# The Nasal Condition in Korean[*]

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## 1. Introduction

In Korean, there is an asymmetry in the occurrence of the vowel [^] in nasal-nasal (NN) sequences morpheme-internally and in suffixation. Morpheme-internal NN sequences do not contain an intervening vowel [^], while it does occur between two nasals in suffixation. The aim of this paper is to capture the asymmetrical distribution of the vowel [^] in NN sequences, within the framework of Government Phonology. The main point of my analysis is that doubly linked morpheme-internal NN sequences, conditioned by the Nasal Condition, meet the requirements of the Empty Category Principle (ECP), and hence the intervening empty nucleus is licensed, so that the vowel [^] is absent. Two heteromorphemic nasals, which contain an association line each, do not satisfy the requirements of the ECP. Accordingly, the intervening empty nucleus must receive phonetic interpretation, so that the vowel [^] is present. In other words, whether or not a given NN sequence satisfies the ECP determines whether the vowel [^] appears or not.

This paper is organised as follows: in section 2, I present data and an overview of previous approaches to this problem. In section 3, I introduce the ECP and show how empty nuclei in Korean are licensed in terms of the ECP. In section 4, I show how the asymmetrical distribution of the vowel [^] in NN sequences is captured by the Nasal Condition. In the final section, I summarise and conclude my analysis.

## 2. Data and previous approaches

The following table summarises the distribution of morpheme-internal NN sequences.

(1)

| N1 N2 | labial | coronal | velar |
|---|---|---|---|
| labial | /simmani/ 'ginseng digger' | /k'nman/ 'even though' | /pa_ma_i/ 'club' |
| coronal | /kumnil/ 'to do a stretch' | /k:nn/ 'to cross' | /ma_nani/ 'wretch' |
| velar | ----- | ----- | ----- |

In (1), we observe that nasal geminates are possible except for the velar nasal. Velar nasals are followed by either labial or coronal nasals, but not vice versa, labial nasals are followed by coronal nasals and vice versa. Morpheme-internally, not only nasal geminates (except for the velar), but also heterorganic nasal sequences are possible. In both cases, the vowel [^] never occurs between two nasals. If we look at suffixation, however, the connective /mj/ and the effective /ni/ suffixes show a different picture in that the vowel [^] occurs between stem-final and suffix nasals, as shown in (2).

(2)    (a) after vowel-final and liquid-final stem
       /ka/            [kamj']          [kani]                 'to go'
       /nar/1          [nalmj']         [nani]2                'to fly'
       (b) after nasal-final stem
       /t't^m/         [t't^m^mj']      [t't^m^ni]             'to grope for'
       /a:n/           [an^mj']3 [an^ni]            'to hug'

In (2a), the vowel [^] does not occur after vowel-final and liquid-final stems. But after nasal-final stems, the vowel [^] occurs between two nasals, as in (2b). Hence, (1) and (2) show that there is a difference between NN sequences morpheme-internally and in suffixation: the vowel [^] splits up such a sequence in suffixation but not morpheme-internally.

In order to capture this asymmetry, rule-based approaches (Kim-Renaud 1982, Ahn 1985, among others) assume that the vowel [^] is lexically specified in stems and suffixes, and propose that this vowel is subject to deletion in suffixation. The underlying representation of the connective and the effective suffixes are then /^mj'/ and /^ni/, respectively. They set up rules in which the vowel [^] is deleted after a vowel, and between a liquid and a nasal or between two liquids, as shown below.

