

Interaction between Phonological Rules and Marking Conditions in Korean*

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1. Introduction

The purpose of this paper is to consider the interaction between phonological rules and marking conditions in Korean.

Korean reveals various interesting phonological processes with regard to the sonorant consonants. First, the alveolar nasal /n/ becomes a lateral when either preceded or followed by the lateral /l/ (e.g., /manli/ → [malli] '4000km'), which is called /n/-lateralization. Second, /l/-nasalization changes the lateral /l/ into [ɺ] at syllable-initial position (e.g., /loin/ → [noin] 'old man'). Finally, obstruents undergo nasalization before a nasal or lateral (e.g., /wus+mwul/ → [wunmwul] 'the upper stream'). By obstruent neutralization, in addition, syllable-final obstruents are neutralized into homorganic lax stops.

Considering these phenomena in the framework of the generative phonology, Kim-Renaud (1974) asserts that the rules have to be strictly ordered to produce correct outputs; that is, /n/-lateralization must be ordered before /l/-nasalization, and nasalization must be preceded by both /l/-nasalization and obstruent neutralization. In the framework of underspecification and feature geometry, however, K-H Kim (1987) claims that no rule ordering be necessary. Assuming that syllable structure assignment takes place only after the syllable-insensitive rules apply, he correctly says that the requirement that the /l/-nasalization which is sensitive to syllable structure has to follow /n/-lateralization which is insensitive to syllable structure is superfluous. Asserting that phonological rules can apply whenever their structural descriptions are met, in addition, he says that nasalization may apply to syllable-final obstruents either simultaneously with or after obstruent neutralization and /l/-nasalization. He also proposes that in the framework of underspecification

and feature geometry, the nasalization of obstruents before nasal consonants and the lateral is interpreted as spreading of the root feature [+son] to the unspecified root node.

In this paper, I will propose (1) that unlike K-H Kim's assertion, phonological rules are not allowed to apply simultaneously and (2) that unlike Kim-Renaud's assertion, no explicit ordering of the rules mentioned above is necessary. In order to treat these facts, following Kiparsky (1985) I will use both marking conditions which prohibit nasality from being marked on aspirated/tensed consonants and [+continuant] consonants as well as /c/ in the lexicon and a sequencing constraint which rules out the sequence of [-son] followed by [+nas]. Under these assumptions, the requirement of obligatory rule ordering among the rules above is no longer necessary since it is predictable by universal and language-specific principles. Besides, I will show that nasal assimilation is related to not the root feature [+son] but the manner feature [+nas].

2. Rule Interaction

2.1. Previous Studies

In Korean, obstruents obligatorily become nasals before a nasal segment, as shown below.

1. a. /p, ph/ → [m] / ____ [+nas]
- b. /t, tt, th, s, ss, c, ch/ → [n] / ____ [+nas]
- c. /k, kk, kh/ → [ŋ] / ____ [+nas]

Obstruents also undergo neutralization in syllable-final position.

2. Obstruent Neutralization

- a. {p, pp, ph} → [p] / ____ \$
- b. {t, tt, th, s, ss, c, cc, ch} → [t] / ____ \$
- c. {k, kk, kh} → [k] / ____ \$

In the framework of generative phonology, Kim-Renaud (1974:220) formulates the nasalization rule as in (3) and

asserts that nasalization applies after neutralization, which is shown in (4).

3. Nasalization

[-cont] → [+nas] / ____ [+nas]

(Stops become nasalized before a nasal)

- 4.
- | | | | |
|-----------|-----------|------------|-------------|
| | /aph+nal/ | /wus+mwul/ | /kkoch+mal/ |
| Neutral.: | apnal | wutmwul | kkotmal |
| Nasal.: | amnal | wunmwul | kkonmal |
| | [amnal] | [wunmwul] | [kkonmal] |

As K-H Kim (1987) asserts, however, rule (3) fails to provide a reason for why stops assimilate to nasals but the opposite process, or denasalization, does not occur. Furthermore, obstruents also become nasalized before an underlying lateral /l/. Thus in order to derive the correct forms such as [kwungnan] and [camnok] in example (5), feeding order is required so that /l/-nasalization in (6), which changes syllable-initial /l/ into [n], will precede nasalization in (3).

