Contour tone in the North Kyungsang dialect: evidence for its existence

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Chung, Young-Hee. 2002. Contour tone in the North Kyungsang dialect: evidence for its existence. *Studies in Phonetics, Phonology and Morphology* 8.1. 135-147. Recently, the existence of contour tones in the North Kyungsang dialect has been challenged in a few studies. In this paper, I argue for the existence of contour tones by presenting a new analysis of the acoustic experiments that were originally presented as evidence against the existence of contour tones. I provide another argument for the existence of contour tones by showing that contour tones condition the peripheral appearance of long vowels. Further support for the existence of contour tones comes from loanwords in NK. I show that tonal behaviors of loanwords are straightforwardly explained if contour tones are assumed for them**. (Sejong University)**

Keywords: contour tone, acoustic evidence, peripheral appearance, F_0 contour, loanwords

1. Introduction

In traditional studies of the North Kyungsang dialect of Korean (henceforth, NK), contour tones appear in long vowels (Huh 1955, Y. M. Kim 1966b, Y. C. Chung 1974, C.K. Kim 1985b). [1] A recent study along the line is Y. H. Chung (1991), where long vowels at the left edge of a word are represented to have a rising tone and long vowels at the right edge to have a falling tone. However the existence of contour tones has recently been challenged in a few studies (G. R. Kim 1988, N. J. Kim 1997), where they claim that long vowels are level-toned, and so no contour tones exist in NK.

One might wonder how such different descriptions are possible of the same data. It might be in part because, as Y.C. Chung (1974) observed, the tone of long vowels in NK has the characteristic that it starts at the lower pitch than the level low but does not reach as high as the level high tone.

Most tonal analyses of NK had mainly been based on the intuition of phonologists before Kim (1997) provided acoustic evidence to disprove the existence of contour tones. To verify whether word-initial long vowels have a rising tone, he compared the degree of F0 changes in long vowels with those in short vowels in two different contexts: in isolation and in

[1] Following Kenstowicz and Kisseberth (1979) I assume that a contour tone is a sequence of level tones within a single syllable. Accordingly, a rising tone is a sequence of a low tone followed by a high tone within a syllable, whereas a falling tone is a sequence of a high tone followed by a low tone

sentence. Based on his experiments, he claimed that long vowels have a level high tone like short vowels because both exhibit almost the same F0 contour. I show in this paper that contrary to his claim there are various differences in F0 contours between long and short vowels, and these differences are caused by their tonal differences, that is, a rising tone in long vowels and a high tone in short vowels.

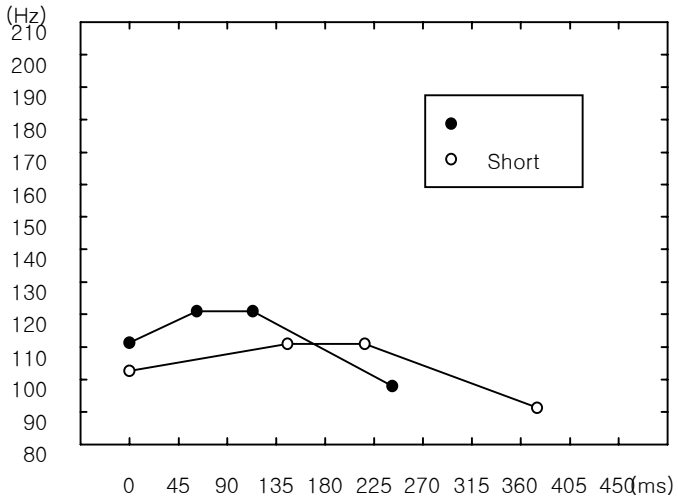
My second argument for the existence of contour tones bears on the fact that long vowels appear only at edges of a word in NK. First, I will show that edges of a word in NK are the only positions where contour tones can occur. Observing that dialects without contour tones have no long vowels, I propose that long vowels are kept at edges of a word in NK because they are contour toned.

