The realisation of final schwa in NK loanword phonology*

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1. Introduction

North Kyungsang Korean (henceforth NK) is spoken in the south-eastern area of the Korean peninsula. Unlike Standard Korean (henceforth SK) spoken in Seoul, NK is prosodically a pitch-accent language.[1] This is the synchronic reflex of Middle Korean, which is known to have been a tone language. The vowel systems of NK and SK are given in (1).

(1) The vowel systems of NK and SK
   a. NK: /i, e, a, u, o, ə/
   b. SK: /i, e, ɛ, a, u, o, ə, ɨ/

Note in (1) that /e, ɛ/ and /ə, ɨ/ in SK are neutralised as /e/ and /ə/, respectively, in NK. In SK, the vowel /ɨ/ is involved in ɨ/zero alternations under suffixation and epenthesis in loanword adaptation. This vowel is treated as underlyingly empty in Underspecification Theory (Sohn 1987) and in Government Phonology (henceforth GP, Rhee 2002). Since SK /ə, ɨ/ are neutralised as /ə/ in NK, there are ə/zero alternations under suffixation and ə-epenthesis in loanwords in this language.

Regarding the phonological behaviour of the schwa in NK, this paper addresses two topics: (i) the underlyingly representation of schwa and (ii) an appropriate account of the occurrence of final schwa in English loanwords ending in a stop. The first question is whether or not different underlying representations are required for schwas in NK that correspond to /ə/ and /ɨ/ in SK. If so, one of the advantages is that we can analyse the epenthetic schwa in NK loanwords in the same way as [ɨ] in SK. The second topic relates to the occurrence of final schwa in English loanwords ending in a stop. Since NK, like SK, does not allow complex onsets and codas, multiple ə-epenthesis occurs when words from a language with complex syllabic constituents, such as English, are adapted in NK. It is observed that different patterns emerge in loanwords ending in a single stop and in those ending in a consonant cluster with a final stop. In the former, three strategies are observed (the epenthetic schwa is underlined): (i) forms without final schwa, e.g. *group*

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[kə̲ru:p], *[kə̲ru:p^{h}ə̲]; (ii) forms with final schwa, e.g. *rope* [ro:p^{h}ə̲], *[ro:p]; and (iii) alternating forms with or without final schwa, e.g. *cut* [k^{h}ət] or [k^{h}ət^{h}ə̲]. In these cases, the occurrence of final schwa is *optional* in the sense that its occurrence differs among individual loanwords. In case of words ending in a sonorant-stop cluster, the occurrence of final schwa is *obligatory*, e.g. *tent* [t^{h}ent^{h}ə̲], *[tent], *[t^{h}ənə̲t]; *salt* [solt^{h}ə̲], *[solt], [sor̲ət].[2] We will explore the reason why different patterns are observed regarding the occurrence of final schwa.

This paper is organised as follows: In Section 2, umlaut in suffixation provides evidence that different lexical representations are required for schwas corresponding to /ə/ and /ɨ/ in SK. In Section 3, the basic facts of English loanwords in NK are presented to show how schwa is inserted in internal and final position. In Section 4, an analysis of the distribution of final schwa in loanwords is discussed. The notion of *government-licensing* (Charette 1991) provides an adequate account of the obligatory realisation of final schwa in loanwords ending in consonant clusters with a final stop. The final section summarises this paper.

2. The treatment of /ə/ in NK: Umlaut in suffixation

In comparison to SK, one of the interesting facts of NK phonology is that it has no surface distinction between [ɨ] and [ə]. That is, this vowel acts as a lexical vowel in SK (henceforth schwa-1). As the schwa corresponding to [ɨ] in SK (henceforth schwa-2), this vowel is not only subject to ə/zero alternation in suffixation, e.g. /ka-si/ 'to go-HON' [kasi], /ka-ni/ 'to go-EFF' [kani], /ka-mjə/ 'to go-CON' [kamjə]; /cap-si/ 'to hold-HON' [capəsi], /cap-ni/ 'to hold-EFF' [capəni], /cap-mjə] 'to hold-CON' [capəmə],[3] but it also emerges as an epenthetic vowel in loanwords, as was observed above (the schwa-2 is underlined.). In fact, the distribution of schwa, exhibiting ə̲/zero alternations in suffixation, is the same as that of /ɨ/ in SK, as shown below.

