tones, since they lack a specification for summit approach or for the lack thereof, pattern as being unspecified for tone for the purposes of determining the distribution of the summit approach.

The Non-Neutralizing Group

We note that in all the data, each composite prosodic phrase has only one summit approach; only one full-fledged peak. In the case of prosodic phrases beginning with a word from the Neutralizing Group, this makes sense: the initial root neutralizes the summit approach of the following root, leaving only one summit approach. However,

for prosodic phrases beginning with a word from the Non-Neutralizing Group, we need another explanation. There are cases where we would expect to see two separate summit approaches. For example, take a prosodic phrase composed of a Category 4 root, which is in the Non-Neutralizing Group, followed by a Category 8 root.

Category 4   Category 8
neogeo   *ajeossi*

Prosodically combined:
neogeo-ajeossi

Based on the tonal patterns of the two words in isolation, we would not expect the first syllable of the second root to be part of a summit approach. Nor can the behavior be attributed to the full three-syllable tonal pattern encoded in the first root playing out on the first syllable of the second root: as we can see when we attach a suffix to *neogeo*, its full tonal pattern would not include the third syllable in the summit approach.

Category 4 with suffix
neogeo-deul

We must account for the third syllable's participation in the summit approach through some phonological rule of South Gyeongsang dialect, then, whereby the syllable in question assimilates tonally to one of its neighbors. I propose that the summit approach spreads to the right onto tonally unspecified syllables. In order for that to work, though, we must also propose that the first syllable of Category 8 words is tonally unspecified and is simply excluded from the summit approach by default. Thus far, we've been conceiving of the exclusion of the first syllable as an essential part of the tonal pattern of Category 8 and other tonal categories whose first syllables aren't in the summit approach. We may have to rethink that when we get to the point of proposing a

tonal specification for those categories at the underlying level.

Let's continue looking at the Non-Neutralizing Group. For one thing, for most non-neutralizing tonal categories, all the syllables of a non-neutralizing root itself always behave the same way preceding another root in a composite prosodic phrase as they would preceding affixes:

	Category 3	Category 4	Category 5	Category 9
Root preceding affixes:	sae-_deul_	gaji-deul	sa_ram-deul_	bok_sunga_-deul
Root preceding another root within a prosodic phrase:	sae-	gaji-	sa_ram_-	bok_sunga_-

So, in general, the tonal category of a non-neutralized second root in a prosodic phrase only affects the pitch pattern of the second root itself, with the first root always maintaining its own tonal pattern. However, there is an exception to this:

	Category 1
Root preceding affixes:	_mal_-deul
Root preceding another root within a prosodic phrase:	_mal_- or mal- Depending on the tonal category of the following root.

In fact, for a composite prosodic phrase beginning with a root from the Non-Neutralizing Group, there are really only three possible outcomes for the resulting tonal pattern of the second root in the prosodic phrase.

Outcome 1 is that the summit approach extends to the first syllable of the second root:

Category 4 followed by Category 10
neogeo-myeoneuri

Outcome 2 is that the summit approach extends to the first two syllables of the second root:

Category 4 followed by Category 11
gaeul-mujigae

The existence of Outcomes 1 and 2 is understandable: the second root has, in isolation, its own summit approach, so when it appears after a root that does not neutralize its tonality, it makes sense for that fact to be reflected and for some of its syllables to participate in the summit approach. However, the existence of the third outcome is something of a surprise:

Outcome 3 is that the summit approach does not extend to any of the syllables of the second root:

Category 4 followed by Category 7
neogeo-jasik

    The outcome depends on the tonal category of the second root in the prosodic phrase. As we can see from the distribution of outcomes in the data table, some second-position tonal categories guarantee certain outcomes, no matter which non-neutralizing category they follow. Others produce more variable results. These patterns inspire another grouping scheme. The name of each group refers to the possible outcomes that the tonal categories in that group can result in when they follow a non-neutralizing root.

Outcome grouping scheme

Outcome 1 Group	Outcome 2 Group	Outcome 1/2 Group	Outcome 2/3 Group
Category 10	Categories 3, 4, 5, 8, 9, 11, 12	Categories 1, 6	Categories 2, 7

    Let's look at the invariable groups within that scheme first: The Outcome 1 Group and the Outcome 2 Group. We know that the difference between Outcome 1 and Outcome 2 is that the second syllable of the second root in a prosodic phrase ends up as part of

the summit approach in Outcome 2, but does not in Outcome 1. In exact accordance with that, all roots in the Outcome 2 Group include the second syllable in the summit approach even when they occur alone.

Category 3	Category 4	Category 5	Category 8
sae-<u>deun</u>	gaji	sa<u>ram</u>	mi<u>na</u>ri
(includes affix to show behavior of second syllable)			

Category 9	Category 11	Category 12
bok<u>sun</u>ga	mu<u>ji</u>gae	hae<u>ba</u>ragi

In addition, when the categories in the Outcome 2/3 Group do not trigger Outcome 3, whose existence we will account for later, they fall neatly into the group of categories that trigger Outcome 2, since they too include the second syllable in the summit approach in isolation.

Category 2	Category 7
<u>nun-deun</u>	<u>mo</u>gi
(includes affix to show behavior of second syllable)	

By contrast, Category 10, the lone member of the Outcome 1 Group, does not include the second syllable in the summit approach when it occurs in isolation.

Category 10
<u>mye</u>oneuri

    Thus, it seems that the summit-approach status of the second syllable of the second root usually carries over from the citation form of that root's tonal pattern, and that the production of Outcome 1 or Outcome 2 is largely governed by that carryover.

    Incidentally, the same carryover principle also explains why, with the unusual exception of Outcome 3, the first syllable of a non-neutralized second root is always part

of the summit approach, regardless of the second root's tonal category. One route is that the second root is from a tonal category that includes the first syllable in the summit approach, in which case that carries over into the composite prosodic phrase:

Category 4   Category 8
gaeul   _mujigae_

Prosodically combined:
gaeul-mujigae

Otherwise, the second root must be from a tonal category that has a summit approach <u>after</u> the first syllable that gets carried over into the composite prosodic phrase, in which case the first syllable joins the summit approach to close the gap between the later summit approach and the summit approach in the first root, as per Rule 3:

Category 4   Category 8
neogeo   _ajeossi_

Prosodically combined:
neogeo-ajeossi

—except for the cases where the first root is one syllable and has no summit approach, in which case the first syllable of the second root must join the summit approach to obey the prohibition on a sequence of two initial non-summit-approach syllables:

Category 3   Category 8
_do:n_   _jumeoni_

Prosodically combined:
don-jumeoni

  Thus, the first syllable of a non-neutralized second root is always part of the summit approach, with the exception of Outcome 3, which we have yet to discuss.

  As we said, the production of Outcome 1 versus Outcome 2 depends largely on the

carryover principle, which is based only on the tonal category of the second root.