(3)    (a) Affixal ^-deletion
       ^ _ Ø / V + __

(b) Inter-consonantal ^-deletion

$$^\wedge \_ \emptyset / 1 \_\_ \begin{Bmatrix} m \\ l \end{Bmatrix}$$

(Kim-Renaud 1982)

Rule (3a) formalises the deletion of the suffix-initial /^/ after the vowel-final stem. This ^-deletion rule prevents vowel hiatus. Rule (b) states that the vowel [^] is deleted between a liquid and a labial nasal, or another liquid. The implicit motivation of the deletion of [^] in this case would be the formation of a well-formed coda-onset sequence [lm]. In other contexts, this vowel is retained after obstruent-final or nasal-final stems: e.g. /m'k/ [m'k^mj'], [m'k^ni'] 'to eat'; /tat/ [tat^mj'], [tat^ni] 'to close'; /'p/ [' pmj'], ['p^ni] 'to carry something or someone on the back'. The preservation of the vowel [^] after the obstruent-final stems can be accounted for on the basis of the fact that the sequences [km], [tm] and [pm] are not well-formed coda-onset clusters in Korean. However, the rule in (b) is unable to explain why the vowel [^] is not deleted before a nasal, because morpheme-internal NN sequences are completely acceptable coda-onset clusters, as shown in (1).

In the next sections, I propose an alternative analysis of these facts within the framework of Government Phonology.

# 3. The ECP and empty nuclei in Korean

## 3.1. Empty nuclei in Korean

Unlike other vowels in Korean,4 the vowel [^] is unique in that it is subject to deletion in suffixation and to epenthesis in loanwords. In SPE-type rule formulations, these processes are characterised as ^-deletion and ^-insertion, respectively (Ahn 1991, Kim-Renaud 1982, among others). In Underspecification Theory, the vowel can be represented as an empty nucleus in phonological representation (Sohn 1986): it is a maximally underspecified vowel. In appropriate contexts, empty nuclei are deleted or inserted. Government Phonology (GP) proposes a different approach in that a vowel alternating with zero is treated as an empty nucleus in the lexical representation, subject to phonetic interpretation in certain well-defined circumstances.5 The crucial difference between GP and other theoretical frameworks is therefore that an empty nucleus is not inserted or deleted in GP. Rather, empty nuclei are present in lexical representation and their context determines whether or not they are phonetically realised.

Related to this, Heo (1995) and Rhee & Heo (1998) propose that Korean has neither branching onsets nor branching rhymes. In other words, Korean is a so-called CV-only

language. Concretely, surface consonant clusters are syllabified as two onsets intervened by an empty nucleus. Domain-final single consonants are syllabified as an onset followed by a final empty nucleus, due to the effect of the Coda Licensing Principle (Kaye 1990) and the Onset Licensing Principle (Harris 1994).6 Thus, a word such as [kotrm] icicle' has the following syllabic representation.

(4) /kotørøm / [kot^r^m] (ø: empty nucleus)

| O | N1 | O | N2 | O | N3 | O | N4 |
|---|----|---|----|---|----|---|----|
| \| | \| | \| | \| | \| | \| | \| | \| |
| x | x | x | x | x | x | x | x |
| \| | \| | \| |   |   | \| |   | \| |
| k | o | t |   |   | r |   | m |

In (4), we can see that there are three empty nuclei in the lexical representation, N2, N3 and N4. If we assume that the phonetic realisation of an empty nucleus is [^], we must determine when these empty nuclei are phonetically realised. With respect to this, GP provides an account based on the Empty Category Principle, which is assumed to be a part of Universal Grammar:

(5) The Empty Category Principle (ECP)7
　　I. A licensed (empty) category receives no phonetic interpretation licensing under the following circumstances:
　　(a) domain-final (empty) categories are licensed (parameterised)
　　(b) properly governed (empty) nuclei are licensed.
　　(c) nuclei within an inter-onset domain are licensed.
　　II. Proper government
　　α properly governs β if:
　　(a) α and β are adjacent on the relevant projection,
　　(b) α is not itself licensed, and
　　(c) no governing domain separates α from β.

