

Transfer of Korean Manner Assimilation to English

Mi-Hyun Kim
(University of Hawaii at Manoa)

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The purpose of this study is to examine the transfer of manner assimilation phenomena from Korean into English. The data from this study showed that three types of manner assimilation in Korean are not transferred to the same degree. That is, obstruent-nasalization and lateralization were readily carried over to the subjects' interlanguage, while the transfer of liquid-nasalization was noticeably low. Following the positional faithfulness of the syllable onset, liquid-nasalization is considered to be a marked phenomenon. Recent transfer studies have found that phonetically motivated processes, such as obstruent-nasalization and lateralization, are more easily carried over to the target language than the lexically restricted morphophonological processes like liquid-nasalization. This suggests that the reason for the discrepancy in transfer rates lies in the difference of status among the three processes, tempered by a morphophonological rule of avoidance of word-initial liquids, which in turn implies that the syllable contact constraint is not the only reason for manner assimilation in Korean.

Key words: obstruent nasalization, liquid nasalization, lateralization, transfer, avoidance of word-initial liquid, syllable contact constraint

1. Introduction

The influence of the native language (NL henceforth) in foreign language acquisition can be found in every aspect of the target language (TL henceforth) production. Phonological interference is detected easily and the NL of foreign language learners can often be identified by their TL speech production. Moreover, phonological interference of NL in TL production has been found from simple segment substitutions to phonological processes (see Major, 2001).

Among the various types of phonological transfer that can occur, this study examines the phonological processes, focusing on the transfer of

three types of manner assimilation in Korean: (a) nasalization¹⁾ of obstruent before nasal, or obstruent nasalization (o-nasalization henceforth); (b) liquid nasalization, which is nasalization of both preceding obstruent and following liquid (l-nasalization henceforth); and (c) lateralization of alveolar stop before liquid. The premise of the study is that if the three manner assimilation processes are the same in their linguistic nature, they will transfer to TL to the same degree.

In order to see the interference, English was selected as a TL because nasalization and lateralization do not occur as mandatory processes in English. In English, when a stop is followed by a nasal or a liquid, the compressed air normally either goes through the nasal passage by the lowering of the soft palate, or it goes through the lateral passage by the lowering of the sides of the tongue. For example, *topmost* can be produced as [tʰɑp.mʊstʰ] and *bad light* can be produced [bæd.laɪtʰ]. The voiceless stops /p, t, k/ are sometimes replaced by a glottal stop [ʔ], and /nɑt. maɪn/ becomes [nɑʔ.maɪn] for *not mine*. Voiced obstruents such as /d, v, z, ð/ can be nasalized by the following nasals in rapid speech. However, this is not mandatory, and is often regarded as a non-standard variation (Cruttenden, 2001; Ladefoged, 2001). Thus, nasalization or lateralization by learners of English as a foreign language can be accounted as a NL transfer or other interference that is not from English.

In a recent study of phonological transfer, Kang and Lee (2001) carried out an English word production experiment with 20 Korean high school students. The students were asked to read ten English words/phrases: *stop me*, *submit*, *good news*, *at noon*, *dark night*, *book maker*, *big mistake*, *hot money*, *big nose*, and *good meal*. Kang and Lee found that more than 70% of the obstruents in 'obstruent+nasal' sequences were nasalized. This result indicates that o-nasalization is easily transferred in English production by Korean speakers. In other words, o-nasalization is a linguistically unmarked phenomenon which can occur when an environment for the process is provided. However, their study did not include the cases of l-nasalization or lateralization of an alveolar stop. Thus it is still unknown how native Korean speakers produce the sequence of 'obstruent+liquid' in English.

This paper is structured as follows. First, the three types of assimilation

1) Throughout the rest of this paper, nasalization will indicate the assimilation of consonants to nasals rather than the nasalization of vowels before nasal consonants.

that are mandatory in Korean will be described. Next, a hypothesis regarding TL production will be proposed. In the *Method* section, descriptions of subjects, survey instruments, and the procedure of this study will be given. The research question will be answered in the *Results* section. Finally, the results with theoretical accounts for the manner assimilation phenomena will be discussed followed by a conclusion.