However, some roots in second position can end up with either Outcome 1 or Outcome 2,

depending on the tonal category of the non-neutralizing root preceding them. These are

the roots in the Outcome 1/2 Group, from Categories 1 and 6:

Category 1	Category 6
mal-deun	_meori_
(includes affix to show behavior of second syllable)	

    Based on what we see with the other groups, we would expect Category 1 and

Category 6 to trigger Outcome 1, since the second syllables of Category 1 and Category 6

words in isolation do not participate in the summit approach. However, sometimes they

end up with Outcome 2 nonetheless.

Outcome 1	Outcome 2
Category 1 when preceded by **Categories 1, 4, 5, 9**	**Category 1** when preceded by **Category 3**
-σ(σ)(σ)	-σ(σ)(σ)
Example:	Example:
Category 5 followed by **Category 1** (with suffix)	**Category 3** followed by **Category 1** (with suffix)
사람뚱이	개뚱이
saram-ttong-i	_gae-ttong-i_
"human excrement"-NOM	"dog shit"-NOM

Category 6 when preceded by **Categories 1, 4, 5, 9** -σ̲σ(σ) Example: **Category 5** followed by **Category 6** 사람머리 *sa<u>ram-me</u>ori* "human head"	**Category 6** when preceded by **Category 3** -σ̲σ̲(σ) Example: **Category 3** followed by **Category 6** 반거름 *ban-<u>georeum</u>* "half-stride"

Specifically, roots in Categories 1 and 6 end up with Outcome 2 if they follow a root in Category 3.

I propose that this reflects the Category 3 root conferring summit approach onto the second syllable of the following root in accordance with its own encoded tonal pattern, just as Category 3 roots confer summit approach onto the first two affixes following them. I will provide a final explanation for it in my section proposing the underlying tonal structure of South Gyeongsang Korean.

To explain this behavior, we look back to the Approach Extension grouping scheme, wherein Category 3 is the only category in the +2 Group, meaning that it extends the summit approach to the first two affixes it takes:

Category 3 root with 2 suffixes
sae-<u>deun-man</u>

In turn, we can look to the Approach Pattern Grouping scheme to account for why it does this: Category 3 is in the 2-3 Group, meaning that it encodes a three-syllable pattern with the summit approach on the second and third syllables. Since a Category 3 root has only one syllable itself, it extends its encoded two-syllable summit approach to the

affixed syllables following it.

If it were to extend its summit approach onto the syllables of the second root, it would be the only tonal category to have the second syllable of the following root within its sphere of influence. For the reasons I discussed above, the potential extension of an initial root's summit approach onto the <u>first</u> syllable of the following root is irrelevant: the first syllable of a non-neutralized second root is part of the summit approach no matter what, with the exception of Outcome 3. However, the second syllable of the second root is tonally variable, and thus vulnerable to the extension of the summit approach by the preceding root.

We have already seen a neutralizing Category 2 root extend its encoded summit approach onto the first syllable of the following neutralized root. I propose that such extension can occur without neutralization. I propose that, for prosodic phrases consisting of a Category 3 root followed by a Category 1 or Category 6 root, Outcome 2 results from the Category 3 root extending its encoded summit approach onto the first two syllables of the following root. I propose that all initial roots with excess encoded summit approaches extend them to the following root, but that such extensions are usually redundant, falling on syllables that are already part of the summit approach. Since the second syllable of Category 1 roots and Category 6 roots is not usually part of the summit approach, that syllable provides an uncommon opportunity for such a process to make a difference.

However, Category 10 roots never end up with Outcome 2 when they follow Category 3 roots, even though it seems that they would be vulnerable to the imposition of Category 3's tonal pattern. We will attempt to explain this when we make our final proposal about underlying tonal specifications.

Outcome 3 differs from all the other behavior we've been talking about following non-neutralizing roots. It features second roots—ones from Categories 2 and 7 that usually trigger Outcome 2—that do not participate in the summit approach at all. First, let's get a sense of when it occurs.

Outcome 2	Outcome 3
Category 2 when preceded by **Categories 3, 5, 9** -σ̲(σ̲)(σ) Example: **Category 5** followed by **Category 2** (with suffix) 대추물이 *daechu-mur-i* "jujube water"	**Category 2** when preceded by **Categories 1, 4** -σ(σ)(σ) Example: **Category 4** followed by **Category 2** (with suffix) 도득놈이 *dodeung-nom-i* "thief bastard"
Category 7 when preceded by **Categories 3, 5, 9** -σ̲σ̲(σ) Example: **Category 5** followed by **Category 7** 사람척추 *saram-cheokchu* "human spine"	**Category 7** when preceded by **Categories 1, 4, 5, 9** -σσ(σ) Example: **Category 4** followed by **Category 7** 너거자식 *neogeo-jasik* (~ *neogeo-jasik*) "your children"

Outcome 3 comes about when a Category 1 or 4 root precedes a Category 2 or 7 root, then. As we see, Outcome 3 is in variation with the expected Outcome 2 for the

combination of Category 4 followed by Category 7.

The other cases where the second root in a prosodic phrase does not participate at all in the summit approach are cases of the second root being neutralized by the first root. That's the universal pattern following all the neutralizing categories except Category 2. It does appear that the Category 2 and Category 7 roots are being tonally neutralized in Outcome 3, losing all their specifications for summit approach. However, Category 1 and Category 4 are not in the Neutralizing Group. They do not neutralize subsequent roots from other tonal categories. There is some kind of special interaction here.

Categories 2 and 7 are both in the 1-2 Group from the Approach Pattern grouping scheme, and that pitch pattern may have some connection to their behavior. However, the three-syllable tonal category from the 1-2 Group—Category 11—does not exhibit the same interaction with Categories 1 and 4, being an ordinary member of the Outcome 2 Group.

As my final analysis of Outcome 3 relies heavily on our proposals for the underlying tonal specification of the tonal categories, we will continue discussing it in the section where I make those proposals.

Final Groupings as per My Sources

I'll now show the final grouping schemes put forth by the primary authors I'm following—S+K and Utsugi— for the tonal categories of South Gyeongsang Korean. S+K's scheme is very similar to Utsugi's; I'll give them one right after the other. They do not use my category numbering system; I have applied that system to their grouping schemes.

Russell G. Schuh and Jieun Kim's grouping scheme

Accented Group			Unaccented Group		Ungrouped
HLL Group	**HHL Group**	**LHL Group**	**Toneless Group**	**LHH Group**	**Ungrouped**
Categories 6, 10	Categories 2, 7, 11	Category 8	Categories 1, 4, 9	Categories 3, 5, 9	Category 12

Akira Utsugi's grouping scheme

Class A		Class B	
Non-Final Group	**Final Group**	**Initial-Double Group**	**Medial-Double Group**
Categories 6, 8, 10	Categories 1, 4, 9	Categories 2, 7, 11	Categories 3, 5

Utsugi does not mention Category 12.

In the following discussion, note that any comment of mine about S+K and Utsugi having groupings that match up well to mine can be taken to mean that I considered and was influenced by their grouping schemes in coming up with my own.