Finally, I show that contour tones also appear in loanwords. Kenstowicz and Sohn (2000) (henceforth K&S) discussed that certain loanwords exhibit exceptional behaviors. I show that the loanwords are not at all exceptional if a contour tone is assumed for them. It is highly unlikely that a contour tone, which can hardly be an emergent phenomenon, occurs in loanwords while not appearing in native words. Therefore, I argue that the existence of a contour tone implies that a contour tone exists in native words. Otherwise, the appearance of a contour tone in loanwords will not readily be explained.

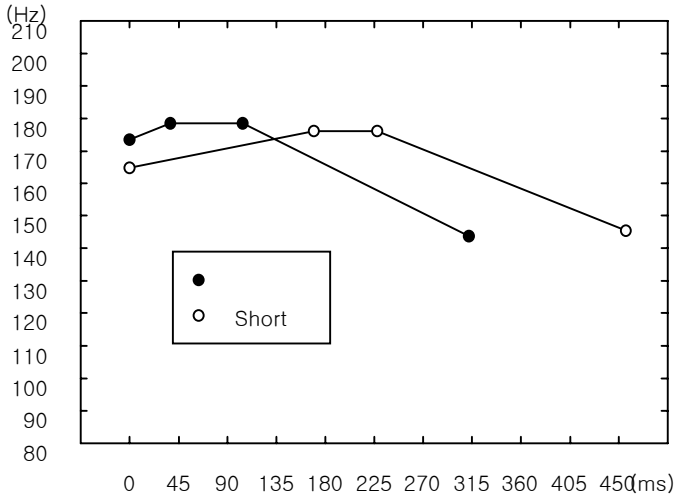
2. New Analysis of Acoustic Experiment

Kim (1997) experimented on F0 contours of long and short vowels in isolation and in a sentence. First, let us see his experiments on long and short vowels uttered in isolation. The data used are high-toned monosyllabic words with a short vowel (e.g. kán[2] 'spice', *kól* 'brain', *kóN*[3] 'emptiness', *tól* 'first birthday', *mál* 'horse') versus monosyllabic words with a long vowel (e.g. *kaan*[4] 'liver', *kool* 'valley', *kooN* 'ball', *tool* 'stone', *maal* 'speech').

[2] The symbol [´] over a short vowel represents a high tone. Vowels with no symbol over them are low toned.
[3] The symbol [N] represents a velar nasal.
[4] Long vowels are represented as a geminate.



<Figure 1 – Speaker1>



<Figure 2 –Speaker 2>

Figure 1 represents F0 contours of long and short vowels spoken by Speaker 1. Figure 2 represents F0 contours of long and short vowels spoken by Speaker 2. We see in the figures that not just do long vowels show an initial rise; high-toned short vowels also show an initial rise. And the degree of a F0 rise in long and short vowels is not significantly

different: in Speaker 1, a long and short vowel have the same initial F0 rise, that is, 10 Hz; in Speaker 2, long vowels show a 8 Hz rise and short vowels, a 5 Hz rise. This fact led Kim to claim that long vowels are as high-toned as short vowels.

Though it is true that an initial rise in long vowels is not significantly greater than in short vowels, it is too hasty based on just the fact to conclude that long vowels are as high-toned as short vowels, because there are some aspects in the figures above that are not likely for a high-toned long vowel. First, we see in the figures that a long vowel starts at lower F0 than a short vowel. In Speaker 1, a long vowel starts at 101.7 Hz and a short vowel starts at 111.8 Hz; in Speaker 2, a long vowel starts at 164.8 Hz and a short vowel starts at 173.6 Hz. Though I agree with Kim that there is a tendency in NK for F0 value to rise at the boundaries of a phonological phrase[5], this tendency does not explain why a long vowel starts at lower F0 than a short vowel. In other words, though a phrase boundary effect can explain the initial F0 rise in a long and short vowel, it cannot explain why a long vowel starts at lower F0 than a short vowel. A long vowel must have something at its beginning to lower initial F0. I propose that a long vowel has a low tone in its first mora, which lowers initial F0.