2. Manner Assimilation in Korean

Manner assimilation refers to the nasalization and the lateralization of oral consonants that are affected by following nasals and liquids. In Korean, two types of nasalization and a lateralization are observed as will be described in the examples below. These phenomena occur in natural speech whenever an appropriate environment is given. They always take place between the coda (or syllable-final consonant) of a preceding syllable and the onset (or syllable-initial consonant) of a following syllable, and may occur either within a word or across a word boundary (Ahn, 1998; Park, 1998; Kim, 2001).

2.1. Obstruent Nasalization

Nasalization of obstruents before nasals /m, n/,²⁾ or obstruent nasalization, is a very characteristic process in Korean as shown in (1):

(1) a. /pap.mas/ ³⁾	[pam.mat [˚]]	‘appetite’
b. /nat.mal/	[nan.mal] ⁴⁾	‘word’
c. /kuk.mul/	[kuŋ.mul]	‘broth’
d. /ap.nal/	[am.nal]	‘future’
e. /cac.na.mu/	[can.na.mu]	‘pine tree’
f. /han.kuk#nam.ca/	[han.guŋ.nam.ca] ⁵⁾	‘Korean man’

2) /ŋ/ cannot occur in the onset position of a syllable.

3) In this paper, ‘.’ indicates a syllable boundary and ‘#’ indicates a word boundary.

4) After the application of nasalization, place assimilation may take place. Thus the final phonetic form can also be [nam.mal].

5) The final phonetic form can be [haŋ.guŋ.nam.ca].

2.2. Liquid Nasalization

Liquid nasalization is also a mandatory process in Korean, but this is quite different from *o*-nasalization. In *l*-nasalization, nasalization is resulted without any nasals involved. As seen in (2), neither a coda nor an onset is a nasal sound as a phonemic form, but their phonetic outputs are both nasals:

- | | | |
|------------------|---------------|------------------------|
| (2) a. /kuk.lan/ | [kuŋ.nan] | 'national disaster' |
| b. /pɔp.ljul/ | [pɔm.njul] | 'law' |
| c. /t'ɜk.la.mjn/ | [t'ɜŋ.na.mjn] | 'ramen with rice cake' |

2.3. Lateralization

When an alveolar coda is followed by a liquid onset, lateralization occurs as in (3):

- | | | |
|-----------------------|----------------|------------------------|
| (3) a. /ti.kɨt#li.ɨl/ | [ti.gɨl.li.ɨl] | 'ㄷ ㄹ' (Korean letters) |
| b. /ot#lo.pi/ | [ol.lo.bi] | 'clothing lobby' |

L-nasalization, however, is also possible as in (4):

- | | |
|-----------------------|----------------|
| (4) a. /ti.kɨt#li.ɨl/ | [ti.gɨn.ni.ɨl] |
| b. /ot#lo.pi/ | [on.no.bi] |

In the next section, we will see how the three phenomena are theoretically accounted for.

3. Syllable Contact Constraint Accounts for Manner Assimilation

3.1. Syllable Contact Constraint

As seen above, manner assimilation occurs in the sequence of 'obstruent + nasal/liquid'. Many theories and rules have been used to explain the phenomenon, and since Vennemann's syllable contact law was introduced in 1988, the sonority difference between coda and onset has been argued for as a fundamental cause of manner assimilation. Also, the syllable contact law has contributed to accounting for the directional asymmetry

of assimilation which has been the most problematic in explaining the phenomenon.