Interestingly, though S+K's subgroupings are very similar to Utsugi's, their overarching groupings are different. S+K seem to be thinking about the behavior of roots in first position in a composite prosodic phrase when they make their top-level groupings: their Accented Group corresponds exactly to my Neutralizing Group, minus Category 12, and their Unaccented Group to my Non-Neutralizing Group. Utsugi, on the other hand, focuses on the length of the summit approach, though he wouldn't call it that: his Class A covers roots with a single high-toned syllable in their full tonal pattern, while his Class B covers roots encoding two adjacent high-toned syllables.

All the authors are on board with the idea that a root can encode a tonal pattern of more syllables than the root itself, and they are game for using those tonal patterns as a basis for making groupings, and so some of their subgroups match groups from my Approach Pattern grouping scheme. S+K's HHL Group and Utsugi's Initial-Double Group are both identical to my 1-2 Group, and some of their other groups are subsets of groups

of mine. However, they both differ significantly from the Approach Pattern grouping scheme in placing Categories 1, 4, and 9 together. The Approach Pattern grouping gcheme has those all separated. Utsugi has them under the Final heading, and S+K under Toneless; taken together, these designations can lead us to surmise that the authors grouped Categories 1, 4 and 9 based on the fact that they all have high tone on the last syllable of the root and that none of them trigger downstep.

S+K distinguishes Category 8 from Categories 6 and 10 by their particular tonal patterns, calling them the LHL Group and the HLL Group respectively, while Utsugi groups them together as the Non-Final Group, reasoning that they all have a single high-toned syllable and drop down from it. As a matter of fact, Utsugi's grouping scheme divides the categories exactly into quadrants based on whether they encode one or two high-toned syllables and whether or not they trigger downstep: his Non-Final Group has one high-toned syllable and does trigger downstep, his Final Group has one and does not, his Initial-Double Group has two and does, and his Medial-Double Group has two and does not.

S+K and Utsugi all claim that downstep is triggered by a sequence of a high-toned syllable followed by a low-toned syllable, though S+K refer to downstep simply as the deletion of all subsequent high tones. S+K call this high-low sequence an "HL drop" and also an "accent point." This is based on the very true fact that no full-scale peak may occur after the descent from the first peak. In the names of their groups, S+K already make assertions about which tonal categories encode HL drops that ensure that the peaks of following roots are deleted rather than simply being allowed to join up with the preceding peak. Utsugi does not make assertions about where accent points are specified until he proposes his underlying tonal representations, which I'll discuss later.

S+K classify Category 9 into both the Toneless Group and the LHH Group by proposing that those two groups converge for three-syllable words, as LHH is the least marked three-syllable pattern and as the LHH pattern does not overhang a three-syllable word, which prevents it from affecting following words or affixes in any way and makes it effectively toneless. They decline to classify Category 12 at all. They could easily assign it to the same merged class as Category 9, since it is an LHH pattern and is clearly the least marked four-syllable pattern, being the only possible one, but they do not. Perhaps the fact that Category 12 words have an HL drop leads them to believe, as it does me, that Category 12 words would trigger downstep in a composite prosodic phrase and are "accented." None of us have any evidence about that, though.

S+K address the two major irregularities in non-downstepped composite prosodic groups, which we encapsulated in the cases of the Outcome 1/2 Group and the Outcome 2/3 Group:

They explain the alternation in the Outcome 1/2 Group, where non-downstepped Category 1 or 6 roots in second position sometimes have high-toned second syllables and sometimes don't, in much the same way that I explain it, though they don't use my terms. THey say that when a Category 3 root precedes a Category 1 or 6 root, the Category 3 root imposes its tonal pattern on the following root, making the second syllable high-toned and producing Outcome 2. However, in trying to address the fact that Category 3 roots—which they would call monosyllabic LHH roots—fail to impose high tone on the second syllable of the following root when the following root is a Category 10 root, S+K give a deeply flawed explanation. They propose that their LHH Group only exists as a separate group in a prosodic phrase of three or fewer syllables, and that in a longer prosodic phrase, any LHH root just behaves like a Toneless root.

This is clearly not true. For one thing, a one- or two-syllable LHH root—that is, a Category 3 or Category 5 root—can take on enough adjacent suffixes to get up to four syllables while maintaining a tonal pattern different from the corresponding pattern of Toneless roots, as S+K's own data plainly show:

Category 1 (with 3 suffixes)   Category 3 (with 3 suffixes)
aka 1-syllable Toneless   aka 1-syllable LHH
mal-deun-man-i   *sae*-*deun-man*-i

Category 4 (with 2 suffixes)   Category 5 (with 2 suffixes)
aka 2-syllable Toneless   aka 2-syllable LHH
gaji-deur-i   *sa*ram-*deur*-i

Even if we rule out affixes and just talk about composite prosodic phrases made up of multiple roots, S+K's assertion is false, based on the following: Outcome 3 is an irregularity where Category 2 and 7 roots appear to get downstepped following Category 1 and 4 roots. A Category 4 root followed by a Category 7 root amounts to a four-syllable prosodic phrase where Outcome 3 occurs, albeit only sometimes.

Category 4   Category 7
aka Toneless   aka HHL
neogeo   *jasik*

Prosodically combined:
neogeo-jasik
(~ *neogeo-jasik*)

Under S+K's assertion, the prosodic phrase's four-syllable length should mean that Toneless roots and LHH roots are interchangeable within it, and that the Toneless Category 4 root can be replaced with an LHH Category 5 root without any tonal change.

However, when a Category 5 root is followed by a Category 7 root, Outcome 3 never occurs.

Category 5   Category 7
aka LHH   aka HHL

sa<u>ram</u>   *<u>cheokchu</u>*

Prosodically combined:
sa<u>ram-cheokchu</u>

Thus, an altogether inadequate assertion.

Moving on, S+K say that Categories 1 and 4 do not have any tonal effects on the following root because they are tonally unmarked: rather than having anything distinctive about their sequence of tones, they merely conform to an unmarked tonal contour. This interpretation actually lends itself to a pretty solid way of accounting for Outcome 3, contradictions aside. It has to do with the underlying tones S+K propose, so we'll discuss it in the section on underlying tonal structure.

Utsugi is studying prosodic phrases composed of a noun followed by a verb, and since tonal categories and contours are different for verbs than for nouns, Utsugi does not observe either of the two major outcome anomalies for non-downstepped roots in second position.

My Final Groupings

I present the grouping scheme that I find to be most useful and fundamental, and that I believe unites tonal categories with the same underlying tonal structure.

Nemo Abraham Swift's grouping scheme

1 Group	2 Group	1-2 Group	2-3 Group

Category 1 (with 2 suffixes to show full tonal pattern): _mal-deur-i_		Category 2 (with 2 suffixes to show full tonal pattern): _nun-deur-i_	Category 3 (with 2 suffixes to show full tonal pattern): _sae-deur-i_
Category 6 (with suffix to show full tonal pattern): _meori-deul_	Category 4 (with suffix to show full tonal pattern): _gaji-deul_	Category 7 (with suffix to show full tonal pattern): _mogi-deul_	Category 5 (with suffix to show full tonal pattern): _saram-deul_
Category 10: _myeoneuri_	Category 8: _minari_	Category 11: _mujigae_	Category 9: _boksunga_
			Category 12: _haebaragi_

This is just the Approach Pattern grouping scheme from earlier. Each group is named for the syllables that make up the summit approach when its full tonal pattern is expressed, whether those are the syllables of the root itself or the affixes that follow it. The 1-2 Group makes obvious sense as a group: all its members tonally neutralize roots that follow them, and all consistently enforce the presence of the summit approach on the first two syllables of a prosodic phrase and nowhere else. Each of the other groups, though, is a mix of neutralizing and non-neutralizing categories, summit-approach-extending and non-summit-approach-extending categories. What the members of each group have in common is the pitch pattern that they encode, whether or not they have the syllables to express it on their own.