Secondly, we see in the figures that a tonal peak appears much later in a long vowel than in a short vowel: in Speaker 1, a tonal peak is reached at 64.3 ms and 144.6 ms in a short and long vowel respectively; in Speaker 2, a tonal peak is reached at 40.8 ms and 170 ms in a short and long vowel respectively. If a long vowel were as high-toned as a short vowel, the first mora as well as the second is high toned, so a tonal peak would be expected to appear as early as in the first mora. Then, why do we have such a late appearance of a tonal peak in a long vowel? One might argue that because a long vowel has a longer duration than a short vowel, a tonal peak is delayed. However, even in percentage terms, we find that a tonal peak is reached much later in a long vowel than a short vowel: in Speaker 1, a tonal peak is reached at 39% (144 ms/376 ms) in a long vowel and at 26% (64 ms/ 241 ms) in a short vowel; in Speaker 2, a tonal peak is reached at 38% (170 ms/ 452 ms) in a long vowel and at 13% (41 ms/ 315 ms) in a short vowel. As you can see, in Speaker 2, a tonal peak in a long vowel appears almost twice as late as in a short vowel in percentage terms. This shows that the late appearance of a tonal peak in a long vowel cannot just be attributed to the vowel length. Therefore, I propose that the first mora of a long vowel has a low tone. Since it has a high tone in the second mora, a tonal peak will appear late in a long vowel.

There is another aspect in the figures that suggests that a long vowel is not high toned. It is that a tonal peak in a long vowel continues just for the same duration as or shorter than in a short vowel: in Speaker 1, a tonal peak continues for 75 ms (75 ms/ 376 ms=20 % in percentage terms) in a

[5] A word uttered in isolation forms a phonological phrase onto itself.

long vowel and 50 ms (50 ms/ 241 ms=20% in percentage terms) in a short vowel; in Speaker 2, a tonal peak continues for 55 ms (55 ms/ 452 ms=12%) in a long vowel and 65 ms (65 ms/ 315 ms=20%) in a short vowel. If a long vowel were high-toned, it would have longer duration of a tonal peak than a short vowel because a high-toned long vowel has two high-toned moras, whereas a short vowel has a single high-toned mora. However, the experiments show that a long vowel has the same or shorter duration of a tonal peak than a short vowel. Therefore, it cannot be true that both moras of a long vowel are high-toned.

Returning to the problem of a long vowel's not showing a significantly greater F0 rise than a short vowel in spite of having a rising tone, let us think of reasons for it. In my speculation, such a relatively small F0 rise in a long vowel could be due to the context in which words are spoken, that is, in isolation. Considering that a long vowel exhibits a greater F0 rise when uttered in a sentence (It will be seen soon below.) we could not disregard the effect of the context on F0 contours of utterances. When uttered in isolation, a word has a limited span of time, and I think this limitation will be likely to prevent a rise or fall of F0 from being fully implemented.

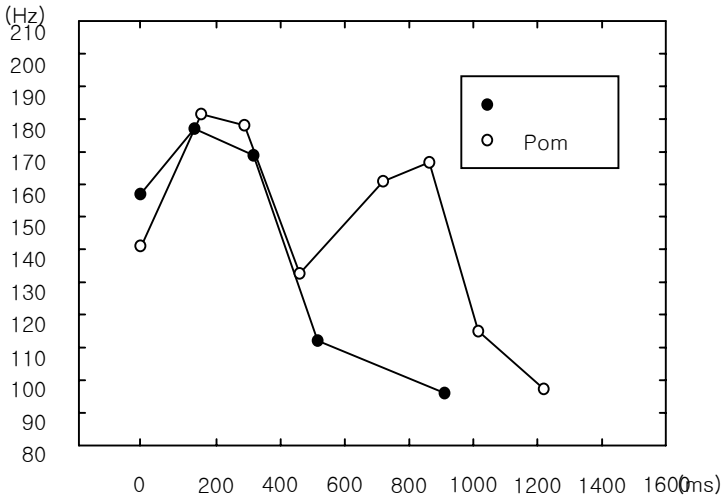
Now let us discuss F0 contours of long and short vowels in the context of a sentence. Of various positions in a sentence, we will consider long vowels at the beginning of a sentence as in (1) and (2) because sentence initial position is the most common place for long vowels in NK.[6]

