

A Study on Resyllabification and Palatalization in Korean

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Choi, Kyung Ae & Joo, Dae Hwan. (2017). A study on resyllabification and palatalization in Korean. *The Linguistic Association of Korea Journal*, 25(4). 23-40. The purpose of this paper is to examine the phonological unit associated with phonological phenomena, emphasizing the vital role of resyllabification and ambisyllabicity in the word formation process to study palatalization in Korean in the framework of lexical phonology. By studying examples and counterexamples in similar phonological environments, we discover that the phonological word (Pw) is the unit in which resyllabification occurs in Korean. Another suggestion is that all words or phrases automatically go through a syllabification device (SD) whenever new word formation occurs in phonology in order for resyllabification to take place. To conclude, palatalization in Korean is a phonological phenomenon taking place in derived environment when the preceding coronal consonants share the feature of [+high] with the following sound by becoming an ambisyllabic element as a consequence of the resyllabification achieved by passing through the SD within the domain of the phonological word.

Key Words: palatalization, resyllabification, ambisyllabicity, phonological word, syllabification device

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1. Introduction

Palatalization is a common phonological phenomenon that can be found in many different languages like Korean, English, Japanese, Chinese and so on for the ease of articulation. However, the phonological environment for this phenomenon is different depending on the languages. There have been many attempts to analyze palatalization with various theoretical backgrounds.

Mohanan (1982), Mohanan and Halle (1985), Ahn (1985) stayed in the framework of lexical phonology, while Borowsky (1984) and Choi (1988) deemed the resyllabification as a crucial condition for palatalization. Shin (2015) also argued that the morpheme boundary is the condition for palatalization on the basis of syllable phonology. Choi and Lee (2000) attempted to prove the close relationship between resyllabification and palatalization based on optimality theory.

This paper is mainly based on lexical phonology to study palatalization in Korean, especially the one proposed by Kiparsky (1985). In line with the argument proposed by Choi (1988) and Choi and Lee (2000), We also assume that resyllabification and ambisyllabicity play a crucial role for the phonological phenomenon in the framework of optimality theory. Emphasizing the importance of resyllabification for phonological phenomena, we suggest that syllabification device(SD)¹⁾ be located somewhere in phonology for the words to go through resyllabification in the lexical model. One issue that should be dealt with is with regard to a phonological unit where resyllabification takes place in Korean. To solve the problem from the fact that Korean has no stress with which the foot is formed, we postulate a phonological word(Pw) as the prosodic constituent in which resyllabification occurs.

In the following chapter, we will examine different environments for palatalization. In chapter 3, some previous studies will be examined, which will be followed by the suggestion of a revised lexical model, emphasizing the role of resyllabification for palatalization to explain the asymmetries of palatalization in Korean in chapter 4. In the last chapter we will conclude the discussion with the findings from the analysis we conducted.

1) SD stands for Resyllabification Device which we will show how it operates in detail in chapter 4.

2. Palatalization in Korean

The rule of palatalization in Korean changes /t^h, t, s, s', n, l/ to [c^h, c, ɛ, ɛ', ɲ, λ] respectively before [i, y] only when they are in a derived environment. Let us examine the types of palatalization in Korean first as shown in (1). There are four different types of palatalization in Korean (Kim, M. R., & Kim, O. Y. 2009)

- (1) a. t-palatalization : /t, t^h/ → [c, c^h]
 /pat^h-i/ → [pac^hi] 'field' - (subjective case) '밭-이'
 /k'it^h-i/ → [k'ic^hi] 'end' - (subjective case) '끝-이'
- b. s-palatalization : /s, s'/ → [ɛ, ɛ']
 /sikan/ → [ɛigan] 'time' '시간'
 /s'i/ → [ɛ'i] 'seed' '씨'
- c. n-palatalization : /n/ → [ɲ]
 /po-ni/ → [poɲi] 'see end' '보-니'
 /njəsək/ → [ɲjəsək] 'guy' '너석'
- d. l-palatalization : /l/ → [λ]
 /mulli/ → [muλλi] 'physics' '물리'
 /hulljuŋ/ → [huλλjuŋ] 'greatness' '훌륭'

It is interesting that Korean native speakers can hardly recognize the difference between the alveolar and palatal sounds in (1b~d) mainly because the palatalized sounds in (1b~d) are the allophones of one phoneme pronounced differently depending on the phonetic environment. Meanwhile, t-palatalization in (1a) shows a phonemic change from /t, t^h/ to [c, c^h] respectively. In this case, a phoneme becomes a different one by the influence of adjacent sounds. This paper will mainly focus on analyzing the phonological phenomenon in (1a), because those in (1b-d) are considered to be the phonetic complementation. The palatalization rule formalized in the framework of generative phonology is illustrated in (2).