I propose this grouping scheme because I think the differences between the members of each group in terms of how they affect subsequent roots can be explained in a consistent manner, without resorting to saying that there are fundamental tonal differences between them. I will demonstrate this.

The main disconnect within the 1 Group is the fact that a Category 1 root does not neutralize the root that follows it, whereas a Category 6 root or a Category 10 root

does. I propose that this is because every root has an underlying tonal specification that must play out completely within the domain of the root and the affixes attached to it in order to trigger neutralization of the following root. This underlying specification is different from the three-syllable surface pattern that we have been looking at, though the underlying specification gets expressed as the three-syllable surface pattern if nothing interferes with it. If a root and its affixes do not provide enough syllables for the root's underlying specification to play out completely, the following root is not neutralized. When a Category 1 root occurs before another root in a composite prosodic phrase, its underlying tonal specification does not have enough syllables to play out on before the following root begins, so the following root is not neutralized. However, a Category 6 root provides enough syllables for the same underlying specification to play out completely, thus triggering neutralization.

The same reasoning explains the split within the 2 Group: Category 4 roots do not neutralize the roots that come after them because they are too short to express their entire underlying tonal specification, but Category 10 words are long enough.

We have specific evidence for this notion—evidence that S+K provide. S+K were interested in seeing some composite prosodic phrases with internal affixes: a root, followed by suffixes, followed by another root, all prosodically combined. They found a construction where this is possible: An object can unify prosodically with the verb following it, so long as the verb is not given focus in the sentence. The object can be modified with suffixes.

When S+K took data on this construction, they found that when a Category 1 noun started the prosodic phrase, with an affix attached so that its whole underlying pitch specification could successfully express itself, the noun did neutralize the verb

following it. The same went for Category 4 nouns. Thus, it seems that there is no fundamental tonal difference between a Category 1 word and a Category 6 word: all a Category 1 word needs is one unspecified syllable for its own underlying tonal specification to play out on in order for it to behave exactly like a Category 6 word. Even a root from the 2-3 Group—a Category 3, 5, or 9 word—will neutralize a following root if they have enough affixes on them to get up to a total of four syllables.

In the following example, I don't mark morpheme boundaries within the verb form or gloss every verbal morpheme. For the combined prosodic phrase, I just provide an idiomatic translation.

Category 4   Verb
without suffix
(Object)
namul   *meogeotda*
"salad"   "eat"-pst

Prosodically combined:
namul meogeotda
"ate salad"

Category 4   Verb
with 1 suffix
(Object)
namur-eul   *meogeotda*
"salad"-ACC   "eat"-pst

Prosodically combined:
namur-eul meogeotda

However, there are some one-syllable words that do trigger neutralization on their own. We will deal with that fact when we reveal our specific proposals for the underlying tonal specifications of our four tonal groups.

The Underlying Level

First, let's see what S+K and Utsugi have to say about the underlying level. Here they differ a lot more from each other.

Russell G. Schuh and Jieun Kim's proposals for underlying tone

Accented Group			Unaccented Group	
HLL Group	**HHL Group**	**LHL Group**	**Toneless Group**	**LHH Group**
Categories 6, 10	Categories 2, 7, 11	Category 8	Categories 1, 4, 9, 12	Categories 3, 5
Underlying tone: H | #σ σ (σ)	**Underlying tone:** H /\\ #σ (σ (σ)) or H | #σ (σ (σ))	**Underlying tone:** H | #σ σ σ	**Underlying tone:** None #σ (σ (σ (σ)))	**Underlying tone:** H /\\ #σ (σ (σ))

S+K propose that the L segments of HL drops are not explicitly encoded in the underlying tone, and that all of them surface through the application of a phonological rule: the assignment of low tone to tonally unspecified syllables. This interpretation works well within their scheme for tone.

Since they represent sequences of adjacent high-toned syllables with a single underlying high tone associated with multiple syllables, their analysis at this deepest level is perhaps not so different from my summit-approach analysis: the period of high tone in a word is one entity, rather than a series of identical entities.

They analyze Categories 1 and 4 as encoding no underlying tone whatsoever, with their entire surface tonal pattern being determined only by the phonology of least-marked tonality. Building off of this analysis, they give an appealing partial explanation of Outcome 3. They propose that roots in Categories 2 and 7, which unexpectedly

become downstepped following Category 1 and 4 roots, have an underlying "preaccent" that overhangs the left edge of the root and hovers there, unassigned. The syllables of Category 1 and 4 roots are unspecified for tone, so when a Category 2 or 7 root is preceded by a Category 1 or 4 root, the preaccent can associate with the last syllable of the Category 1 or 4 root. Low tone is then assigned phonologically to the first syllable of the Category 2 or 7 root, triggering downstep.

<div style="border:1px solid gray; padding:1em;">

Category 4   Category 2
aka 2-syllable Toneless   aka 1-syllable HHL
                                    H
                                   |

dodeuk   *nom*

Prosodically combined:
   H
   |
dodeung-nom

Assignment of low tone to tonally unmarked syllables:
 L H   L
 | | |
dodeung-nom

Result:

dòdeúng-nòm
aka
dodeung-nom

</div>

However, S+K admit that they do not have a good explanation for why the H tone would associates with the first <u>two</u> syllables of the Category 2 or 7 root that encodes it in the absence of an unspecified syllable it can associate with in the previous word. They simply propose an alternating underlying form for Category 2 and 7 roots, where there is a floating preaccent in the presence of an available preceding syllable, and an ordinary high tone associated with the first two syllables otherwise. They propose that Category 11 has lost this alternation, entrenching the HH form in all contexts. Perhaps

this results from longer words being less likely to unite prosodically with neighboring words, so that the preaccent form rarely appeared for Category 11 anyway.

We can move on to Utsugi's proposals. In my notation for Utsugi's proposed underlying tone, a dash "-" represents the end of the root, to be followed either by an affix or by another word, when its location is relevant to the definition of an underlying tone.