(1) kee-nEn maal-El hanta[7] 'A dog is speaking'
(2) póm nál-i wat-ta[8] 'Spring has come'

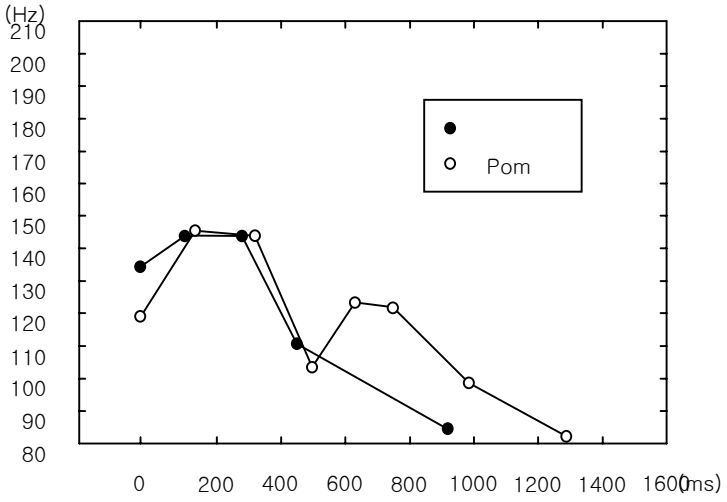
[6] In NK, long vowels appear only at the initial or final position of phonological phrases. Consequently, sentence medial long vowels are possible only when they are phonological phrase initial or final. For convenience sake, I choose to discuss long vowels at the beginning of a sentence. The overall shape of a F0 contour will not be much different whether long vowels occur at the beginning of a sentence or not as far as it is phonological phrase initial.

[7] The symbol [E] represents the mid central vowel. The high central vowel and mid-central vowel are neutralized as [E] in NK.

[8] The compared words *pom and kee* do not have the same syllable type: *pom* is closed by a coda consonant, whereas *kee* is an open syllable. However, the presence of a coda consonant does not seem to affect an initial F0 contour of a syllable significantly. Thus, for example, we see in Kim (1997:50,54) that the closed-syllabled word *moon* in *moon-nak-ket-ta* exhibits almost the same F0 contour as the open-syllabled word *nuu* in *nuun-El-mEEli-sE pat-ta* (the coda consonant [n] in *nuun* resyllabifies, so that it becomes the onset of the following syllable).



<Figure 4 – Speaker 4>



<Figure 3 – Speaker 3>

Figure 3 shows F0 contour of the sentence in (1) and (2) spoken by Speaker 3. Figure 4 shows F0 contours of the same sentences spoken by Speaker 4.[9] The sentence in (1) begins with a long vowel, whereas the sentence in (2) begins with a short high-toned vowel.

[9] Speaker 3 is the same person as Speaker 1. Speaker 4 is not the same person as Speaker 2 though.

Since we are interested in F0 contours of *kee* and *pom*, we will focus just on the first three points in the figures above. In the figures, we see a greater initial F0 rise for *kee* than *pom*: in Speaker 3, a 26 Hz rise in *kee* and a 10 Hz rise in *pom*; in Speaker 4, a 40 Hz rise in *kee* and a 20 Hz rise in *pom*. That is, a long vowel shows twice as a great F0 rise as a short vowel. Such a greater F0 rise in a long vowel is not likely to occur if a long vowel is as high-toned as a short vowel. Therefore, I argue that a long vowel is rising-toned.