(2)

Stem		/si/	/ni/	/mjə/	
/ca/	NK	[casi]	[cani]	[camjə]	'to sleep'
	SK	[casi]	[cani]	[camjə]	
/u:l/	NK	[u:si]	[u:ni][4]	[u:lmjə]	'to cry'
/ul/	SK	[usi]	[uni]	[ulmjə]	
/cap/	NK	[capə̲si]	[capə̲ni]	[capə̲mjə]	'to hold'
	SK	[capɨsi]	[capɨni]	[capɨmjə]	

Rhee (2002) proposes that the underlying representation of /ɨ/ in SK is an empty nucleus. The phonetic interpretation of empty nuclei is regulated by the Empty

Category Principle (henceforth ECP, Kaye 1995), which is assumed to be part of UG. This implies that the schwa in (2) can be treated in the same way as /ɨ/ in SK, i.e. this vowel is underlyingly empty.

Choi (1978) observes that schwas in stems behave differently regarding umlaut in suffixation in NK, as shown below.

(3) a. Schwa-1

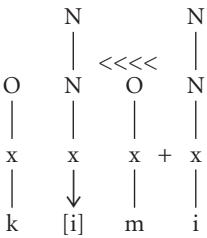
i.	/kəp/ 'fear' + /i/ 'NOM'	[kepi]
ii.	/pəs/ 'to take off'+ /ki/ 'CAUS'	[pekk'i]
iii.	/sə/ 'to stand' + /iu/ 'CAUS'	[seu]

b. Schwa-2

i.	/kə̲m/ 'line' + /i/ 'NOM'	[kimi]
ii.	/k'ə̲rh/ 'to boil' + /i/ 'CAUS'	[k'iri]
iii.	/k^{h}ə̲/ 'to grow' + /iu/ 'CAUS'	[k^{h}iu]

The first two types of umlaut, as in (3a-i–ii), (3b-i–ii), show different phonetic outputs of a stem-final schwa, viz. [e] and [i] in (3a,b), respectively. Also, in the third type (iii), vowel fusion and ə̲-deletion are observed in (3a,b), respectively. These two processes are probably due to the avoidance of vowel-hiatus. Regarding the umlaut forms in (3a-i, -ii) and vowel fusion in (3a-iii), the surface vowel [e] can be analysed as the result of the spreading of the feature [−back] in a feature framework or the spreading of the palatal or front element I in element-based theoretical frameworks (see Harris 1994 for GP, Anderson & Ewen 1987 for Dependency Phonology). If we were to posit a single underlying representation of the schwa in NK as /ə/, with respect to the forms in (3b), it would be difficult to derive the surface vowel [i]. In other words, the umlaut facts suggest that the two /ə/s should be underlyingly represented in a different way, e.g. by specifying one as a lexical vowel /ə/, for (3a), and the other as an empty nucleus, for (3b). Indeed, if we treat the latter as an empty nucleus, the realisation of [i] in umlaut outputs can be accounted for directly without additional mechanisms. Umlaut is then simply analysed as the spreading of the segmental content of the trigger vowel /i/ to the preceding empty nucleus on the nuclear projection (Kim 1996). The result is the vowel [i], as shown below.

(4) /kØm + i/ 'line-NOM' [kimi] (Ø: empty nucleus)



Regarding ə̲-deletion in (3b-iii), this is due to the avoidance of vowel-hiatus whereby the preceding empty nucleus is deleted, i.e. /k^hØ + iu/ [k^hiu]. In such a context, it is assumed that the empty nucleus rather than the lexical vowel is deleted.