Akira Utsugi's proposals for underlying tone

Class A		Class B	
Non-Final Group	**Final Group**	**Initial-Double Group**	**Medial-Double Group**
Categories 6, 8, 10	Categories 1, 4, 9	Categories 2, 7, 11	Categories 3, 5
Underlying tone: $\begin{array}{c}\text{H}^* \text{ +L} \\ \mid \quad \mid \\ \#(\sigma) \;\sigma \quad \sigma\,(\sigma)\text{-} \end{array}$	**Underlying tone:** $\begin{array}{c}\text{H}^* \text{ +L} \\ \mid \quad \mid \\ \#((\sigma)\;\sigma)\;\sigma\text{-} \end{array}$	**Underlying tone:** $\begin{array}{c}\text{H}\omega \text{ +H +L} \\ \mid \quad \mid \quad \mid \\ \#\sigma \quad (\sigma \;\;(\sigma)) \end{array}$	**Underlying tone:** $\begin{array}{c}\text{L}\omega \text{ +H +H +L} \\ \mid \quad \mid \\ \#\sigma \quad (\sigma) \end{array}$

Unlike S+K, Utsugi does encode the L of HL drops in the underlying tonal specification. He also attributes the fact that Categories 1 and 4 don't trigger downstep to a phonological deletion of that +L, as he calls it, when there is no available syllable for it within the word, rather than a total lack of lexical tone. In this respect, his analysis is closer to mine. However, he still groups Categories 1 and 4 together, thereby not showing the kinship between Category 1 and Categories 6 and 10, whose behavior Category 1 shares when it has affixed syllables, or the similar kinship between Category 4 and Category 8.

For his Class A, consisting of tonal categories with a single high-toned syllable, Utsugi gives an ordinary underlying specification of tone, with a two-syllable high-low that can start anywhere in a word. Even though Category 9 has two consecutive high syllables at the surface level, he groups it with Categories 1 and 4, perhaps motivated by

the fact that it, like them, never imposes its tonal pattern on a following word. He proposes that only the third syllable of a Category 9 root is distinctively high, and that the second syllable becomes high through leftward spreading of high tone.

For his Class B, which contains the other tonal categories whose surface patterns feature two adjacent high-toned syllables, he proposes "edge tone" specifications: tonal specifications that are defined with respect to the left edge of a word. He allows the same deletion of +L for his Medial-Double Group that he does for his Class A, since Medial-Double words with too few syllables, affixes included, to reach the +L part of the pattern do not trigger downstep.

However, since Category 2 and Category 6 words, which he has in the Initial-Double Group, trigger downstep even without having enough syllables to include the +L that is encoded in their tonal specification, he says that +L deletion simply does not occur for the Initial-Double Group.

He accounts for the effects of a Category 2 root on the subsequent root, whereby the subsequent root is downstepped but the Category 2 root confers high tone on the first syllable of the subsequent root, by proposing that the unassigned +H in the Category 2 root's underlying tonal specification imposes itself on the first syllable of the following root, and that after that, the subsequent +L from the Category 2 root's tonal specification triggers downstep.

He does not account for the effects of Category 3 roots on subsequent Category 1 and 6 roots, nor for the effects of Category 1 and 4 roots on subsequent Category 2 and 7 roots, since those phenomena do not surface in his data on object-verb prosodic phrases.

I now present my own proposed underlying tonal specifications. Since I am now

proposing that syllables can be specified as not being part of the summit approach, which contrasts with syllables that are simply tonally unspecified, I cannot rely on my underline notation. Instead, I will represent syllables that are underlyingly specified as being part of the summit approach with Y, which stands for "yes," and I'll represent syllables that are underlyingly specified as not being part of the summit approach with N, which stands for "no." Unspecified syllables will simply appear as "σ". If I had greater graphical capabilities, I would link adjacent syllables with the same tonal specification to a common tonal node, but as it is, I will duplicate those tones directly above each syllable.

My Underlying Tonal Proposals

Nemo Abraham Swift's proposals for underlying tonal specification

1 Group	2 Group	1-2 Group	2-3 Group
Category 1 (with 2 suffixes to show full tonal pattern): *mal-deur-i*		Category 2 (with 2 suffixes to show full tonal pattern): *nun-deur-i*	Category 3 (with 2 suffixes to show full tonal pattern): *sae-deur-i*
Category 6 (with suffix to show full tonal pattern): *meori-deul*	Category 4 (with suffix to show full tonal pattern): *gaji-deul*	Category 7 (with suffix to show full tonal pattern): *mogi-deul*	Category 5 (with suffix to show full tonal pattern): *saram-deul*
Category 10: *myeoneuri*	Category 8: *minari*	Category 11: *mujigae*	Category 9: *boksunga* Category 12: *haebaragi*
Underlying tone: Y N | | #σ (σ (σ))	**Underlying tone:** N Y N | | | #σ σ (σ)	**Underlying tone:** Y | #σ (σ (σ))	**Underlying tone:** N Y Y N | | | | #σ (σ (σ (σ)))

As you can see, I propose underlying tonal specifications of varying lengths for

the different groups, ranging from one to four syllables.

I also propose that the trigger for the tonal neutralization of a root is the completion of the preceding root's entire underlying tonal specification within the syllables of the preceding root and its affixes. I'll elaborate. The following rules explicate the phonological processes that allow these underlying tonal forms to result in the surface tonal patterns we see.

Ordered Rules

Not every aspect of this order is essential, and some of the orderings I just chose to make the phonological processes easier to follow. Each of these rules will be restated in context when it is called for in the extensive phonological explication further below.

1) Single Y Loss Rule. A Category 2 or 7 root loses its underlying tonal specification when it follows a Category 1 or 4 root within a prosodic phrase.

2) Neutralization Rule. If a root's complete underlying tonal specification is expressed by the syllables of the root and its affixes, any subsequent root within the prosodic phrase is neutralized. In a neutralized root, "N" is deleted and "Y" is downstepped to "y."

3) Summit Approach Joining Rule. "Y" is assigned to any non-"Y" syllable occurring in between two separate summit approaches within a single prosodic phrase.

4) Specification Overhang Rule. In a composite prosodic phrase, the segments of an initial root's underlying tonal specification that are not expressed on the root and its affixes are assigned to the syllables at the beginning of the subsequent root.

5) Specification Deletion Rule. When unassigned segments of an underlying tonal specification have no syllables left to associate with within a prosodic phrase, they are deleted.

6) Y Supersession Rule. If a syllable is associated with both "Y" and "N," it delinks from "N."

7) Summit Approach Spreading Rule. A tonally unspecified syllable to the right of a "Y" syllable becomes associated with "Y."

8) Y Capitalization Rule. If a syllable becomes associated with both "Y" and "y," it delinks from "y."

9) N Assignment Rule. "N" is assigned to all syllables unspecified for "Y" or "N."

Unordered Rules and Prohibitions:

y Susceptibility Rule. Syllables associated with "y" are tonally unspecified for the purposes of assigning "Y" and "N."

YYY Word Prohibition. The combined syllables of a root and the affixes attached to it may not include a three-syllable summit approach.

#YYY Prohibition. No prosodic phrase may begin with a three-syllable summit approach.

Explication of Tonal Operations

Take a pair of roots joined in a single prosodic phrase. If it's an object-verb construction, with a nominal root followed by a verbal root, both roots may have affixes. If it's a compound noun construction, with two nominal roots, then only the second root may have affixes.

Now: If the first of those roots, together with all the tonally unspecified affixes that may be attached to it, provides enough syllables for its entire underlying tonal specification to play out completely, then it neutralizes the second root. It downsteps the second root's peak, removing its specification for summit approach.