(2) Palatalization (Chomsky & Halle, 1968)

$$\left[\begin{array}{c} -\text{son} \\ +\text{cor} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{high} \\ -\text{ant} \\ +\text{strid} \end{array} \right] / \text{---} \left[\begin{array}{c} +\text{high} \\ -\text{back} \\ -\text{syll} \\ -\text{cons} \end{array} \right] \left[\begin{array}{c} \text{V} \\ -\text{stress} \end{array} \right]$$

(2) indicates that /t^h, t/ become palatalized before /y/ by being assimilated with the feature of [+high]. It is a well-known fact that palatalization accompanies not only the change of the point of articulation, but the manner of articulation for the convenience of pronunciation. For example, when /k'it^h-i/ is pronounced as [k'ichⁱ] 'end' in (3a), the plosive /t^h/ becomes the affricate [chⁱ]. However, the rule(2) does not apply to (3b,c), even though the structural description for the rule is met.

(3) a.	/k'it ^h -i/ → [k'ich ⁱ]	'end'	'끝-이'
	/mat-i/ → [maci]	'to be the eldest'	'맏-이'
	/kut-i/ → [juci]	'stubbornly'	'굳-이'
b.	/pat ^h -ilaŋ/ → [panniraŋ]	'the ridge of a field'	'밭-이랑'
	/hot ^h -ipul/ → [honnibul]	'single blanket'	'홀-이불'
	/pat ^h -il/ → [panil]	'filed work'	'밭-일'
c.	/t ^h i/ → [t ^h i]	'dust'	'티'
	/mati/ → [madi]	'knot'	'마디'
	/əti/ → [ədi]	'where'	'어디'

In (3b), even though they are in the same phonological environment as (3a), not palatalization but nasalization and gemination occurred. Moreover, in (3c), neither palatalization nor any other phonological phenomenon occurs. Before extending our discussion on this asymmetry shown in (3), let us examine the previous studies on this phonological phenomenon.

3. Previous studies

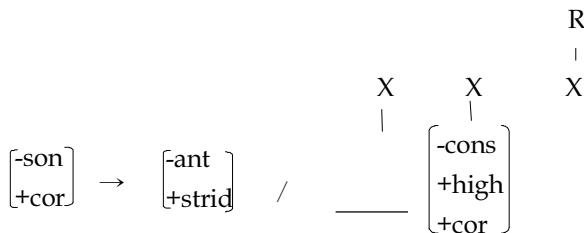
In this chapter, some previous studies on palatalization based on lexical phonology, syllabic phonology and optimality theory will be examined.

3.1. The analysis based on Lexical Phonology

Unlike the premise proposed by early generative phonologists that the phonology, morphology, syntax, and semantics are completely separated from one another and there is no interface among them in the word formation process, lexical phonologists argue that morphology and phonology interact with each other in the process of word formation and the morphology part consists of at least two separated levels.

Mohanan (1982) suggests that there should be two different kinds of rules based on lexical phonology. One is the lexical rule that is cyclically applied to the derived forms in the lexicon and the other is the postlexical rule which applies to the output of syntax outside lexicon. According to his argument, the palatalization rule on the lexical level changes ‘partial’ to [pʌrfəɭ], whereas ‘send you’ becomes [sendʒu] by the application of the rule on the postlexical level. Later in 1985, Halle & Mohanan suggested that not all the lexical rules in the lexicon are cyclic to account for the different application of phonological rules. They divided the phonology into four strata and postulated that the palatalization rule is applied in stratum 2 where non-cyclic phonological rules are applied.

(4) Palatalization (stratum 2)²⁾ (Halle & Mohanan, 1985)



2) Halle and Mohanan’s stratum means a level in Kiparsky(1982)’s term.

They postulate two palatalization rules which are applied on different strata, even though the environment where those rules apply is the same.