Sonority refers to resonance in the vocal tract. As sonority increases, the sound becomes louder (Spencer, 1996; Ladefoged, 2001). Furthermore, the sonority of language sounds has a hierarchy, and the scale from the least sonorous to the most sonorous can be written as in (5) below (Clements, 1990; Spencer 1996):⁶⁾

(5) Obstruents < Nasals < Liquids < Glides < Vowels

It is now generally accepted that the more sonorant a consonant is, the weaker that consonant is. This means that obstruents are the strongest consonants whereas glides are the weakest. Cross-linguistically, more sonorous sounds occur in a syllable-final position than in a syllable-initial position. For example, a syllable structure of English word like *say*, where the onset is a stop and the coda is a glide, is more common across languages than *yes*, where the onset is a glide and the coda is a stop (Clements, 1990; Abrahamsson, 2001).

It has been noted that sonority also plays an important part in the relationship between syllables. Vennemann (1988) claimed that the codas of preceding syllables should be weaker than the onsets of following syllables and suggested a syllable contact law, as in (6):

(6) Syllable contact law (Vennemann, 1988, p. 40)

A syllable contact A\$B is the more preferred, the less the Consonantal Strength of the offset A and the greater the Consonantal Strength of the onset B.

The syllabifications of German names /var\$ta/ *Wartha* and /ta\$tra/ *Tatra* are good examples of the syllable contact law. When /r/ and /t/ abut at a syllable boundary, /r\$t/ is preferred to /t\$r/, because /r/ is weaker than /t/ and a weaker consonant is preferred at a coda position.

The concept of weak and strong consonantal strength in Vennemann's law was later inverted in terms of the sonority, and Vennemann's syllable

6) In Clements (1990) and Spencer (1996), obstruents are divided into stops and fricatives, in which stops are lower than fricatives in sonority. However, in this study, this distinction is not directly relevant, and thus the more general term, 'obstruents', will be used.

contact law has been rewritten in terms of sonority as the syllable contact law (Kim, 2001), the sonority condition (Cho, 1997), and the syllable contact constraint within the framework of Optimality theory as shown in (7) (Davis & Shin, 1999):

- (7) SyllCon (Davis & Shin, 1999, p. 290)
 Avoid rising sonority over a syllable boundary.

The constraints state that the sonority of a coda should not be lower than that of the following onset.

The application of the syllable contact constraint is well observed cross-linguistically. That is, in many languages, when two syllables meet and the sonority of the coda is lower than that of the following onset, an adjustment of sonority between the two consonants is necessary. Rice (1992, p. 70) illustrates four repair strategies found in various languages: (a) *Epenthesis*. In Ponapean, an Austronesian language, when coda consonants /d, t, s/ meet onset sonorants /n, r, l/, a vowel is inserted between two consonants to avoid sonority rising. For example, /rot rot/ → /rotorot/ 'dark'. (b) *Metathesis*. In Sidamo, a Cushitic language, when the sonority of the coda is lower than that of the onset, the two consonants change places. For example, /gud nonni/ → /gundonni/ 'they finished'. (c) *Consonant deletion*. In Diola-Fogny, a Niger-Congo language, the coda is deleted before more sonorant onset. For example, /ujuk ja/ → /ujuja/ 'if you see'. (d) *Assimilation*. In many languages, the sonority of a coda increases to the same sonority as an onset. Manner assimilation in Korean is a good example of this strategy.

3.2. Syllable Contact Constraint Accounts of Korean Manner Assimilation

Consider the examples of Korean manner assimilation in (8) again:

- (8) a. *o-nasalization*
 /kuk.mul/ [kuŋ.mul] 'broth'
 b. *l-nasalization*
 /kuk.lan/ [kuŋ.nan] 'national disaster'
 c. *lateralization*
 /ti.kit#li.ɨl/ [ti.gil.li.ɨl] 'ㄷ ㄹ' (Korean letters)

For (8a) /kuk.mul/ 'broth', two ways of sonority leveling are possible: raising sonority of a coda as [ku_ŋ.mul] or lowering sonority of an onset as [kuk.bul]. By sonority raising of an obstruent coda /k/ to nasal [ŋ], ultimate phonetic realization of phonemic form /kuk.mul/ is [ku_ŋ.mul] not [kuk.bul].