Downstepping results in a pitch peak that occurs near the baseline—the peak operates within, as Utsugi says, a compressed pitch range. Syllables that would have had "Y" specifications for inclusion in the summit approach are now, because of the neutralization, instead specified for downstepped high tone. This compressed-range specification is not the same thing as a normal "Y," and we will represent it with "y". "N" specifications, on the other hand, are entirely eliminated by neutralization.

Unless otherwise influenced, the syllables of the neutralized root do not end up

as part of the summit approach. We propose, then, that all tonally unspecified syllables are eventually assigned "N." "Tonally unspecified" syllables include syllables with "y" specifications, which might seem contradictory. However, "y" is merely a compressed-range specification and does not directly specify whether the syllable participates in the summit approach. All "N" specifies is that a syllable is not in the summit approach, which does not conflict with being part of a downstepped peak. Thus, "y" and "N" can coincide.

Neutralization Rule. If a root's complete underlying tonal specification is expressed by the syllables of the root and its affixes, any subsequent root within the prosodic phrase is neutralized. In a neutralized root, "N" is deleted and "Y" is downstepped to "y."

N Assignment Rule. "N" is assigned to all syllables unspecified for "Y" or "N."

y Susceptibility Rule. Syllables associated with "y" are tonally unspecified for the purposes of assigning "Y" and "N."

An example derivation of surface tone from underlying tone, involving the neutralization process:

(Unexpressed tonal segments appear to the right of the root that encodes them. When a syllable is associated with two different tonal specifications, they will appear one on top of the other above the syllable.)

```
Category 6              Category 4
eunhaeng                namu

Underlying tonal specifications:
Y   N               N   Y N
|   |               |   |  |
eunhaeng            namu

Prosodically combined:
Y   N   N Y N
|   |   | | |
eunhaeng-namu
```

The underlying tonal specification of *eunhaeng* is fully expressed within the root, triggering neutralization.

```
Neutralization:
Deletion of N in the second root:
Y   N       Y
|   |       |
eunhaeng-namu

Downstepping of Y in the second root:
Y   N       y
|   |       |
eunhaeng-namu

N assignment:
            N
Y   N   N y
|   |   | |
eunhaeng-namu

Result:
eunhaeng-namu
"gingkonut tree"
```

This is a correct result.

We return to the notion of a pair of roots joined in a single prosodic phrase. If the first root and its affixes do not provide enough syllables for the underlying tonal specification to play itself out, then the second root is not neutralized. The second root's Y and N specifications for summit approach remain intact. If this results in two separate summit approaches, the intervening non-summit-approach syllables are assigned with

"Y." Since even syllables with an "N" specification join the summit approach by this

mechanism, I propose that "Y" supersedes "N".

Summit Approach Joining Rule. "Y" is assigned to any non-"Y" syllable occurring in between two separate summit approaches within a single prosodic phrase.

Y Supersession Rule. If a syllable is associated with both "Y" and "N," it delinks from "N."

An example derivation of surface tone from underlying tone, involving the summit approach joining process:

```
Category 4          Category 8
neogeo              ajeossi


Underlying tonal specifications:
  N   Y N             N Y N
  |   |               | | |
neogeo              ajeossi


Prosodically combined:
  N   Y N Y  N
  |   | | |  |
neogeo-ajeossi
```

The underlying tonal specification of *neogeo* is not fully expressed within the root, so neutralization is not triggered.

```
Summit approach joining:
        Y
  N   Y N Y  N
  |   | | |  |
neogeo-ajeossi


Y supersession:
  N   Y Y Y  N
  |   | | |  |
neogeo-ajeossi


Result:
neogeo-ajeossi
"your uncle"
```

This is a correct result.

Note that I propose a tonal specification for the 1-2 Group of only one syllable: Y.

This proposal accounts for the fact that unaffixed Category 2 roots trigger neutralization despite having only one syllable. If the 1-2 Group encodes a specification that's only one syllable long, then even a one-syllable word can express the entire specification, thereby triggering neutralization.

On the other end of the spectrum, roots in the 2-3 Group have a four-syllable underlying tonal specification: thus, the only roots in that group to be able to trigger neutralization on their own are the four-syllable roots of Category 12. All the other roots in the group are too short to express all four segments of the underlying tonal specification. In order to be able to trigger neutralization, they require enough affixes to get them to a total of fours syllables—and only in an object-verb prosodic phrase are they allowed to take affixes in initial position.

Category 3 roots, within the 2-3 Group, are a special case: in isolation, they take on two tonal segments within their single syllable, lengthening the vowel to acommodate them both. We presume that they must do this because of a prohibition on prosodic groups without a summit approach.

Summitless Prohibition. No prosodic group may exist without a summit approach.

We propose, though, that the Category 3 does not conjure up a "Y" association from elsewhere in order to skirt this prohibition; rather, it takes advantage of the opportunity to make use of some of its copious excess underlying tonal specification.

Let us test whether the system I've proposed for triggering neutralization of a subsequent root with a prosodic phrase correctly predicts which tonal categories are in the Neutralizing Group.

Category 1 _mal_	**Category 2** _nun_	**Category 3** _sae:_
Underlying tonal specification: Y N | _mal_ A Category 1 root does not accommodate its full underlying pitch specification. It is **non-neutralizing**.	Underlying tonal specification: Y | _nun_ A Category 2 root accommodates its full underlying pitch specification. It is **neutralizing**.	Underlying tonal specification: NY Y N || _sae:_ A Category 3 root does not accommodate its full underlying pitch specification. It is **non-neutralizing**.
Category 4 _gaji_	**Category 5** _saram_	**Category 6** _meori_
Underlying tonal specification: N Y N | | _gaji_ A Category 4 root does not accommodate its full underlying pitch specification. It is **non-neutralizing**.	Underlying tonal specification: N Y Y N | | _saram_ A Category 5 root does not accommodate its full underlying pitch specification. It is **non-neutralizing**.	Underlying tonal specification: Y N | | _meori_ A Category 6 root accommodates its full underlying pitch specification. It is **neutralizing**.
Category 7 _mogi_	**Category 8** _minari_	**Category 9** _boksunga_
Underlying tonal specification: Y | _mogi_ A Category 7 root accommodates its full underlying pitch specification. It is **neutralizing**.	Underlying tonal specification: N Y N | | | _minari_ A Category 8 root accommodates its full underlying pitch specification. It is **neutralizing**.	Underlying tonal specification: N Y Y N | | | _boksunga_ A Category 9 root does not accommodate its full underlying pitch specification. It is **non-neutralizing**.

Category 10 *myeoneuri*	Category 11 *mujigae*	Category 12 *haebaragi*
Underlying tonal specification: Y N | | *myeoneuri*	Underlying tonal specification: Y | *mujigae*	Underlying tonal specification: N Y Y N | ||| *haebaragi*
A Category 10 root accommodates its full underlying pitch specification. It is **neutralizing**.	A Category 11 root accommodates its full underlying pitch specification. It is **neutralizing**.	A Category 12 root accommodates its full underlying pitch specification. It is **neutralizing**.

These predictions are correct.