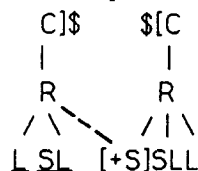
5. /caplok/ → [camnok] 'a miscellany'
 /kwuklan/ → [kwungnan] 'a civil war'
 cf. /kwukka/ → [kwukka] 'nation'

6. /l/-nasalization

[+lat] → [+nas, -cont] / \$ ____ (Kim-Renaud 1974)

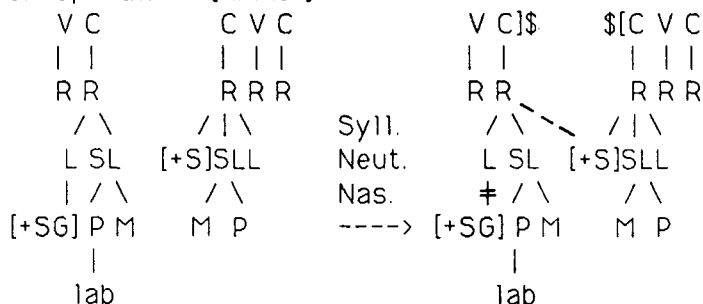
In the underspecified, hierarchical feature representations, K-H Kim (1987) says, these shortcomings are easily eliminated. According to him, since obstruents become nasalized before either a nasal or a lateral, the nasalization process will be interpreted as sonority assimilation, i.e., spreading of the root feature [+sonorant] to the underspecified root node of the preceding obstruent.

7. Feature [+sonorant] Spreading

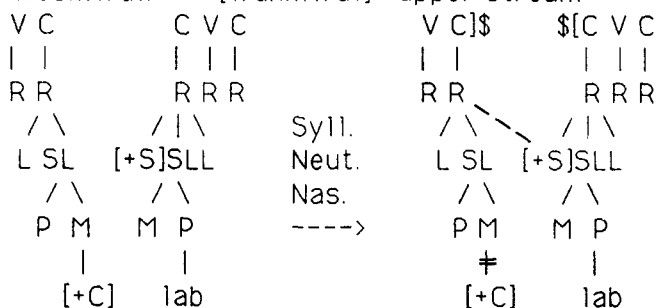


He says that the requirement of obligatory rule ordering among obstruent neutralization, /l/-nasalization, and nasalization is no longer necessary, since it is predictable by universal principles. Assuming that phonological rules are allowed to apply whenever their structural descriptions are met, he claims that nasalization in (7) may apply to syllable-final obstruents either simultaneously with or after obstruent neutralization and /l/-nasalization, as shown in (8).

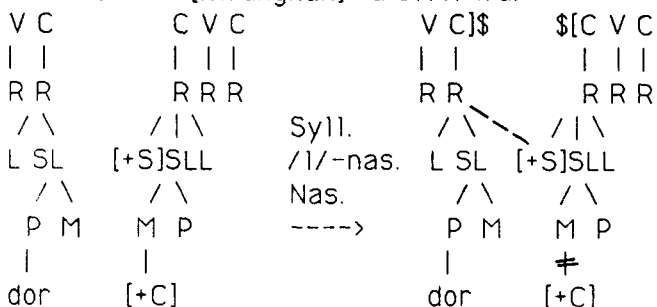
8. a. /aphnal/ → [amnal] 'future'



b. /wusmwul/ → [wunmwul] 'upper stream'



c. /kwuklan/ → [kwungnan] 'a civil war'



However, K-H Kim's analysis also has certain shortcomings. First, the feature [sonorant] is used to distinguish vowels, glides, nasals, lateral /l/ and /r/ from other consonants. Since among the [+sonorant] segments, only nasal consonants are specified as [+nas] but others as [-nas], bearing [+son] cannot guarantee the feature [+nas]. If the feature [+son] can cause a neighboring segment to become nasalized, then it is incorrectly predicted that consonants adjacent to a vowel or a glide should undergo nasalization -- and yet they typically do not. Furthermore, the syllable boundaries in (7) are redundant, for Korean does not have consonant clusters either on onset or on coda positions (Kim-Renaud (1975), Sohn (1987), Chin-W Kim (1990)). That is, the syllable template for Korean is C(G)VC. Second, is it possible for two different phonological rules to apply simultaneously when their structural conditions are met so that no ordering relationship between them is necessary? Suppose that a language has two rules, which refer to the same environment, as shown below.

9. a. A → C / ___ B b. B → D / A ___

What result (i.e., C, D or something else) would we get if rule (9a) applied simultaneously with rule (9b)? Since rule (9a) and (9b) may bleed each other, they have to be ordered to produce a correct output.

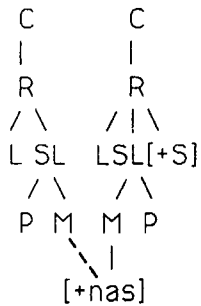
2.2. Alternative Analysis

In this section, I will show that no explicit rule ordering need be specified in the grammar. Feature value changing accounts like Kim-Renaud (1974) must have various rule ordering requirements. In the autosegmental accounts, however, these requirements are automatically predicted by universal and language specific marking conditions. Following Kiparsky (1985), I will use both marking conditions and a sequencing constraint, which keep disallowed configurations from being created by application of rules. I will also follow Archangeli and Pulleyblank (1990), assuming that our use of

marking conditions interacts integrally with underspecification in such a way that those conditions can refer only to values actually present in the representation. Before doing this, I will first revise the nasalization rule in (7) proposed by K-H Kim (1987).