In the case of /kuk.lan/ [ku_ŋ.nan] 'national disaster', the highest sonority that /k/ can reach is nasal [ŋ] without alteration of the place of articulation as in [ku_ŋ.lan].⁷⁾ However, the sonority of the preceding coda is still lower than that of the following onset. Therefore, the sonority of the onset is lowered to nasal [n].

We saw that 'ㄷ ㄹ' /ti.kit#li.il/ (8c) can be pronounced as either [ti.gi.li.il] as in (3) or [ti.gin.ni.il] as seen in (4) above. It is suggested that lateralization is a phonologically transparent process because the sonority of the coda /t/ in /ti.kit/ 'Korean letter for /t/' increases to be the same as [l] before the onset /l/ in /li.il/ 'Korean letter for /l/' without changing the place of articulation (Ko, 2002). Thus, the change of the onset's sonority as in [ti.gin.ni.il] is a less natural phenomenon even though it is also possible and occurs in natural speech.

In recent studies within the framework of Optimality theory, several researchers (Kim, 2000; Kang, 2002; Ko, 2002) hypothesize that this phenomenon of sonority lowering of the onset, which results in [ti.gin.ni.il], occurs because morphological awareness hinders the lateralization of alveolars in a syllable-final position. If alveolars become laterals, then the sounds have deviated too much from the morphological form, and the original phonemes cannot be recovered. Thus, the speakers choose the less varied form of [n] than [l] for /t/. For example, from the possible phonetic forms of /ot#lo.pi/, [on] of [on.no.bi] is closer to /ot/ than [ol] of [ol.lo.bi], and thus it is easier to recover /ot/ from [on] than [ol]. This is an assumption, however, based on another supposition of psychological distance between the three sounds, which requires further studies with concrete linguistic evidence to claim.

In sum, the syllable contact constraint explains why and how manner assimilation occurs in Korean, and it also accounts for why nasalization always takes place regressively when the coda is obstruent and when the onset is a sonorant, but not vice versa in Korean (Song, 1990; Kim, 1996; Davis & Shin, 1999; Ko, 2002). If a coda of the preceding syllable is a

7) According to the syllable contact law, the alteration of place of articulation is more strongly constrained than the alteration of sonority (Ko, 2002).

sonorant and a following onset is an obstruent, no change in terms of sonority is necessary as in (9):

- | | | |
|------------------|------------|----------------|
| (9) a. /kam.tok/ | [kam.dok'] | 'director' |
| b. /koŋ.sa/ | [koŋ.sa] | 'construction' |
| c. /sin.pal/ | [ʃin.bal] | 'shoe' |
| d. /kal.pi/ | [kal.bi] | 'rib' |

4. Research Question

We have seen that the sonority adjustment causes manner assimilation in Korean based on the sonority contact constraint. This leads to an assumption that the three types of assimilation will equally affect the English production of Korean speakers. Based on the accounts of manner assimilation in Korean, the present study seeks to prove the following hypothesis:

Hypothesis: Three types of manner assimilation in Korean in (10) will transfer to English in the same degree.

- (10) a. *o-nasalization*
 'bilabial/alveolar/velar obstruent+nasal' → [nasal + nasal]
- b. *l-nasalization*
 'bilabial/velar obstruent+liquid' → [nasal + nasal]
- c. *lateralization*
 'alveolar obstruent+liquid' → [liquid + liquid]

5. Method

5.1. Subjects

In this study, ten native speakers of Korean were chosen from a sample of Oahu residents, including undergraduate and graduate students at the University of Hawaii at Manoa, students in the NICE language program at the University of Hawaii, and spouses of graduate students. All participants were older than 20. This study focused on data results within subjects and did not compare results among subjects, thus English proficiency level of

the participants was not considered in this study as long as they could read the English sentences given to them without difficulty. Two native speakers of American English originally from the US mainland also participated, in order to provide native speaker baseline data.