The ECP dictates that an empty nucleus is not interpreted if it is licensed. The licensing conditions for empty nuclei vary, depending on the position of the nucleus. The condition in (5.I.a) is a parameter: some, but not all, languages license domain-final empty nuclei. A language which has consonant-final words (such as English, Dutch, German, Arabic and Korean) licences a domain-final empty nucleus: it is not phonetically realised. However, in languages without consonant-final words (such as Japanese and Italian), final empty nuclei are not licensed and therefore must be interpreted. Words in these languages must end in a vowel.
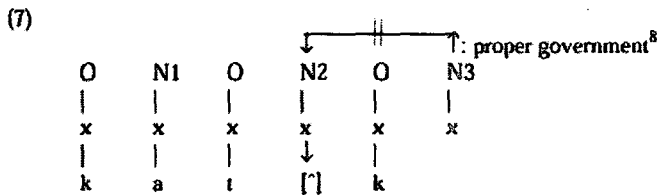
Languages which have empty nuclei normally require the condition (5.I.a) and (5.I.b) to account for vowel/zero alternations. However, languages such as Polish (e.g. Gussmann & Kaye 1993 and Cyran & Gussmann 1999) and Mongolian (e.g. Charette 1992) show that the notions of domain-final licensing and proper government are not sufficient to explain the (non-)interpretation of empty nuclei. An additional mechanism is required, namely, inter-onset government: governing relations between two onsets determine the licensing of intervening empty nuclei. In what follows, I consider how these three conditions, i.e. the domain-final licensing parameter, proper government and inter-onset government, provide an adequate account of ^/zero alternation in Korean.

## 3.2. Licensing empty nuclei

In this section, I introduce Heo's (1995) analysis of licensing empty nuclei in Korean. First, let us establish how domain-final licensing and proper government deal with empty nuclei in mono-morphemic words in Korean.

(6)  /katøkø/      [kat^k]   'full'    /mEtøpø/     [mEt^p]   'knot'

     /kjarømø/     [kjar^m]  'oval'    /musønø/     [mus^n]   'what'

     /c'ac'ø_ø/    [c'ac'^_]  'anger'   /onørø/      [on^l]    'today'

Notice that the penultimate empty nucleus in all words in (6) is interpreted as [^] in every case. This is due to the fact that final empty nuclei are licensed by domain-final licensing in Korean: they cannot act as proper governors for the preceding empty nuclei (cf. (5.II) above). So, since the penultimate empty nuclei are not properly governed, they must be interpreted. This is illustrated for the word /katøkø/ in (7).

(7)

```
                         ┌──────┤├──────┐
                         ↓      ┤├       ↑: proper government⁸
     O    N1   O    N2   O    N3
     |    |    |    |    |    |
     x    x    x    x    x    x
     |    |    |    ↓    |
     k    a    t    [^]   k
```
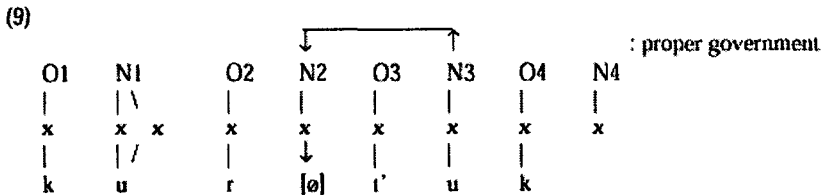
In (7), the empty nucleus N3 is licensed due to domain-final licensing; it cannot act as a proper governor of the preceding empty nucleus N2. Therefore, N2 is not licensed and must receive phonetic interpretation as the vowel [^]. The phonetic form is [kat^k].

The notion of proper government also explains why internal empty nuclei do not receive phonetic interpretation in other contexts. Consider the following examples in which the potential proper governors have phonetic content (i.e. are unlicensed).