On the other hand, Ahn (1985) classifies the lexicon into 4 strata based on the lexical model of Mohanan (1982), and postulates that the palatalization rule is very sensitive to morpheme boundaries, suggesting rule(4) be applied in stratum 3 and 4. According to Ahn's argument, the neutralization and voicing rules are applied prior to (4), which prevents the coronal consonants from being palatalized. For instance, the process of forming a compound word [k'innil] 'the final work' in Korean is as follows: a lexical word /k'it^h/ and /il/ become a compound word [[k'it^h][il]] in stratum 1 where the palatalization rule does not belong to. When it moves to stratum 3 where the palatalization is supposed to occur, all the internal brackets have already been deleted by the Bracket Erasure Convention (Mohanan, 1982) and consequently, the morpheme boundary sensitive rule can not be applied.

Mohanan (1982) and Halle and Mohanan (1985) analyze palatalization by adopting the concept of stratum. On the basis of Mohanan's argument, Ahn (1985) also tried to explain the different phonetic representations in a similar environment in Korean, remaining a controversy over the criteria that divides the same rule into two different ones: the obligatorily applied rule in lexical level, and the optionally applied one in the postlexical level.

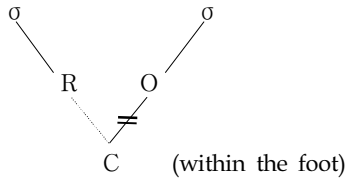
Therefore, attempts to capture more generalization of palatalization in Korean should be made, one of which is setting the phonological unit where palatalization takes place. Before suggesting our argument on this particular phenomenon, let us examine another previous study from the perspective of syllabic phonology.

3.2. The analysis based on Syllabic Phonology

Borowsky (1984) suggests that the palatalization rule is a syllable sensitive one and is applied only when the coronal consonants /t, d, s, z/ and the glide /y/ are not in the same syllable. Namely, they should be heterosyllabic elements for the palatalization rule to be applied. According to her argument, a word 'residual' is phonetically realized as [rizid͡ʒuəl] ('residue+al') even though /d/ and /y/ are tautosyllabic elements as a result of the application of the

resyllabification rule illustrated in (5) below.

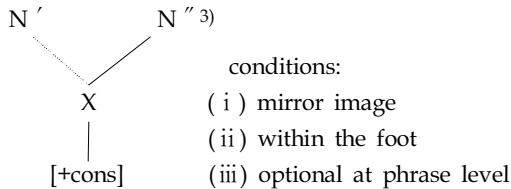
(5) Resyllabification Rule (Borowsky, 1984)



The rule (5) changes the onset of the second syllable to the coda of preceding one, providing the appropriate environment for palatalization. Consequently, the resyllabified coda shares the feature of [+high] with the onset of the following syllable. However, like Mohanan (1982), Borowsky also argues that palatalization rules are divided into obligatory and optional ones depending on where the rules apply. Therefore, the criteria for dividing the palatalization rule into two still remains to be solved.

Taking a step forward, Choi (1988) suggested a unified palatalization rule by postulating modified resyllabification process. The resyllabification rule proposed by Choi (1988) is formalized in (6) below.

(6) Resyllabification Rule (Choi, 1988)



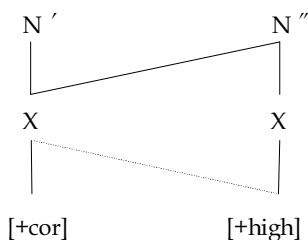
3) Resyllabification Rule (Choi, 1988)

(i) We will follow the way of what Levin (1983) suggested to represent the syllable structures and will not extend the argument on the issue to stay in the topic we are focusing on.

(ii) Unlike Borowsky's suggestion, Choi argued that the complete dissociation of the coronal consonant from the original line minimizes the onset of the following syllable, which violates the Onset First Principle.

She regards the ambisyllabicity occurred by the resyllabification as an essential element for palatalization. That is, the syllable initial or final consonant shares the features with the following or preceding syllable simultaneously, producing an ambisyllabic element. Unlike Borowsky, she argues that it is the ambisyllabicity that operates as a trigger for palatalization. She reformalized the palatalization rule as follows in (7).

(7) Palatalization Rule (Choi, 1988)



(7) shows that the first X becomes ambisyllabic by the rule (6), which makes the phonological environment for palatalization where the feature of [+high] the second X has is shared with the preceding one.