Now, consider the initial F0 in a long and short vowel. As in a long and short vowel in isolation, we see in the figure (3) and (4) that *kee* starts at lower F0 than *pom* in both speakers: in Speaker 3, *kee* starts at 119 Hz and *pom* starts at 135 Hz; in Speaker 4, *kee* starts at 141 Hz and *pom* starts at 157 Hz. As discussed above, lower initial F0 in *kee* could be taken as an indication that *kee* has a low tone in its first mora.

Finally, if a long vowel were high-toned, it would be supposed to have a tonal peak that continues longer than a short vowel, because a high-toned long vowel has two high-toned moras, whereas a short vowel has only a single high-toned mora. However, in Figure 3 and 4, a tonal peak in a long vowel continues for the same duration as (or shorter than) in a short vowel: in Speaker 3, a tonal peak continues 164 ms in *kee* and 150 ms in *pom*; in Speaker 4, a tonal peak continues 128 ms in *kee* and 170 ms in *pom*. The short duration of a tonal peak in a long vowel suggests that both moras of a long vowel are not high-toned. That is, a long vowel has only a single high-toned mora as a short vowel.

3. Long Vowel at Edge

In this section, I argue for the existence of contour tones by showing that contour tones condition the existence of long vowels in NK. For the purpose, I first consider the fact that long vowels appear only at edges of a word (which is a tonal domain) in NK.

(3)	nuun	'snow'	maknee	'the youngest'
	taampe	'cigarette'	muundii	'leper'
	hoolaNi	'tiger'		

Since there is not likely to be anything in the nature of long vowels that restricts them to edges, the reason for the peripheral appearance of a long vowel must be sought not in a long vowel itself, but in something else. An answer is likely to be found in the fact that long vowels have disappeared (that is, shortened) or almost disappeared (by shortening) in dialects without tone or with level tones only. For example, in the Seoul dialect, which has no tone, long vowels have almost disappeared;[10]in the South

[10] The Seoul dialect used to have long vowels. However, in my observation, they have almost disappeared in the speech of the younger generations. Phonologists such as J.Y. Thak and K.H.

Kyungsang dialects, which have just level tones, long vowels have disappeared.[11]Based on this fact, we can hypothesize that long vowels, which are not contour toned, have disappeared. In other words, we can hypothesize that only contour-toned long vowels are kept long. Provided that we have long vowels only at word edges, it follows from the hypothesis that long vowels can have a contour tone only at word edges in NK.

Then, we need to explain why long vowels can have a contour-tone only at word edges in NK. I propose it is because contour tones in NK arise as a result of a constraint (i.e. Non-Final) that excludes from high tone assignment a mora of a long vowel. This is traditionally analyzed as extratonality. Since only peripheral mora can be extratonal (which is referred to as the peripherality condition of extratonality[12]), a long vowel only at edges of a tonal domain (i.e. a word) can have an extratonal mora. Provided that an extratonal mora has a low tone as default, a long vowel at word edges will have a low tone in its leftmost mora, which results in a rising tone. On the other hand, a word-final long vowel will have a low tone in its rightmost mora, which results in a falling tone. In contrast, a long vowel word-medially cannot have an extratonal mora because only peripheral mora can be extratonal. Without an extratonal mora, a long vowel cannot have a contour tone in NK.[13] Consequently, due to extratonality, only a long vowel at word edges has a contour tone in NK.

To recapitulate, contour tones in NK appear only at word edges since contour tones arise due to extratonality, which is subject to peripherality condition. It follows from this that long vowels at word edges only will have a contour tone. Given that we have long vowels only at word edges, and that dialects without contour tones do not have long vowels, we can conclude that long vowels are kept if contour-toned. Therefore, I argue that we have long vowels in NK because they are contour toned.

4. Tone of Loanwords

Tone of loanwords of NK has been discussed and analyzed by Chung (1998, 2000) and Kenstowicz &Sohn (2000) among others. In their description of tone of heavy syllables, Chung and K&S do not agree.[14]

Chu confirmed my observation.

[11] According to Cha-Kyun Kim (1999), the South Kyungsang dialect spoken in the area of Changwon, South Kyungsang, has contour tones on long vowels.