(8)    (a)    /mjˊrøcHi/        [mjˊlcHi]9ˊanchovy'

              /ˊ:møpHo/         [ˊ:mpHo]          'threat'

       (b)    /pEkøcˊˊ_ø/       [pEkcˊˊ_]         'butcher'
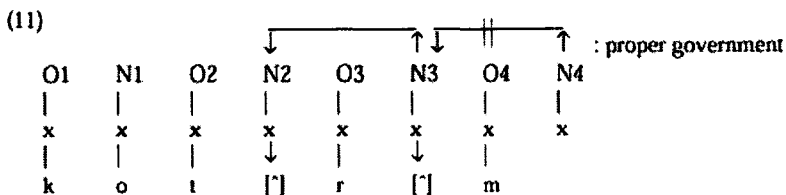
              /ku:røtˈukø/      [ku:ltˈuk] 'chimney'

The words in (8) show that internal empty nuclei (underlined) are not interpreted when they are properly governed by a following nucleus. In (a), domain-final unlicensed nuclei act as proper governors, while in (b) the antepenultimate empty nucleus is licensed by a following unlicensed nucleus. The word /ku:røtˈukø/ in (8b) shows that the unlicensed nucleus N3 properly governs the preceding empty nucleus N2; it is licensed, so it is not audible.

(9)

```
                            ↓ ┌──────────┐ ↑            : proper government
    O1    N1      O2    N2    O3    N3    O4    N4
    |     | \     |     |     |     |     |     |
    x     x   x   x     x     x     x     x     x
    |     | /     |     ↓     |     |     |
    k     u       r     [ø]   tˈ    u     k
```

Let us now consider some examples in which internal empty nuclei are properly governed but also phonetically interpreted.

(10)    /pukˈørˊpø/      [pukˈˆrˊp]        'shy'

        /kEtˈøri/        [kEtˈˆri]         'to break'

        /kørˊmøro/       [kˆrˊmˆro]        'therefore'

        /kotørømø/       [kotˆrˆm]         'icicle'

        /sinapøro/       [sinapˆro]        'gradually'

        /pusørˊki/       [pusˆrˊki]        'fragments'

Notice that the underlined empty nuclei in these examples have a potential proper governor to their right. Even though they may be properly governable, they are phonetically manifested. Consider the word /kotørømø/.

(11)

```
                        ↓ ┌─────┐ ↑↓ ┌╫─┐ ↑     : proper government
    O1    N1    O2    N2    O3    N3    O4    N4
    |     |     |     |     |     |     |     |
    x     x     x     x     x     x     x     x
    |     |     |     ↓     |     ↓     |
    k     o     t     [ˈ]   r     [ˈ]   m
```

. There are three empty nuclei in succession. Let us see how proper government applies in this structure. The final empty nucleus N4 is licensed due to the effect of the parameter-setting (5Ia). It cannot be a proper governor for the penultimate empty nucleus N3, which therefore gets interpreted as the vowel [^]. Since N3 is unlicensed, it can be a proper governor for the antepenultimate empty nucleus N2. Because it is properly governed, we expect N2 to be licensed. However, the phonetic form [kot^r^m] (*[kotr^m]) shows that it is interpreted.

If we examine the distribution of the consonants which surround an N2-type nucleus in (11), we find that they involve sequences of obstruent + empty nucleus + liquid. When the order of these sequences is reversed, i.e. liquid + empty nucleus + obstruent, the intervening empty nucleus is not interpreted. This is shown by the following examples.

(12)   /t'a:røki/       [t'a:lki]        'strawberry'
       /t'arøpo/        [t'alpo]         'dwarf'
       /k'arøt'Eki/     [k'alt'Eki]      'funnel'
       /ma:røs''_/      [ma:ls''_]       'trouble'

In each of the cases in (12), an internal empty nucleus is properly governed by a following unlicensed nucleus, and not interpreted. Aside from proper government, the main difference between (10) and (12) concerns the quality of the consonants surrounding the internal empty nucleus; if an empty nucleus intervenes between a liquid and an obstruent, it is licensed by proper government, but if the order is reversed, an intervening empty nucleus is interpreted in spite of being properly governed. This suggests that not only proper government but also the quality of the surrounding consonants affect licensing conditions and hence the interpretation of internal empty nuclei in Korean.