On the other hand, Shin (2015) points out that the reason the palatalization rule does not apply in (3b,c) unlike (3a), is due to the morphological boundaries between the stem and affix in derivational words. Regarding the morphological boundaries as a key element, he argues that there should be morpheme boundaries before /i, y/ in order for palatalization to take places, which coincides with Ahn's (1985) argument.

However, it seems insufficient to explain the exceptions of palatalization such examples as /pat^h-ilaŋ/ → [panniraŋ], /hot^h-ipul/ → [honnibul], and /pat^h-il/ → [panil], where palatalization does not occur, even though there are morpheme boundaries in the words.

3.3. The analysis based on Optimality Theory⁴⁾

The most significant feature of optimality theory is that the phonetic

4) We mainly refer to the constraints set by Choi and Lee(2000).

representation is not the result of a series of derivation, but the interaction of relevant constraints. In this theory, the constraints ranked appropriately select the best option among various possible candidates. Choi and Lee (2000) attempted to reanalyze Korean palatalization and set the constraints as follows:

(8) Constraints for palatalization (Choi & Lee 2000)

- a. AMBI-MARGIN : Consonants located at the margin of syllables should be ambisyllabic elements.
- b. PLTL : The ambisyllable should share the feature of [+high] with following sound.
- c. *[palatal][y] : The palatalized sound and glide /y/ should not occur consecutively.
- d. PARSE : No element in underlying form is omitted or deleted on the surface form.

The constraint ranking is as follows: *[palatal][y] » AMBI-MARGIN » PLTL » PARSE.

Let us examine how the constraints operate to select the best option (Choi & Lee 2000).

(9) [sɛndʒu] (fast speech)

/sɛnd+yu/	*[palatal][y]	AMBI-MARGIN	PLTL	PARSE
$\begin{array}{c} \sigma \quad \sigma \\ \vee \\ \text{a. sɛnd yu} \end{array}$			*	
$\begin{array}{c} \sigma \quad \sigma \\ \vee \\ \text{b. sɛndʒyu} \end{array}$	*!			
$\begin{array}{c} \leftarrow \sigma \quad \sigma \\ \vee \\ \text{c. sɛndʒu} \end{array}$				*

σ d. sɛnɔ̃y <u>u</u>		*!		
σ σ \vee e. sɛndu			*	*

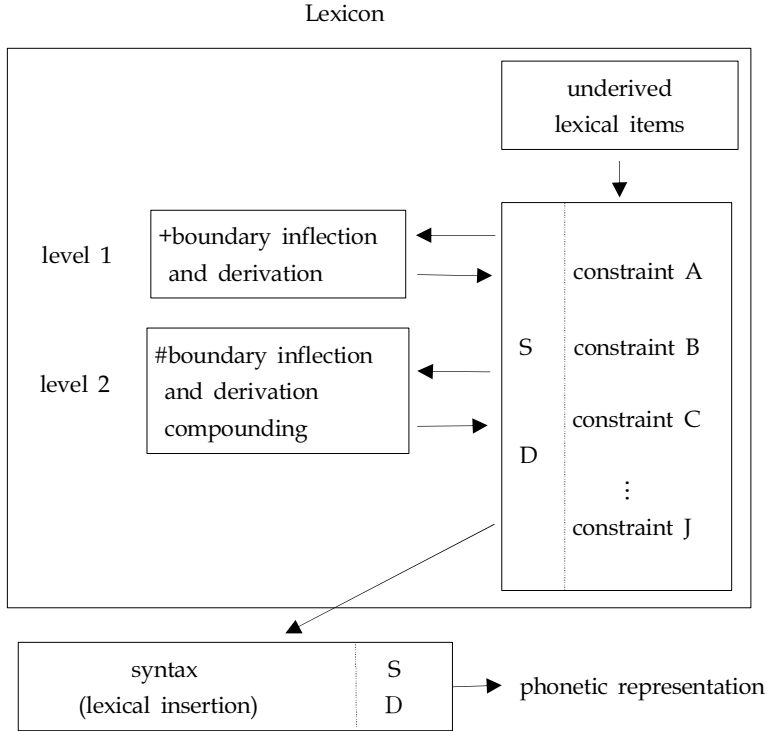
In (9), (9a) has not been chosen as the best option because it violates PLTL constraint even though the environment is satisfied. (9b) also cannot be chosen since it violates the highest-ranked constraint. The output in (9d) does not have an ambisyllabic element, which violates the AMBI-MARGIN constraint. The environment of (9e) is satisfied for palatalization, but it violates two constraints. Therefore, the option (9c) has been chosen as the optimal form even though it violates PARSE constraint which is the lowest-ranked.