[12] For the peripherality condition of extratonality, refer to Hayes (1982) and Pulleyblank (1986).

[13] Heavy syllables attract a H in NK. Thus, without extratonal moras, long vowels cannot have a contour tone.

[14] Unlike in native words, a short vowel followed by a coda consonant, either a sonorant or an obstruent, counts heavy in loanwords, attracting a high tone like a long vowel. See Chung (1998, 2000) and S&K (2000) for a discussion on tone and syllable weight in loanwords of NK.

Chung describes heavy syllables as contour-toned, whereas K&S describe them as high-toned. Here I want to argue that long vowels have a contour tone in loanwords by showing that the exceptional tonal behaviors of loanwords that K&S discussed are straightforwardly accounted for if contour tones are assumed for them.

K&S pointed out that loanwords behave parallel to native ones with two interesting exceptions. One of the exceptions is that monosyllabic loanwords with a long vowel systematically fail to double its H when suffixed, unlike their native counterparts. The data in (4) are from K& S, where long vowels are represented to have a high tone.

(4)	(a)	tóón	'money'	seem	'well'
		tóón – í	'money-nom'[15]	séém –í	'well-nom'
		tóón –chÉlEm	'like money	séém-chÉlEm	'like a well'
	(b)	t^{h}íím	'team'	púúm	'boom'
		t^{h}íím –I	'team-nom'	púúm-I	'boom-nom'
		t^{h}íím-chElEm	'like a team'	púúm-chElEm	'like a boom'

The words in (4a) are native words and those in (4b) are loanwords. We see a high tone in native noun stems spread to a suffix, whereas in loanwords such tone doubling does not occur.

The other exception is that loanwords with a high tone in the final syllable systematically fail to shift their H to the right when suffixed. Compare oxy-toned loanwords in (5b) with their native counterparts in (5a). (In (5b), I repeat the data in K&S, where loanwords are represented to have a high tone.) We see that a word-final high tone, when followed by a suffix, moves to the right in native words in (5a), whereas no such shift occurs in loanwords as in (5b).

(5)	(a)	mál	'horse'	mulÉp	'knee'
		mal-chÉlEm	'like a horse'	mulEp-chÉlEm	'like a knee'
	(b)	pél	'bell'	k^{h}echáp	'ketchup'
		pél-chElEm	'like a bell'	k^{h}echáp-chElEm	'like ketchup'

K&S discuss that these exceptions in loanwords are results of influence of the citation form on their tonal shape under inflection, cliticization, or phrasal complementation. For instance, in the case of *k^{h}echáp -chElEm* `like ketchup', the high tone remains in the stem final syllable because the stem *k^{h}echap* phrase-medially mimics the citation form *k^{h}echáp,* which has a high tone in the final syllable. In the same vein, the tone doubling is inapplicable to *t^{h}íím-chElEm* and *púúm-chElEm* in (4b), because the stem *t^{h}iim* and *puum* phrase-medially are faithful to the citation form, that is, t^{h}íím and púúm, which has a single H. Regarding the reason the citation form has a special influence on loanwords, they speculate that it is because

[15] 'nom' represents a nominative marker.

in the process of adapting loanwords, the citation form has a special status as the gateway through which lexical items enter the native system. However, their explanation is merely a speculation that has not been verified. A further research needs to be done on the process of adopting lexical items before the explanation they provide is accepted. Even though we admit the influence of citation forms on loanwords in K&S, their analysis still faces difficulty because we find some oxy-toned loanwords shift a high tone rightward to a suffix.