One of the advantages of setting up two different underlying representations of the neutralised schwa in NK is that we can analyse schwa-2 in NK loanwords in terms of the ECP, in the same way as the vowel [ɨ] in SK. The only difference in the postulation of empty nuclei between NK and SK is that the phonetic realisation of empty nuclei is [ə̲] rather than [ɨ]. In the next section, we will introduce some basic facts of English loanwords in NK, paying particular attention to the distribution of schwa-2.

3. Basic facts of English loanwords in NK

First consider the occurrence of non-final schwa-2 in English loanwords containing branching onset clusters.

(5) a. Branching onset: Cr cluster
printer [p^hə̲rint^{h}ə] *training* [t^hə̲reiniŋ]
crew [k^hə̲ru:]
b. Branching onset: Cl cluster
plan [p^hə̲llen] *clean* [k^hə̲lli:n]

Schwa-2s occur between an obstruent and a liquid. This is due to the fact that native NK, like SK, does not allow branching onsets. It is reasonable to assume that the occurrence of schwa-2 in these contexts is motivated by the preservation of the segmental identity in the source language, as formalised in the *Preservation Principle* (Paradis & Lacharité 1997). With respect to internal coda-onset clusters from English, however, we do not observe the occurrence of schwa-2 between these two consonants, as shown in (6). Thus, the presence vs. absence of schwa-2 is sensitive to whether or not consonant clusters in the source language form a coda-onset sequence.

(6) a. liquid-obstruent cluster
elbow [eløpou] *building* [piløtiŋ]
b. nasal-obstruent sequences
camping [k^hemøp^{h}iŋ] *centre* [senøt^{h}ə]
(ø: absence of schwas)

Regarding schwa-2s in final position, let us consider sonorant-final English loanwords. We observe that schwa does not occur in this position.

(7) a. nasal-final words
dam [tem] *pen* [p^hen]
king [k^hiŋ]
b. l-final words
hotel [hot^{h}el]

The absence of schwa-2 in this position can be attributed to the Coda Condition in NK and SK. In both languages, only [m, n, ŋ, l, p, t, k] can occur in the coda. In the native phonology, if other segments occur, they undergo neutralisation to become one of these seven segments.[5] In the loanword phonology, for fricative-final and affricate-final English words, we observe the occurrence of final schwa-2, which indicates that the loanword phonology is different from the native phonology which do not allow no words ending in schwa-2.

(8) a. s-final and z-final words
bus [pəsə̲] *cheese* [cʰicə̲]
b. f-final and v-final words
beef [piːpʰə̲] *live* [raipə̲]
c. ʃ-final and ʒ-final words
sash [sɛsi̲][6] *beige* [peici̲]
d. t-final words
mouth [mausə̲]
e. tʃ-final and dʒ-final words
coach [kʰoucʰi̲] *college* [kallici̲]

The occurrence of [ə̲] or [i̲] in final position can be motivated by the Preservation Principle. Without final vowels, final consonants would undergo neutralisation, which would make loanword outputs indistinguishable from native ones, e.g. /pəs/ 'friend' [pət], *bus* [pəsə̲]; /təcʰ/ 'trap' [tət], *Dutch* [təcʰi]. In this sense, the occurrence of schwa-2 is obligatory in the data in (8).

Finally, let us consider stop-final English words.