In the next chapter, we will reanalyze palatalization in Korean, accepting resyllabification and ambisyllabicity proposed by Choi as key conditions and make suggestions to the problems mentioned beforehand.

4. Reanalysis of Palatalization in Korean

Considering that the types of affix on each level are closely related with the phonological phenomena including palatalization, we insist that the syllabification device(SD) where all the words in word-formation process automatically pass through for syllabification and resyllabification should be positioned in phonology. We hereby suggest the following revised lexical model, emphasizing the fact that phonological phenomena including palatalization are very sensitive to syllable structure as well as the importance of SD for the resyllabification in the process of word formation.

(10) Lexical Model



The word formation process based on the lexical model (10) is as follows: First, when an underived form comes into phonology, it passes through the SD for the syllabification. When more word formation process is necessary, it straightly moves into the level 1 in morphology, where weak(+) boundary inflection takes place. After the word formation in level 1 morphology, the output automatically passes through the SD for resyllabification in phonology, and then the relevant constraints interactively operate to select the best phonological output from the candidates. Then, the selected form moves again into the level 2 morphology where strong(#) boundary inflection and compounding process take place. The words or compound words move back to phonology and go through the same process as before. After all the process in lexicon, the words move to the postlexical level where the word becomes a part of phrase or sentence. Finally, it

is phonetically realized after passing through the SD in postlexical level. The notable property in model (10) is that palatalization always occurs regardless of the level whenever the condition is satisfied.

An issue that has not yet been resolved in our discussion is with respect to the phonological unit in which resyllabification occurs. We have seen that Borowsky (1984) and Choi (1988) regard ‘foot’ as a prosodic unit for resyllabification, which is plausible for the languages with the stress. However, a language without stress like Korean needs to set up a new phonological constituent. To solve this problem, we will assume that it is the phonological word(*Pw*) that Korean native speakers intuitively regard as a phonological unit where resyllabification occurs in Korean. In order to secure the validity for our argument, let us re-examine some of the examples we have seen earlier. As seen in the examples of /t^hi/‘티’ → [t^hi], /mati/‘마디’ → [ma.di], palatalization does not occur when the coronal consonant /d/and /i/ are tautosyllabic. This indicates that palatalization does not take place within a syllable. Let us look at some examples of /k^hi/‘끼’ → [k^hi], /mat-i/‘맷-이’ → [maci], which seems to tell us that palatalization should be Domain Limit Rule⁵⁾ since the coronal consonants become palatalized when the /t^h, t/ and /i/ are positioned in a different syllable. However, setting the palatalization environment to the Domain Limit Rule can cause another problem of explaining the counterexamples of /pat^h-ilaŋ/ → [panniraŋ] or /hot^h-ipul/ → [honnibul], which show no palatalization even though the environments are satisfied.

5) Nespor & Vogel, (1986, p. 15) characterized three domain-sensitive rules as follows:

(*D_i* and *D_j* stand for certain prosodic categories)

a. Domain span:

A → B / [... X ___ Y ...]*D_i*

b. Domain juncture:

i) A → B / [...[... X ___ Y]*D_j* [Z ...]*D_j* ...]*D_i*

ii) A → B / [...[... X]*D_j* [Y ___ Z ...]*D_j* ...]*D_i*

c. Domain limit:

i) A → B / [... X ___ Y]*D_i*

ii) A → B / [X ___ Y ...]*D_i*

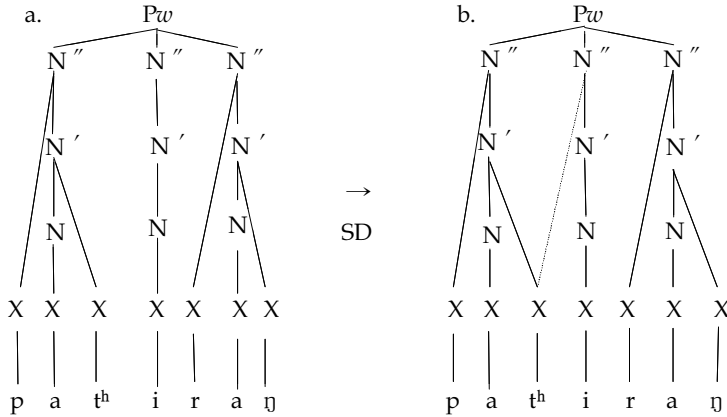
A domain span rule applies within the particular domain, while the domain juncture rule applies on distinct domain *D_i* depending on whether the segment belongs to *D_j* within *D_i*.