Let us examine the relevant consonant sequences in more detail. The sequences in (10) and (12) contain a liquid which precedes an empty nucleus in (12), but follows it in (10). Generally, liquids are regarded as weak consonants, while obstruents are strong in the segmental strength hierarchy (e.g. Clements 1990). In GP terms, liquids are lower in rank in the governing hierarchy and obstruents are higher in rank. Thus, the following segmental governing hierarchy can be proposed.10

(13)    (a) liquids < nasal, lenis obstruents < tensed, aspirated obstruents
        (b) Mutual government is not allowed among segments in the same rank.

As we will see below, the motivation of the proviso in (13b) stems from the fact that an intervening empty nucleus receives phonetic interpretation between two segments in the same rank though this empty nucleus is properly governed. Given the governing

hierarchy in (13), we can account for the presence vs. absence of phonetic interpretation of intervening empty nuclei with the assumption that we establish a governing relation between two consonants and the governing direction is right-to-left (i.e. head-final). In (9) above, for instance, a governing relation is established between O2 and O3; the coronal tensed stop [t'] in O3 can govern the liquid [l] in O2. If the requirement of inter-onset government between O2 and O3 is met, the intervening empty nucleus N2 is licensed; hence it does not receive phonetic interpretation. In (11) above, however, no inter-onset governing relation between O2 and O3 is established, because the liquid [r] in O3 cannot govern the lenis stop [t] in O2. In this case, the intervening empty nucleus N2 does receive phonetic interpretation as the vowel [^]. The following configurations illustrate these points.

(14) /kuːrət'ukə/ [kult'uk] 'chimney'
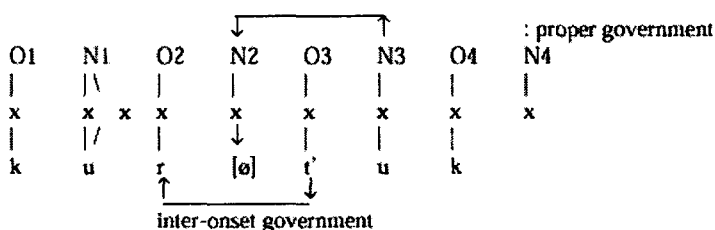


(15) /kotərəmə/ [kot'r'm] 'icicle'
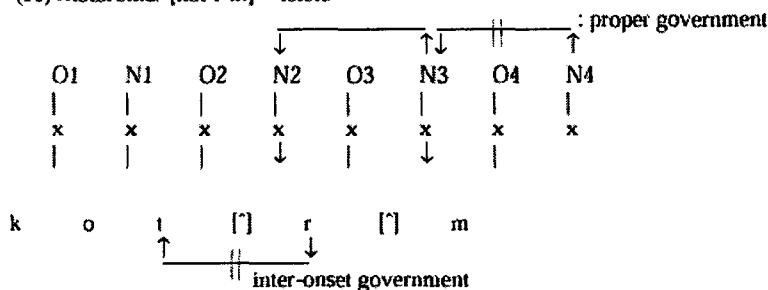


(14) and (15) show that an internal empty nucleus is licensed if and only if it is properly governed by a following nucleus, and inter-onset government is established between the consonants which surround it. If either of these two requirements is not satisfied, the internal empty nucleus is interpreted. In the next section, I consider how empty nuclei are licensed in nasal sequences morpheme-internally and in suffixation and show how the mechanisms outlined above straightforwardly account for the absence vs. presence of the vowel [^].

# 4. The Nasal Condition

Consider again the examples from (1) and (2b), repeated below.

(16)　(a) morpheme-internal

|  |  |  |  |
|---|---|---|---|
| /simmani/ | 'ginseng digger' | /kumnil/ | 'to do a stretch' |
| /k'ːnn'/ | 'to cross' | /k'nman/ | 'even though' |
| /pa_ma_i/ | 'club' | /ma_nani/ | 'wretch' |

　　　(b) in suffixation

|  |  |  |  |
|---|---|---|---|
| /t't&oslash;m&oslash;/ | [t't^m^mj'] | [t't^m^ni] | 'to grope for' |
| /aːn/ | [an^mj'] | [an^ni] | 'to hug' |

The phonetic realisation of empty nuclei in suffixation can be accounted for by the governing hierarchy proposed in (13): segments in the same rank cannot govern each other. The lexical representations of the connective and the effective forms of /t't&oslash;m&oslash;/ are shown in (17a) and (17b), respectively.