(9) a. p-final words
i. *chip* [cʰip] *[cʰipʰə̲] ii. *rope* *[roːp] [roːpʰə̲]
iii. *type* [tʰaip] [tʰaipʰə̲]
b. t-final words
i. *asset* [eset] *[esetʰə̲] ii. *beat* *[piːt] [pitʰə̲]
iii. *diskette* [tisə̲kʰet] [tisə̲kʰetʰə̲]
c. k-final words
i. *trick* [tʰə̲rik] *[tʰə̲rikʰə̲] ii. *knock* *[nok] [nokʰə̲]
iii. *check* [cʰek] [cʰekʰə̲]
d. b-final words
i. *tab* [tʰep] *[tʰepə̲] ii. *hub* *[həp] [həpə̲]
e. d-final words
ii. *grid* *[kə̲rit] [kə̲ritə̲]
f. g-final words
i. *big* [pik] *[pikə̲] ii. *league* *[liːk] [liːkə̲]

Three types of phonetic forms in each example set are illustrated: type (i) allows forms in which [ə̲] does not occur, type (ii) allows forms in which this vowel occurs in the final position, and type (iii) allows either of the two forms. Contrary to (7)

and (8), it appears that the occurrence of [ə̲] in final position is arbitrary or optional in the sense that in the same environment this vowel occurs in some examples, but not in others. One generalisation that could be said to hold is that type (iii) is not allowed for voiced stop-final words, and that, in particular, only type (ii) is allowed in d-final words.

In comparison to (9), the occurrence of final schwa-2 is different in loanwords ending in a coda-onset cluster with a final stop, where it is obligatory. The relevant data concern final clusters such as *mp*, *lp*, *nt*, *ld* and so on, as shown below.

(10)	*pulp*	[pʰəlpʰə̲]	*cult*	[kʰəltʰə̲]	*milk*	[milkʰə̲]
			guild	[kiːltə̲]		
	camp	[kʰempʰə̲]	*tent*	[tʰentʰə̲]	*bank*	[peŋkʰə̲]
			land	[lendə̲]		

In (10), forms without final schwa-2 like *camp* *[kʰempʰ], *[kʰemə̲p], *[kʰemp] are ill-formed. In order to capture the optional occurrence of [ə̲] in (9), some analyses of loanwords in SK, such as that proposed by Kang (1996), among others, introduce the feature [±release] and formalise the faithfulness constraint IDENT-IO(release). Recall that the distribution of final [ɨ] in SK is the same as that of final schwa-2 in NK. If we now look at a contrasting pair such as *cup* [kʰəp] and *rope* [lopʰɨ] in SK, the optional occurrence of the vowel [ɨ] in this pair is controlled by encoding the release feature in the inputs. Thus, to evaluate the optimal forms, *cup* and *rope* have [−release] and [+release] in inputs, respectively.

However, the specification of the feature value [release] in input forms is arbitrary in the sense that the relevant feature value is determined by individual words. Furthermore, this analysis overlooks the distinction between the obligatory and the optional occurrence of the vowel [ɨ] in final position, by ignoring the fact that the presence or absence of a coda-onset cluster determines the obligatory occurrence of the following vowel [ɨ]. Accordingly, this analysis does not provide an adequate account of the reason why /pʰ/ in *camp* must have the feature [+release] and /pʰ/ in *rope* and *cup* can contain either [−release] or [+release]. In the next section, we present a principles-and-parameters account and argue that this approach provides a better explanation.

4. An alternative analysis: Government-licensing

As discussed in Section 2, the schwa-2 corresponding to [ɨ] in SK shows the same phonological behaviour regarding its distribution in mono-morphemic words and in suffixation. This indicates that we can treat the schwa-2 in the same way as the vowel [ɨ] in SK. Regarding the syllable structure of NK, following Rhee (2002), we assume that, like SK, NK has neither branching onsets nor branching rhymes. The

occurrence of the schwa-2 in mono-morphemic words is represented by an empty nucleus, and surface consonant clusters are syllabified as two onsets where an empty nucleus intervenes. Furthermore, 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).[7] Consider, for instance, the phonetic form [kot̲ər̲ə̲m] 'icicle' and its lexical representation /kotØ$_1$rØ$_2$mØ$_3$/ (Ø: empty nucleus). There are three empty nuclei in the lexical representation. If we assume that the phonetic realisation of an empty nucleus is [ə̲] in NK, we must determine when these empty nuclei are phonetically realised. With respect to this, GP provides an account based on the ECP:

(11) The Empty Category Principle
A licensed (empty) category receives no phonetic interpretation under the following circumstances:
a. Domain-final (empty) nucleus licensing parameter
b. Nuclei within an inter-onset domain are licensed.