A domain rule applies to the beginning or end of a domain *D_i*.

Therefore, it is reasonable to regard the palatalization in Korean as the Domain Span Rule within a *Pw*.

Let us examine the asymmetries (3b) of palatalization in Korean through the word formation process in the lexical model (10). The process of /pat^h-ilaŋ/ to [pac^hiraŋ] is as follows: First, an underived form /pat^h/ comes into the phonology and automatically goes through SD for syllabification. It moves into the level 1 in morphology where the coordinative particle⁶⁾ '-ilaŋ' is added to become [pat^h-ilaŋ]. After the word formation process, it passes through the SD and is resyllabified into *Pw*[pat^hilaŋ] as seen in (11).

(11) Resyllabification process



(11b) shows that /t^h/ belongs to both the preceding and following syllable at the same time, becoming ambisyllabic. After the resyllabification, the phonological constraints related to the new syllable structure (in this case, palatalization constraints) interact with one another to select the optimal candidate as seen in (12).

6) There is a controversy over the grammatical definition of '-ilaŋ'. However, we will tentatively regard it as a coordinative particle, and further study on this will be conducted in the following research.

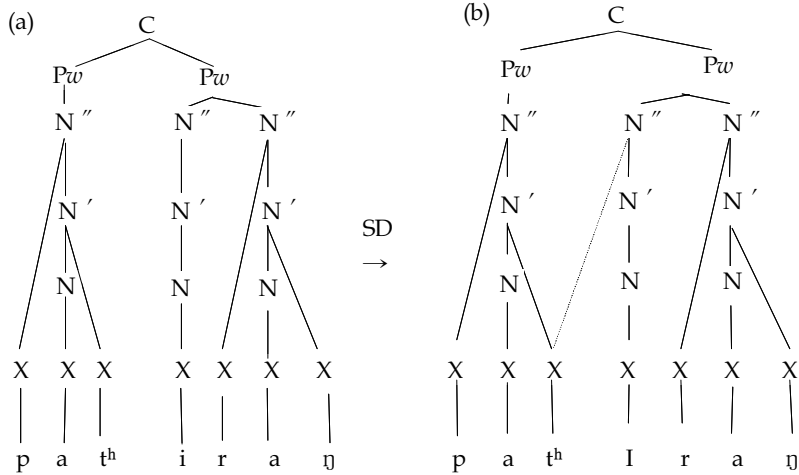
(12) /pat^hilaŋ/ → [pac^hiraŋ]

/pat ^h +ilaŋ/	*[palatal][y]	AMBI-MARGIN	PLTL	PARSE
$\begin{array}{c} \sigma \quad \sigma \\ \diagdown \quad / \\ \text{a. pat}^h\text{ilaŋ} \\ [\text{pat}^h\text{ilaŋ}] \end{array}$			*	
$\begin{array}{c} \sigma \\ \\ \text{b. pat}^h\text{ilaŋ} \\ [\text{pat}^h\text{ilaŋ}] \end{array}$		*	*	
$\begin{array}{c} \sigma \quad \sigma \\ \diagdown \quad / \\ \text{c. pat}^h\text{ilaŋ} \\ [\text{pac}^h\text{yilaŋ}] \end{array}$	*!			
$\begin{array}{c} \sigma \quad \sigma \\ \diagdown \quad / \\ \text{d. pat}^h\text{ilaŋ} \\ [\text{pac}^h\text{ilaŋ}] \end{array}$				*
$\begin{array}{c} \sigma \\ \\ \text{e. pat}^h\text{ilaŋ} \\ [\text{pac}^h\text{laŋ}] \end{array}$		*		*

(12d) has been chosen as the optimal form among the candidates as it violates the lowest-ranked constraint.