However, if I'm proposing Y as the entire underlying tonal specification for the tonal categories in the 1-2 Group, I must explain why words in this group always extend the summit approach across the first two syllables of a prosodic phrase. The tonal specification only accounts for one of those summit-approach syllables.

I propose, then, that the summit approach spreads rightwards to tonally unspecified syllables.

In a Category 11 word—that being a three-syllable word in the 1-2 Group—the summit-approach does not spread farther than the second syllable because of a prohibition on sequences of three adjacent summit-approach syllables within the extent of a root and its affixes.

Summit Approach Spreading Rule. A tonally unspecified syllable to the right of a "Y" syllable becomes associated with "Y."

The Summit Approach Spreading Rule should apply before the N Assignment rule.

YYY Word Prohibition. The combined syllables of a root and the affixes attached to it may not include a three-syllable summit approach.

When a shorter root from the 1-2 Group appears in initial position in a composite

prosodic phrase, the same pattern where only the first two syllables are in the summit approach applies to the entire prosodic phrase. Here, we cannot rely on the YYY Word Prohibition to prevent the summit approach from spreading to the third syllable, since the first three syllables of the prosodic phrase do not all belong to the same root. Thus, we must propose another similar prohibition on a three-syllable summit approach at the beginning of a prosodic phrase.

#YYY Prohibition. No prosodic phrase may begin with a three-syllable summit approach.

In the case of composite prosodic phrases starting with a Category 2 root, we know that "Y" must spread from the Category 2 root to the first syllable of the second root. This works out, since the syllables of the second root are tonally unspecified, having been neutralized.

As we've seen, syllables that are only specified for "y" are affectively tonally unspecified. Thus, "Y" can freely spread even onto a syllable associated with "y." If a syllable is in the summit approach, though, it can't be a downstepped peak, so "Y" does overwrite "y."

Y Capitalization Rule. If a syllable becomes associated with both "Y" and "y," it delinks from "y."

An example derivation of surface tone from underlying tone:

Category 2   Category 10
bap   *ajimae*

Underlying tonal specification:
 Y   YN
 | ||
bap   *ajimae*

Prosodically combined:
 Y   YN
 | ||
bab-ajimae

The underlying tonal specification of *bap* is fully expressed within the root, triggering neutralization.

Neutralization:
Deletion of N in the second root:
 Y   Y
 | |
bab-ajimae

Downstepping of Y in the second root:
 Y   y
 | |
bab-ajimae

Summit approach spreading:
      Y
 Y   y
 | |
bab-ajimae
(Prevented from spreading further by the #YYY Prohibition.)

Y capitalization:
 Y   Y
 | |
bab-ajimae

N assignment:
 Y   YN N
 | || |
bab-ajimae

Result:
bab-ajimae
"woman that cooks rice"

This is a correct result. It may seem like a roundabout way to get to a final surface tonal pattern that is an exact sequence of the two roots' original individual surface tonal patterns, but that's what we have to do!

One more example derivation of surface tone from underlying tone:

Category 2   Category 9
mul   *sa*_mag_*wi*

Underlying tonal specification:
```
 Y                      N  Y  Y  N
 |                      |  |     |
mul                     samagwi
```

Prosodically combined:
```
 Y   N  Y  Y N
 |   |  |  | |
mul-samagwi
```

The underlying tonal specification of *mul* is fully expressed within the root, triggering neutralization.

Neutralization:
Deletion of N in the second root:
```
 Y      Y  Y
 |      |  |
mul-samagwi
```

Downstepping of Y in the second root:
```
 Y      y  y
 |      |  |
mul-samagwi
```

Summit approach spreading:
```
 Y  Y  y  y
 |  |  |  |
mul-samagwi
```
(Prevented from spreading further by the #YYY Prohibition.)

N assignment:
```
        N  N
 Y  Y  y  y
 |  |  |  |
mul-samagwi
```

Result:
*mul-sa*_mag_*wi*
"praying mantis"

This result is also correct.

Now we must account for the effect that Category 3 roots have on Category 6 roots and affix-bearing Category 1 roots that follow them within a prosodic phrase: the

fact that the second syllable of the Category 6 root, or the first syllable affixed to the

Category 1 root, is part of the summit approach when it otherwise wouldn't be. It looks

like that syllable's participation in the summit approach could be an expression of the

preceding Category 3 root's own underlying tonal specification, which has several

unexpressed syllables left over.

Category 3 followed by Category 1 with 1 affix
gae-ttong-i
"dog shit"-NOM

Separately:

Category 3	Category 1
gae:	*ttong*

Underlying tonal specification:
```
  NY Y N              Y   N
  ||                  |
gae:                ttong
```

Category 3 roots only take up two syllables of their underlying tonal specification like

that when they are in isolation. Because of that, it would be useful to see the underlying

tone distribution of *gae:* when it has an affix. In fact, we'd be happy to see both words

separately with an affix apiece, since the behavior of the affix on *ttong* is what we're

interested in in the first place.

Category 3 with 1 affix	Category 1 with 1 affix
gae-ga	*ttong-i*

Underlying tonal specification:
```
  N  Y Y N              Y   N
  |  |                  |   |
gae-ga                ttong-i
```

So, when it precedes other syllables, a Category 3 root encodes an underlying

summit approach that extends after it for two syllables. That's long enough to reach the

affix on a subsequent Category 1 root.

Thus, we propose that every root in initial position in a composite prosodic phrase assigns the excess segments of its underlying tonal specification to the first syllables of the following root on top of whatever specifications the syllables of the following root may already have. This happens whenever an initial root has some of its underlying tonal specification left over—so, really, whenever neutralization doesn't happen. It's just that the only time it makes a difference is when a Category 3 root precedes a Category 6 root or an affix-bearing Category 1 root.

Specification Overhang Rule. In a composite prosodic phrase, the segments of an initial root's underlying tonal specification that are not expressed on the root and its affixes are assigned to the syllables at the beginning of the subsequent root.

I should also make sure to propose that, when leftover segments of an underlying tonal specification reach the end of a prosodic phrase, they are deleted.

Specification Deletion Rule. When unassigned segments of an underlying tonal specification have no syllables left to associate with within a prosodic phrase, they are deleted.

An example derivation of surface tone from underlying tone using the words we were working with before, involving the effects of a Category 3 root's leftover specification:

Category 3   Category 1 with affix
gae: *ttong*-i

Underlying tonal specification:
  NY Y N   Y   N
  || | |
gae: *ttong*-i

Prosodically combined:
  N Y Y N Y   N
   | | |
gae   -   *ttong*-i

The underlying tonal specification of *gae* is not fully expressed within the root, so neutralization is not triggered.

Specification overhang:
       Y   Y N
   N   Y   N
   | | |
gae-ttong-i

Specification deletion:
       Y   Y
   N   Y   N
   | | |
gae-ttong-i

Y supercession:
  N   Y   Y
  | | |
gae-ttong-i

Result:
gae-ttong-i
"dog shit"-NOM

This result is correct.