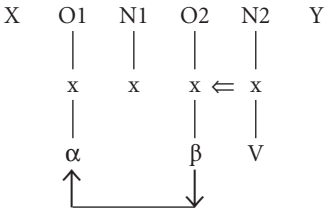
The ECP dictates that an empty nucleus is not interpreted if it is licensed. The licensing conditions for empty nuclei vary, depending on the position of the nucleus. The condition in (11a) is a parameter: some, but not all, languages license domain-final empty nuclei. A language which has consonant-final 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 Bemba and Italian), final empty nuclei are not licensed and therefore must be interpreted. Words in these languages must end in a vowel.

With respect to the licensing of internal empty nuclei, Rhee (in prep.) argues that head-final inter-onset government together with the notion of government-licensing are required to account for the licensing of internal empty nuclei. The definition of government-licensing is as follows:

(12) Government-licensing
For a governing relation to hold between a non-nuclear head α and its complement β, α must be government-licensed by its nucleus.
(Charette 1991: 101)

Government-licensing states that an onset head should be licensed by a following nucleus in order to govern its complement. This nucleus is called a government-licenser. The licensing conditions of internal empty nuclei are as follows:

(13) Licensing Condition for Internal Empty Nuclei



inter-onset government (⇐: government-licensing, V: vowel)

N1 is licensed iff

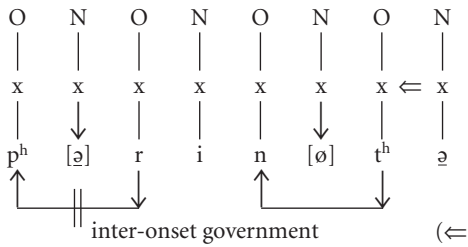
a. O2 governs O1
b. N2 must be unlicensed (i.e. with phonetic content).

There are two requirements for the licensing of the internal empty nucleus N1 in (13): O2 must have an appropriate governing property to govern its preceding onset in (13a) and O2 must be government-licensed by a following unlicensed nucleus in (13b). If either of the two is not met, then N1 is not licensed and must receive phonetic interpretation as [ə̲] in NK. The following governing hierarchy determines governing properties among segments (see Rhee (2002) for a motivation of this hierarchy):

(14) Governing Hierarchy
   a. liquid < nasal, lenis obstruent < tensed or aspirated obstruent
   b. Mutual government is not allowed for segments of the same rank.

In English loanwords in NK, head-final inter-onset government can account for the asymmetrical distribution of schwa-2 between surface complex onsets and coda-onset clusters in the source language. Though a potential government-licenser is available, the presence of schwa-2 in (5) is due to the failure of inter-onset government, i.e. liquids cannot govern plosives. Its absence in (6) is ascribed to the satisfaction of the requirements in (13), i.e. obstruents can govern preceding liquids and aspirated obstruents can govern nasals as in (6a) and (6b), respectively and, a following government-licenser is available. (15) illustrates how the conditions in (13) explain the occurrence of schwa-2, with the example *printer* where one empty nucleus is phonetically realised and the other is not.

(15) *printer* [pʰə̲rintʰə]



We now turn to loanwords ending in a stop. We have observed three patterns of occurrence of final schwa-2 in those loanwords: (i) presence, (ii) absence, (iii) alternation. It has been argued that the occurrence of schwa is optional or arbitrary, in the sense that it is determined by individual words. This implies that the presence/absence of the final schwa-2 may not be accounted for by phonological mechanisms. One possible way to treat the distribution of the final schwa-2 in these loanwords is that they are individually listed in the lexicon, i.e. the occurrence of final schwa-2 is encoded in the underlying representations of the loanwords in question.