(17)　(a) the connective form /t't&oslash;m&oslash;mj'/



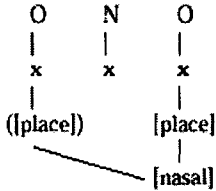(b) the effective form /t't&oslash;m&oslash;ni/
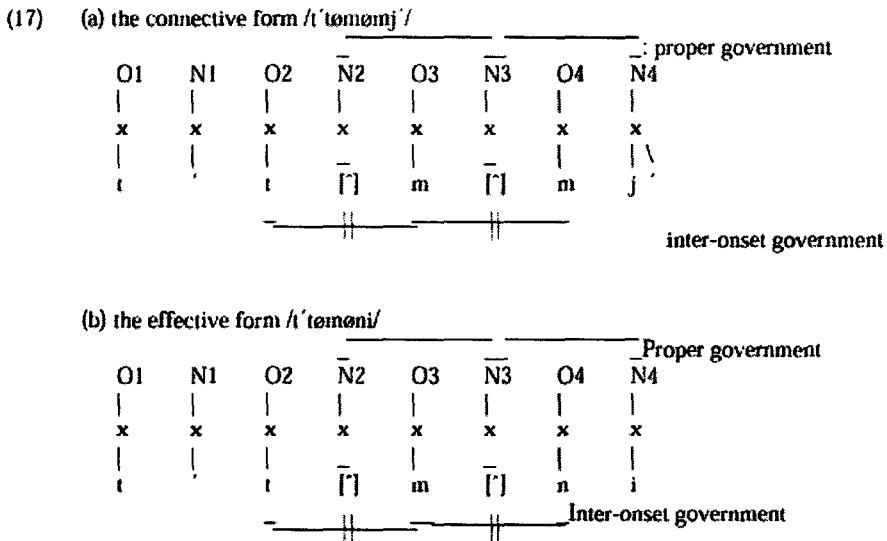


Regarding the lexical representations in (17), I assume that these two suffixes are non-analytic: no inner domains are involved between a stem and a suffix.11 Unlike the previous rule-based approaches, I assume that the underlying representation of the connective and the effective suffixes are /mj/ and /ni/, respectively (Heo 1995). In (17a) and (17b), the presence of the empty nucleus N3 between the stem and the suffix is due to the fact that Korean does not allow codas, as mentioned in section 3: the stem-final /m/ is syllabified as an onset followed by an empty nucleus. The empty nucleus N3 between two nasals, as in both (17a) and (17b), is not licensed, because

although it is properly governed the inter-onset governing relation between O3 and O4 is not satisfied: the segments involved in inter-onset government are of the same rank. That is, /m/ and /n/, in (a) and (b) respectively, cannot govern the preceding nasals /m/. Also, the empty nucleus N2 is not licensed for the same reason: it is properly governed but no inter-onset governing relation can be established between O2 and O3, precisely because the segments which occupy these two onsets are of the same rank. Thus, the phonetic forms [t't^m^mj'] and [t't^m^ni'] are derived.
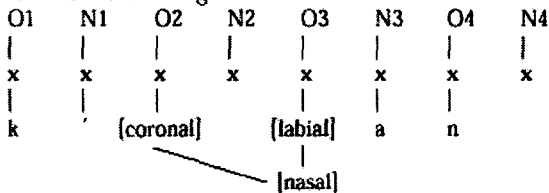
Finally, we discuss morpheme-internal NN sequences. By the assumptions made so far, there is also an empty nucleus between the two nasals here. Why does it not receive phonetic interpretation? I propose the following condition on morpheme-internal NN sequences.