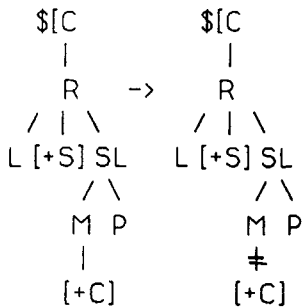
As discussed in the preceding section, the feature [+sonorant] does not trigger nasalization. Since nasalization is related not to the feature [+sonorant] but to the feature [+nasal], I will propose the following nasalization rule instead of (7).

10. Nasalization¹

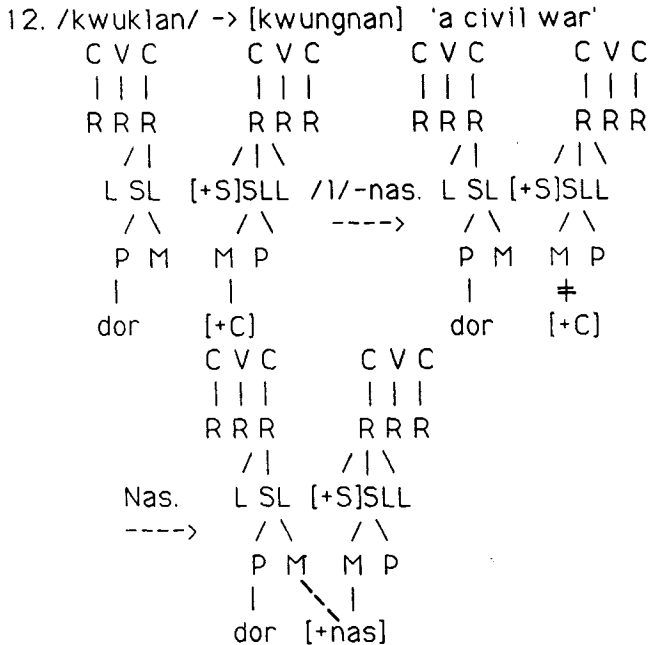


To begin with, let's consider how the rule in (10) interacts with the /l/-nasalization rule, which is formulated as in (11) by K-H Kim (1987).

11. /l/-nasalization



[kwungnan], for instance, is derived from its underlying form /kwuklan/ as follows.



In (12) the redundant feature [+nas] is inserted by a default rule after /l/-nasalization. Here, it appears that rule ordering is crucial, for applying nasalization before /l/-nasalization would result in a wrong output, i.e. *[kwuknan]. But the requirement of obligatory rule ordering that /l/-nasalization should be before nasalization is superfluous, for it is predictable by both a general principle of rule application given in (13) and a language-specific sequencing constraint in (14) which rules out the sequence of [-son] and [+nas].

13. R1 < R2 if opposite order derives an ill-formed output.

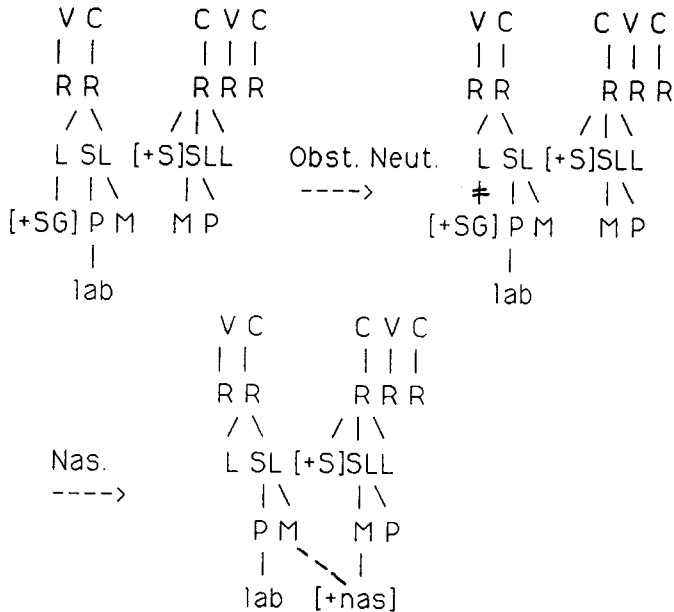
14. *[-son] [+nas]²

The constraint (14) requires obstruents to undergo nasalization obligatorily. The ordering in (12) is predictable, for the opposite ordering results in a violation of this sequencing constraint.