Loanwords with final schwa-2 behave differently from those without. As Rhee (2002) points out, the latter participate in native phonological activities in suffixation but the former do not. For instance, for the word *web* [wep], the stem-final /p/ becomes [m] when a nasal-initial suffix follows, e.g. /wepØ/ + /manØ/ 'only' [wemman], like the native word /kəpØ/ 'fear' + /manØ/ [kəmman]. However, for the word *pipe* [pʰaipʰə̲], such nasalisation is not observed, e.g [pʰaipʰə̲man]. In other words, loanwords without final schwa-2 behave in the same way as the native words.

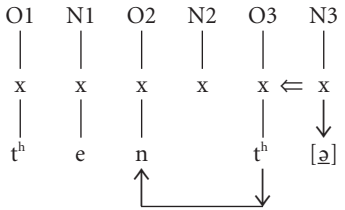
With respect to English words ending in a single voiceless stop, we find the same phonological pattern. Their corresponding loanwords without final schwa-2 are subject to relevant native phonological processes. For instance, the phonetic form of the word *cup* is [kʰəp] in isolation and it is realised as [kʰəmman] when the suffix /manØ/ follows. In this case, the question arises as to what is the underlying segment for the stem-final *p*. As noted in endnote 2, English voiceless stops are adapted as aspirated in NK. For the word *cup*, the initial stop is realised as [kʰ] in the loanword output. Likewise, if the stem-final segment is postulated to be /pʰ/, then it undergoes nasalisation to become [kʰəmman], just like the native word /ipʰØ/ 'leaf' and its suffixal output [imman]. However, this analysis faces a problem in nominative suffixation. The corresponding nominative forms are [kʰəpi] and [ipʰi], respectively. Note that the segmental identity of the stem-final consonant is realised without any changes in the native word. If we assume that the underlying representation of the word *cup* is /kʰəpʰØ/, then a de-aspiration process of the stem-final segment is needed before the nominative suffix /i/, in order to derive the correct phonetic form. Hence, the implementation of the de-aspiration process for loanwords is not well-motivated. Rather, this process is the result of a lexicalised

process in the sense that this process is not visible in the loanword phonology. The stem-final consonant of *cup* is stored as a lenis stop in the lexicon.

Furthermore, *t*-final English loanwords show an interesting phenomenon in the nominative suffixation. In isolation, for instance, the word *cut* is realised as [k^hət] and as [k^həsi] in the nominative form. We observe the alternation between [t] and [s]. As discussed above, the segmental identity of the stem-final consonant is preserved before the nominative suffix /i/. Thus, if we assume that the stem-final consonant is /s/ for the word *cut*, then we can provide an adequate account of this alternation, i.e. /s/ becomes [t] in final position (see endnote 5). This is a plausible analysis, since /s/ becomes [t] in the same context in the native phonology of NK as well as SK, e.g. /pəsØ/ 'friend' [pət]. What t-final loanwords suggest is that the segmental change from *t* in the source language to /s/ in the host language cannot be dealt with by phonology. For these reasons, we propose that the presence/absence of the final schwa-2 in loanwords ending a single stop is a lexical matter.

While loanwords ending in a single stop exhibit optional realisation of the final schwa-2, those ending in a consonant cluster with a final stop show obligatory realisation, as we have seen in (10) above. Let us consider the word *tent* [t^hent^{h}ə̲].

(16) /t^hent^{h}Ø/ [t^hent^{h}ə̲] *tent*



inter-onset governmnet (⇐: government-licensing)