However, we would expect the application of the Specification Overhang Rule to have the same effect on Category 10 roots following Category 3 roots, since Category 10 roots have a vulnerable "N" syllable in the same position. It doesn't. That syllable stays out of the summit approach. Why? I don't know. My current analysis doesn't account for it at all. I have one idea: Utsugi, in a later paper (2009), gives evidence that Category 3 is

in the process of merging with Category 1, alongside other mergers involving tonal categories in the 2-3 Group. The unexpected tonal pattern we get when a Category 3 root is followed by a Category 10 root is indeed consistent with how a sequence of Category 1 followed by Category 10 would behave. The only possibility I can propose is that this phenomenon is a symptom of the ensuing merger.

Category 3   Category 10
seo:m   *ajimae*

Prosodically combined:
seom-ajimae

Next, we'll look at Outcome 3, where Category 1 and 4 roots seem to neutralize subsequent Category 2 and 7 roots, even though we wouldn't expect them to, since Categories 1 and 4 don't express their entire underlying tonal patterns.

Category 1 followed by Category 7
sul-danji
"wine jug"

We can't use the "floating preaccent" solution that S+K give, where the Category 2 or 7 root assigns a high tone to the last syllable of the preceding Category 1 or 4 root, thus triggering its own downstep, because we don't analyze Categories 1 and 4 as being underlyingly toneless. Also, since we propose rightward spreading of high tone, there would be nothing to prevent the high tone assigned by the second root to the last syllable of the preceding root from spreading right back to the second root.

All we can propose is a system of complete alternation, where roots from Categories 2 and 7 lose their underlying tonal specification—which is just a single Y— following roots from Categories 1 and 4. Given that, a Category 1 or 4 root can assign its unused N specification to the first syllable of the de-specified Category 2 or 7 root

following it by way of the Specification Overhang Rule. This prevents the rightward

spreading of the Category 1 or 4 root's summit approach. And thus, without any

neutralizations, the Category 2 or 7 root is stripped of the summit approach. This is not

very satisfying, but we'll take it.

Single Y Loss Rule. A Category 2 or 7 root loses its underlying tonal specification when it
follows a Category 1 or 4 root within a prosodic phrase.

Though Category 11 is in the 1-2 Group with Categories 2 and 7, we propose that

it is not subject to single Y loss.

An example derivation of surface tone from underlying tone, involving single Y loss:

Category 1   Category 7
<u>sul</u>   <u>danji</u>

Underlying tonal specification:
 Y N   Y
 | |
sul   danji

Prosodically combined:
 Y N Y
 | |
sul - danji

Single Y loss:
 Y N
 |
sul - danji

The underlying tonal specification of *sul* is not fully expressed within the root, so neutralization is not triggered.

Specification overhang:
 Y   N
 | |
sul - danji

N assignment:
 Y   N N
 | | |
sul - danji

Result:
<u>sul</u>-danji
"wine jug"

This is a correct result.

Just one more thing remains. Continuing the subject of Category 1 roots in initial position in prosodic groups, we must account for the production of Category 1 roots as non-summit-approach syllables preceding certain tonal categories. Since Category 1 roots are associated with a "Y" specification, we wouldn't expect that to happen.

Unfortunately, we don't have all the data: S+K only provide data for Category 1 roots preceding five of the other tonal categories in composite prosodic phrases, and

Utsugi's data on object-verb constructions aren't quite clear on this point. Thus, we don't know what the exact distribution of the phenomenon is. There are only two cases where we've seen it: When a Category 1 root precedes a Category 5 root or a Category 11 root.

Category 1 followed by Category 5
jip-gulduk
"house chimney"

Category 1 followed by Category 11
ap-jeongbagi

It makes sense preceding Category 5. The Category 1 root and the second syllable of the Category 5 root are both associated with underlying "Y," but the syllable between them cannot join the summit approach in accordance with the Summit Approach Joining Rule without violating the #YYY Prohibition. It's reasonable that one of the two "Y" syllables would have to delink, and there's no reason for it not to be the first one.

However, I would want any rule I came up with to account for the case of Category 11 too, and the case of Category 11 is still impenetrable. Category 11 roots do not have an underlying "Y" associated with their second syllables, so there is no reason why a preceding Category 1 root couldn't remain part of the summit approach. The summit approach would just have to avoid spreading to the second syllable of the Category 11. We would expect this result:

ap-jeongbagi

But that's not what we get. Yet perhaps I <u>can</u> get towards an explanation. To explain the interactions of a Category 3 root with a following Category 10 root, I proposed that the Category 3 root might be behaving like a Category 1 root in anticipation of a coming merger between those tonal categories. And now that a Category 1 root is yielding unexpected results preceding a Category 11 root, perhaps I

can propose that the Category 1 root is, in turn, behaving like a Category 3 root. That would actually explain the outcome perfectly. This is more evidence for the imminence of the merger.

Conclusion

The fundamental characteristic of the tonal patterns of prosodic phrases in South Gyeongsang is the presence of a single summit approach in each. The singular nature of the summit approach is always enforced, either through downstepping peaks or through joining peaks together.

The fundamental principle behind the behavior of individual roots and the affixes they take in South Gyeongsang Korean is the existence of underlying tonal specifications that can cover more syllables than the roots that bear them.

There are twelve tonal categories in South Gyeongang Korean, falling into four groups based on their underlying tonal specifications.

The fundamental mechanism for determining the interactions of roots within prosodic phrases in South Gyeongsang Korean is this: Roots that express their entire underlying tonal specifications neutralize the roots that follow them, while roots that do not have enough syllables to express their specifications leave the roots that follow them tonally intact.

My proposals do not account for all behavior, but they account for most of it pretty well. No approach I've seen accounts for everything satisfactorily, including the approaches of S+K and of Utsugi. There are still data I haven't seen that I'd like to: in particular, data on the behavior of roots from Categories 9, 10, 11, and 12 in initial position in prosodically unified noun compounds.

Even as I've tired of the work that this thesis has entailed, I've never stopped liking to think about the tonal behaviors at hand. I'll keep it up. I may speak Korean someday. I feel grateful to have been able to have so much fun.

Bibliography

Cutler, Anne and Takashi Otake. (1998). Pitch accent in spoken-word recognition in Japanese. Acoustical Society of America.

Kenstowicz, Michael and Chiyoun Park. (2006). Laryngeal Features and Tone in Kyungsang Korean: a Phonetic Study. Massachusetts Institute of Technology.

Schuh, Russell G. and Jieun Kim. (2008). South Kyengsang Tone and Pitch Accent. UCLA.

Schuh, Russell G. and Jieun Kim. (2009). Tone and Accent in South Kyengsang Korean Verbs. UCLA.

Utsugi, Akira. (2007). The interplay between lexical and postlexical tonal phenomena and the prosodic structure in Masan/Changwon Korean. A paper presented at ICPhS 2007 Satellite Meeting: Workshop on "Intonational Phonology: Understudied or Fieldwork Languages," Saarbrücken, Germany.

Utsugi, Akira and Hyejin Jang. (2008). Lexical pitch accent and tonal targets in Daegu Korean. Ms, University of Edinburgh.

Utsugi, Akira. (2009). Merger-in-Progress of Tonal Classes in Masan/Changwon Korean. Language Research 45.1, 23-42.