On the other hand, the process of /pat^h-ilaŋ/ to [panniraŋ] is as follows: First, the underived forms of [pat^h] and [ilaŋ] come into phonology and passes through SD for syllabification and move into the level 1 in morphology for +boundary inflection. Moving to the level 2 without any change in the level 1, they become a compound word [[pat^h][ilaŋ]]. After the compounding process, it passes through the SD and is resyllabified into C[Pw[pat^h]Pw[ilaŋ]] as seen in (13).

(13) $[[pat^h][ilaŋ]] \rightarrow C[Pw[pat^h]Pw[ilaŋ]]$



Unlike our assumption, (13b) shows that the compound word ‘[[pat^h] [ilaŋ]]’ consists of two different *Pws*, which prevents /t^h/ from becoming an ambisyllabic. Since the prosodic structure is different from that of (11), another constraint related to the new environment is needed. In order to cover this, we will set a NG constraint⁷⁾ as the highest one. Let us look at (14) to see how [panniraŋ] is selected as the most appropriate form.

(14) /pat^hilaŋ/ → [panniraŋ]

/pat ^h +ilaŋ/	NG	*[palatal][y]	AMBI-MARGIN	PLTL	PARSE
$\begin{matrix} \sigma & & \sigma \\ & \diagdown & / \\ \text{a. pat}^h & & [ilaŋ] \\ & & [pa^chilaŋ] \end{matrix}$	*!				*
$\begin{matrix} \sigma \\ \\ \text{b. pat}^h & & [ilaŋ] \\ & & [pat^hilaŋ] \end{matrix}$	*!		*	*	

7) Nasal Gemination constraint(NG) is a domain limit rule that changes [t^h] in the environment of C[-t^h]pw pw[i-] to [nn].

$\begin{array}{c} \sigma \quad \sigma \\ \diagdown \quad / \\ \text{c. pat}^h[\text{ila}\eta] \\ [\text{pac}^h\text{yila}\eta] \end{array}$	*!	*			*
$\begin{array}{c} \sigma \quad \sigma \\ \diagdown \quad / \\ \text{d. pat}^h[\text{ila}\eta] \\ [\text{pat}^h\text{ila}\eta] \end{array}$	*!			*	
$\begin{array}{c} \sigma \\ \\ \text{e. pat}^h[\text{ila}\eta] \\ [\text{pannira}\eta] \end{array}$			*		*
$\begin{array}{c} \sigma \\ \\ \text{f. pat}^h[\text{ila}\eta] \\ [\text{padila}\eta] \end{array}$	*!		*		*

Every candidate except 14(e) has been rejected as the best output because they all violate the NG constraint which is the most critical one. Even though the option 14(e) violates the AMBI-MARGIN and PARSE constraints, they are relatively weak compared to other ones. Therefore, [pannira η] in 14(e) instead of [pac^hira η] is selected as the best option through the interaction of the constraints.

By postulating that palatalization in Korean takes places within the range of *Pw* and the ambisyllabicity generated by the resyllabification process after passing through SD plays a key role for the phonological phenomenon, it has been possible to persuasively explain the asymmetries of palatalization shown in (3a) and (3b, c).

5. Conclusion

We have thus far examined palatalization in Korean on the basis of lexical phonology emphasizing the role of the resyllabification. From the analysis of previous studies, we pointed out that there remain some problems to be solved even though each study provides convincing logic and rationale for explaining palatalization. In chapter 3, we presented a revised lexical model adopting the core principles of the theories examined in preceding chapter and suggested a solution to the issue that we indicated with a view to more comprehensive understanding of palatalization.

By examining the process of word formation through the new lexical model presented, we found that palatalization in Korean occurs within a phonological word (Pw) and ambisyllabicity resulting from the resyllabification process plays an essential role.

In conclusion, the analysis that we have conducted indicates that palatalization in Korean is a phonological phenomenon taking place in derived environment when the preceding coronal consonant shares the feature of [+high] with the following sound as a consequence of the resyllabification process which is conditioned by passing through SD within the domain of the phonological word.

Analyzing palatalization in Korean, we assume that the resyllabification occurs within the phonological word. However, we do not clarify the controversial definition for the phonological word and we have to admit that more supporting phonological evidences that Pw is suitable for other phonological phenomena should be explored. we will leave those subjects for subsequent research.

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Received on October 31, 2017

Revised version received on December 16, 2017

Accepted on December 31, 2017