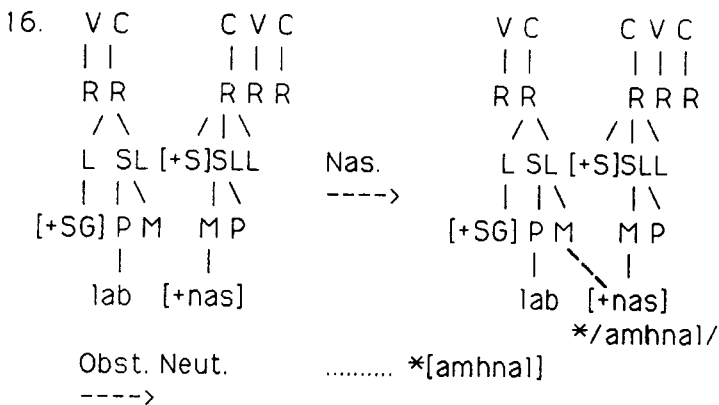
Syllable-final obstruents are neutralized into homorganic lax stops as shown in (2) above. Kim-Renaud's (1974) assertion apparently looks correct that obstruent

neutralization should apply before nasalization. (15), for example, shows how [amnal] is derived from /aphnal/.

15. /aphnal/ → [amnal] 'future'



[+nas] in (15) is also inserted by a default rule. If we applied nasalization before obstruent neutralization, then we would get wrong results, as shown below.



It is clear from the above that obstruent neutralization must precede nasalization. The obligatory rule ordering, however, need not be specified in the grammar, since it also can be predicted by marking conditions, which prohibit nasality from being marked on aspirated and tensed consonants (i.e., /pp, ph, tt, th, ss, cc, ch, kk, kh/) as well as /c/ in the lexicon. First, it is universal that tenseness/aspiration is distinctive for obstruents but not for nasals, which is expressed by a universal marking condition given in (17).

17. *{[α SG], [α CG]], [+nas]}

According to Kiparsky (1985), marking conditions such as (17) should be applicable to underived lexical representations as well as to derived lexical representations, including the output of word-level rules. Structure Preservation implies that (17) not only prohibits aspirated/tensed nasals from appearing in underlying representations and lexical derivations but also keeps the redundant specification [-SG]/[-CG] from being assigned to nasals in lexical derivations. For example, no language can have /mh/ (=aspirated /m/) or /m*/ (=tensed /m/). Since the marking condition in (17) blocks derivations in (16) such that the opposite ordering in (15) can be predictable by the general principle of rule application given in (13), no explicit ordering is required.

Up to now, only two obstruents, i.e. /s/ and /c/, remain to be accounted for. First, let's consider /s/, whose underlying representation based on K-H Kim (1987) is given below.

18. /s/

```

  C
  |
  R
 / \
L SL
 / \
M P
 |
[+C]
```

The feature [+continuant] cannot cooccur with the feature [+nasal], which is predicted by the universal marking condition in (19).

19. *C
 |
 [+cont, +nas]

Nasalization cannot connect feature [+nas] to /s/ in (18), for it is already connected to feature [+C]. Put differently, /s/ can undergo nasalization only after it loses its manner feature [+C] through obstruent neutralization. Here, that is, the ordering is predicted by the universal marking condition above.

Finally, the lax palatal affricate /c/ is underlyingly represented as follows.

20. /c/
 C
 |
 R
 / \
 L SL
 / \
 M P
 |
 cor
 |
 [-A]

When /c/ occurs before nasals, it undergoes obstruent neutralization and then nasalization, finally becoming [n]. The opposite ordering is blocked by the following marking condition.

21. *[+nas, -A]

The association of [+nas] to [-ant] will be blocked by the marking condition (21). Like other obstruents, only after it undergoes neutralization can it be subject to nasalization.

Since the rule ordering is also predictable here, no explicit rule ordering is required.

3. Conclusion

The interaction between assimilation rules and marking conventions in Korean has been discussed so far. First, assimilation is regarded as spreading the specified feature to the underspecified feature node. Second, nasal assimilation is triggered by the manner feature [+nas] rather than by the root feature [+son]. In order to produce correct outputs, finally, rules have to apply in certain orders. But no explicit rule orderings are necessary, for they are automatically predicted not only by universal/language-particular marking conditions but also by a general principle of rule application.

Notes

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¹Redundancy rules can apply both before and after phonological rules, which principle is stated as in (i).

i. Redundancy Rule Ordering Constraint

A default or complement rule assigning [α F], where " α " is "+" or "-", is automatically assigned to the first component in which reference is made to [α F].

(Archangeli and Pullyblank 1990)

In (10), the redundant feature [+nas] is inserted by the following redundancy rule, which is required to apply before nasalization by the principle given in (i).

ii. [] \rightarrow [+N] / [__, +S] (K-H Kim (1987))

²For sequential constraint in other languages, see Prince (1984:239).

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