(18) The Nasal Condition in Korean

```
        O      N      O
        |      |      |
        x      x      x
        |             |
     ([place])     [place]
         \            |
           \ ------ [nasal]
```

The Nasal Condition in (18) states that morpheme-internal NN sequences form a (partial) geminate in which the first member may contain its own place element, but lacks the nasal element, which it shares with the second member. Given the Nasal Condition, the word /k'nømanø/ has the representation, as shown in (19).

(19) /k'nømanø/ 'even though'

```
   O1    N1    O2    N2    O3    N3    O4    N4
   |     |     |     |     |     |     |     |
   x     x     x     x     x     x     x     x
   |     |     |           |     |     |
   k     '  [coronal]   [labial] a     n
                  \         |
                    \ --- [nasal]
```
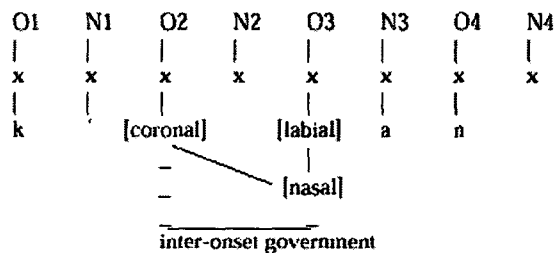
Let us compare (19) with (17). The structural differences between these two are clear: the nasals in (17) have a single association line each, but those in (19) are doubly-linked. In the literature (Hayes 1986 and Schein & Steriade 1986, among others), this doubly-linked structure has special properties one of which is integrity: geminates cannot be split by rules of epenthesis. Translating this insight into my analysis, this means that an intervening empty nucleus within a doubly-linked structure is always licensed. In fact, Kaye (1995: endnote 11) adopts this integrity notion into inter-onset governing domains, but does not give any explicit account of why an intervening empty nucleus in this domain does not receive phonetic interpretation. Seeking an appropriate

account of the licensed status of this empty nucleus, I rely on the Complexity Condition (Kaye et al. 1990: 218), which stipulates that a segment may govern if it has a complexity greater than its governee. The complexity of a given segment is calculated in terms of the number of elements occurring in its representation. Specifically, in (19), O3 contains the manner and the place elements, but O2 lacks the manner element: the nasal in O3 is more complex than that in O2. Accordingly, O3 can govern O2 and so the requirements of inter-onset government are met. The same account applies to a full geminate, since a governed onset is empty and its whole elements are provided by a governing onset.

What about proper government between N2 and N3? In the GP literature, there are no specific discussions on proper government within doubly-linked structures. However, in Gussmann & Kaye (1993) and Charette (1992), they explicitly argue that proper government and inter-onset government are independently required for the licensing of empty nuclei. In other words, if either type of government is satisfied, then the empty nucleus in question is licensed. This is different from Heo's (1995) analysis of the licensing of empty nuclei in Korean discussed in section 3.2, i.e. if either type of government is not met, then the empty nucleus is not licensed. The main point of Heo's analysis is that the failure of inter-onset government blocks the application of proper government. Thus, whenever the requirements of inter-onset government are not satisfied, a properly governable empty nucleus always receives phonetic interpretation: inter-onset government overrides proper government. In other words, the application of proper government is redundant once inter-onset government fails to be established. The same effect is observed when both types of government are satisfied, as in (14), i.e. when a properly governable empty nucleus is licensed when an inter-onset governing relation is established. This indicates that proper government is not necessary when inter-onset government is taken into account: these two types of government are independently active.12 The implication of this independence is that the satisfaction of inter-onset government within a doubly-linked structure is enough to license the intervening empty nucleus, as shown below.

(20) /k'nəmanə/ 'even though'

```
 O1    N1    O2    N2    O3    N3    O4    N4
 |     |     |     |     |     |     |     |
 x     x     x     x     x     x     x     x
 |     |     |           |     |     |
 k     '  [coronal]   [labial]  a    n
              __          |
                \    [nasal]
              __   /
      _____
      inter-onset government
```

# 5. Conclusion

This paper has dealt with the asymmetry in the occurrence of the vowel [^] in NN sequences in Korean. This asymmetry is captured by the Nasal Condition in which morpheme-internal nasals have doubly-linked structures. The doubly-linked structure satisfies the requirements of the ECP, hence the empty nucleus sandwiched between two nasals is licensed. In suffixation, however, due to the fact that a stem-final and a suffix-initial nasal have their own association lines, the requirements of the ECP, in particular, inter-onset government, are not met; accordingly the intervening empty nucleus must receive phonetic interpretation.