(6)	met^{h}Eró	'metro'	met^{h}Ero-chÉlEm	'like a metro'
	nigEró	'negro'	nigEro-chÉlEm	'like a negro'
	panama	'banana'	panana-chÉlEm	'like a banana'

If the failure of tonal shift in oxy-toned loanwords is due to the influence of the citation form as K&S claimed, why do we have oxy-toned words that do shift a high tone rightward to a suffix as in (6)? Why do these words not mimic the citation form? An answer for it is likely to be found in the weight of a word-final syllable in (5b) and (6). The words in (5b) have a heavy word-final syllable (because it is closed by a coda consonant), while those in (6) have a light word-final syllable. Because a contour tone occurs only in a heavy syllable in NK, loanwords in (6) cannot have a contour tone, whereas those in (5b) can have a contour tone. Thus, I argue that loanwords in (5b) have a falling tone, while those in (6) have a high tone. With a falling tone assumed for loanwords in (5b), it is evident why loanwords in (5b) do not shift a high tone rightward to a suffix. It is because a falling tone is a sequence of a high and a low tone, and it is the low tone that blocks the high tone from shifting rightward, as illustrated in (7).

(7) pe l-chElEm [16] k^{h}echap-chElEm

We see in (7) that a rightward high tone shift incurs a violation of the convention of "no association line crossing" in *pel-chElEm* and *k^{h}echap-chElEm* because of a low tone on the right. Therefore, a high tone cannot shift rightward to a suffix in (7).

met^{h}Ero and *nigEro*, on the other hand, have no low tone that blocks a rightward high tone shift, so a tonal shift occurs, as illustrated in (8)

[16] The fact that the final syllable of *k^{h}echap* has the same tone LH as *pel*does not necessarily mean that it has the same vowel length as *pel* phonetically. An obstruent coda may not lengthen its preceding vowel as much as a sonorant coda. How a moraic coda influences the length of a preceding vowel will be another topic that needs a research.

(8) met^{h}ro-chElEm
‡ /
H

The failure of tone doubling in *t^{h}iím-chElEm* and *púúm -chElEm* in (4b) can be accounted in a similar way. A falling tone is assumed for the loanwords *t^{h}iim* and *puum*. A low tone in a falling tone blocks a high tone on its left from spreading rightward to a suffix, as illustrated in (9).

(9) thiim-chElEm
‡|
H L

puum-chElEm
‡|
H L

With a low tone on its right, a rightward high tone spreading incurs a violation of the convention of "no association line crossing". This is why tone doubling fails to occur in loanwords in (4b).

Before concluding discussion, I need to point out that in my analysis most monosyllabic loanwords with a long vowel turn out to have a falling tone, which is in contrast with native words where most monosyllabic words with a long vowel have a rising tone. At present I do not come up with any plausible explanation of this difference between native words and loanwords. I will leave this to further researches.

5. Conclusion

So far, I have tried to argue that NK has contour tones. For the purpose, I have shown first that the F0 contour of word-initial long vowels shows aspects that are not likely to occur for a high tone. I have argued that those aspects can be explained straightforwardly if a contour tone is assumed for a long vowel. Secondly I have shown that contour tones condition the peripheral appearance of long vowels by resorting to extratonality and peripherality condition. Finally I have shown that tonal behaviors of loanwords are straightforwardly explained if a contour tone is assumed for them. Provided that a contour tone exists in loanwords, a contour tone can also be assumed to exist in native words; otherwise, contour tones have to be an emergent phenomenon occurring only in loanwords, which is highly unlikely. The first argument has used physical properties of a long vowel to show that it is contour-toned, while the other two arguments have used language internal phenomena.

The present analysis may have some limitations. First, my argument that various aspects of the F0 contour of a long vowel in the experiments are likely to be those of a contour tone rather than of a level high tone will be more convincing if it is supported by more cross linguistic research on general characteristics of F0 contours of a contour tone. Secondly, much of

my argument is based on the reanalysis of the acoustic experiments done by Kim (1997). I have chosen to analyze his experiments instead of doing my own experiments in order to show that even the experiments presented to disprove the existence of contour tones turn out rather to support it. I suppose that further experiments on extended data will provide firmer grounds for the present argument. Finally, "emergence of the unmarked" phenomenon as well as the relationship between the native and loanword phonological system needs to be further researched before we decide on the implication of the existence of contour tones of loanwords for native words.

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