In (16), there are two possible sites for phonetic interpretation of empty nuclei in question, i.e. N2 and N3. Realising the former would result in [t^henə̲t] and realising the latter [t^hent^{h}ə̲]. In fact, the phonetic interpretation of N2 follows the native phonology in that the final empty nucleus in NK is licensed due to the parameter-setting, as discussed in (11). That is, even though /t^h/ can govern the preceding /n/, a licensed empty nucleus cannot act as a government-licenser which licenses the preceding onset to govern its complement, as in /sirØmØ/ 'anxiety' [sirə̲m] where /m/ can govern a preceding /r/. In the phonetic form, note that the final consonant /t^h/ undergoes neutralisation to become [t]. In the latter, we note that the occurrence of the final schwa-2 overrides the domain-final parameter so that the inter-onset governing relation between O2 and O3 remains intact. In this form, the final [ə̲] can act as a government-licenser and so the intervening empty nucleus N2 is licensed. Obviously, as noted in (6) where internal coda-onset clusters of the source language are preserved, the native NK speakers perceive that the phonetic [t^henə̲t]

is not phonetically similar to the form of the source language, since the schwa-2 intervenes the coda-onset sequence.[8] The phonetic interpretation of N3 prevents the occurrence of [ə̲] in N2 and so sustains the identity of the consonant sequence, which makes the phonetic form similar to that of the source language.

In this sense, the motivation of the phonetic interpretation of the final empty nucleus in (16) is different from that of the cases shown in (8). Both cases have in common the obligatory realisation of the final empty nucleus due to the preservation of its preceding onset, but the role of the unlicensed final empty nucleus is different in that it acts as a government-licenser in the former but as a licenser of a preceding consonant in the latter case.

5. Summary

This paper addressed two topics in NK loanword phonology: i) how to treat the neutralised schwa underlyingly in NK phonology and ii) how to provide an appropriate account of the occurrence of the final schwa-2 in English loanwords ending in a stop. Regarding the first issue, umlaut in suffixation provides evidence that the neutralised schwa has two distinct underlying representations, i.e. the lexical schwa and an empty nucleus of which the phonetic interpretation is [ə̲] if certain conditions are met. For the latter, one of the advantages is that the occurrence of the epenthetic schwa in loanwords can be treated in the same way as in the occurrence of [ɨ] in SK in terms of the ECP.

We have observed that the distribution of the final epenthetic schwa is different in loanwords ending in a single stop and those ending a coda-onset cluster with a final stop. In the former, its occurrence is a lexical matter. In the latter, however, it is obligatory in that the presence of the final schwa serves for the segmental preservation of preceding consonant sequences of the source language. The phonological role of this vowel is attributed to the notion of government-licensing.

Notes

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1. See Kim (1997) for pitch-accent assignment in native NK within the framework of Optimality Theory and Kenstowicz & Sohn (2001) for pitch-assignment in English loanwords.

2. The consonantal inventory of NK is as follows (Kim 1997):
(a) aspirated obstruents: /p^h, t^h, k^h, c^h (=$tʃ^h$)/; (b) tensed obstruents: /p', t', k', c' (= tʃ')/; (c) lenis obstruents: /p, t, k, c (= tʃ), s/; (d) nasals: /n, m, ŋ/; (e) liquid: [r] or [l]; (f) glottal fricative: /h/.

3. The following abbreviations of suffixes are used in this paper.

HON	Honorific	EFF	Effective	CON	Connective
NOM	Nominative	CAUS	Causative		

4. l-deletion in the honorific and the effective forms is due to the phonotactic constraints *ls and *ln in Korean.

5. All coronal obstruents, i.e. /t', t^h, c, c', c^h, s/ become [t]. Labial and dorsal obstruents, i.e. /p', p^h, k', k^h/ become [p] and [k], respectively. In the Korean phonology literature, this process is called *neutralisation*.

6. The prime motivation why [i] occurs in this context is to distinguish coronal fricatives from palato-alveolar affricates and fricatives.

7. 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.

8. In terms of the number of repair operations, this can be accounted for the fact that the phonetic form [t^hent^{h}ə̲] requires a single phonological operation, i.e. the realisation of the final empty nucleus N3, but the latter forms needs two operations, i.e. the phonetic interpretation of N2 and neutralisation. Obviously, fewer operations are favoured in the sense of the *Minimality Principle* proposed by Paradis & Lacharité (1997).

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