# Notes

1. The liquid [r] and [l] are distributed complementarily. I assume that /r/ is underlying in Korean. See Heo (1995) and Rhee & Heo (1998) for a detailed discussion of this matter.

2. The deletion of the stem-final liquid is due to a constraint which prohibits the sequence [ln] in Korean.

3. Note that the stem-final long vowel is shortened. For a government-based analysis of vowel-shortening, in this context, see Rhee (in progress).

4. The segmental inventory of Korean is as follows:
(A) Vowels: /i, e, E, u, o, ', a, ^/ (B) Consonants: (a) aspirated obstruents: /pH, tH, kH, cH (=tSH)/; (b) tensed obstruents: /p', t', k', c'(=tS'), s'/; (c) lenis obstruents: /p, t, k, c(=tS), s/; (d) nasals: /n, m, _/; (e) liquid: [r] or [l]; (f) glottal fricative: /h/

5. For a theoretical introduction to GP, see Kaye et al. (1985, 1990), Charette (1991), and Harris (1994), among others. The phonetic interpretation of empty nuclei varies from language to language: it is [^] in Moroccan Arabic (Kaye 1987); ['] in French (Charette 1988); [e] in Polish (Gussmann & Kaye 1993).

6. The Coda Licensing Principle:
A post-nuclear rhymal position must be licensed by a following onset.
The Onset Licensing Principle:
An onset head position must be licensed by a nuclear position.

7. The ECP in (2) differs in its formulation from that of Kaye (1995). One missing licensing condition in the ECP is 'magic-licensing' which is designed for s-C clusters in

Indo-European languages (Kaye 1992). This difference has no bearing on matters discussed in this paper.

8. In this paper, I adopt Kaye's proposal (1990: endnote 21) that proper government proceeds from right to left (i.e. head-final). Recently, however, Rowicka (1999) proposes that the direction of proper government is head-initial on the basis of the strict CV framework (Lowenstamm 1996). See Rhee (in progress) for a critical review of Rowicka's proposal. Also, note that I do not specify the nuclear projection at which proper governing relations are established, for representational convenience.

9. The segment /r/ becomes [l] when a following empty nucleus is licensed. This is due to a licensing constraint on empty nuclei in Korean: licensed empty nuclei can only follow a segment from the group [p, t, k, m, n, _, l].

10. In GP, segments are represented by elements. Unlike binary features, elements are 'privative' in that the distinction among segments is characterised as the presence vs. absence of an element in question (Kaye et al. 1990, Harris 1990, among others). A detailed discussion of segmental representations and governing hierarchy among consonants in Korean is beyond the scope of this paper. As we will see below in (18), the elements [nasal] and [place] are cover terms for the relevant elements in GP. Also, note that this governing hierarchy is different from Heo's (1995). See Rhee (in progress) for critical comments of Heo's governing hierarchy.

11. With respect to the morphology-phonology interface, GP recognises two types of suffixes: analytic and non-analytic (Kaye 1995). Analytic suffixation involves internal domains as [[stem] suffix]. Non-analytic suffixation does not contain internal domains: [stem suffix]. The lexical representations in (17) are, however, based on the claim that the distinction between stems and suffixes is necessary also in non-analytic suffixation: stem-final and suffixal nasals have their own association lines. For a more detailed discussion, see Rhee (in progress).

12. This independency follows the fact that proper governing relations are established at the level of nuclear projection and inter-onset governing relations at the level of onset projection. See Rhee (in progress) for a detailed discussion on how proper government and inter-onset government interact in Korean.

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