5.2. Instruments

Seventy three sentences including 75 target forms were created to be read aloud in randomized order. In order to avoid any effect of vowel length on the pronunciation of stop codas, all target words had lax (or short) vowels as the syllable nucleus: *stepmother*, *bad-mouth*, *sick man* et cetera.⁸⁾ Tense (or long) vowels were excluded because Korean speakers tend to insert vowels after the long vowels as in [bi.tʰi] for *beat* (Broselow & Park, 1995; Lee, 1998). Exceptions were three targets with [ɑ]: *job*, *got* and *drop*. [ɑ] was used because it is rarely used in an open syllable where tense (or long) vowels are used. Also, target forms with both stressed syllables (though not necessarily equally) were chosen. English words that are widely used as loanwords in Korean were excluded from the study.

Bilabials, alveolars and velars were examined as codas preceding the four following phonological contexts: bilabial nasal /m/ (e.g. *mapmaker*, *got mad*, *leg muscles*), alveolar nasal /n/ (e.g. *hypnotic*, *good name*, *basic knowledge*), lateral /l/ (e.g. *lip liner*, *fat lady*, *big leagues*), and approximant /r/ (e.g. *rib restaurant*, *get results*, *black ring*). Three or four tokens of each target-context type were represented. The sequences of 'obstruent + sonorant' appeared both within words and across word boundaries because the assimilation takes place in Korean regardless of word boundary. If there was any pause between two syllables or words, the data was discarded. As a result, 25 tokens were omitted from the analysis. The sentences used for data collection are presented in the Appendix, with the target forms underlined.

5.3. Procedures

The participants were audio-recorded reading the 73 sentences twice using a Tandberg TCR 522 and 3M microphone in a sound-proofed studio

8) In general, /ɪ, ε, æ, ʌ, ʊ/ are classified as lax vowels and /i:, aɪ, eɪ, oʊ, u:, aʊ, ɔɪ, ju:/ are classified as tense vowels (Ladefoged, 2001).

at the University of Hawaii at Manoa. The production of 'obstruent + sonorant' sequence was investigated by the researcher through the analysis of 1800 target forms from 12 subjects. Another phonetically trained researcher, who is a native speaker of American English, rated 10% of the data sample (180 tokens) in order to establish inter-rater reliability, in which 93% agreement was achieved.

Stop codas before sonorant onsets were classified as *English native like*, *released*, *assimilated*, *deleted*, and *vowel-inserted*. Unreleased closures before sonorants were rated as *English native like*. When stops were released without vowel insertion, they were classified as *released*. When stops were completely assimilated to the following sonorants and became nasals as [m, n, ŋ] or liquids [l, r], or were partially assimilated as a sound somewhere between stops and sonorants, they were rated as *assimilated* without distinguishing between the two. This was done because not only was it difficult for raters to judge degrees of assimilation, but also because the degree of assimilation was also not a major concern of this study. When stops were deleted before sonorants, they were rated as *deleted*. If there was an evident vowel insertion after stops, they were rated as *vowel-inserted*.

6. Results

Korean speakers assimilated 27% of all 'obstruent + sonorant' targets from 1500 English targets. When compared with the results from the two English speakers (3% assimilation), this rate is very high (Table 1). Thus, it is safe to say that manner assimilation, which is obligatory in Korean, was transferred to English production.

Table 1. Production of Obstruents Before Sonorant Onsets

Native language	English native like	assimilated	deleted	released	vowel-inserted	else	pause	total
Korean	894 (60%)	404 (27%)	13 (1%)	107 (7%)	6 (0%)	51 (3%)	25 (2%)	1500 (100%)
American English	289 (96%)	8 (3%)	3 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	300 (100%)

The rate of total assimilation was 27%, but there was considerable difference between before nasal onset and before liquid onset. As shown in Figure 1, Korean speakers nasalized 44% of all obstruents before nasals, but nasalized or lateralized only 11% before liquids. English speakers showed much less assimilation before nasals (5%) and none before liquids.

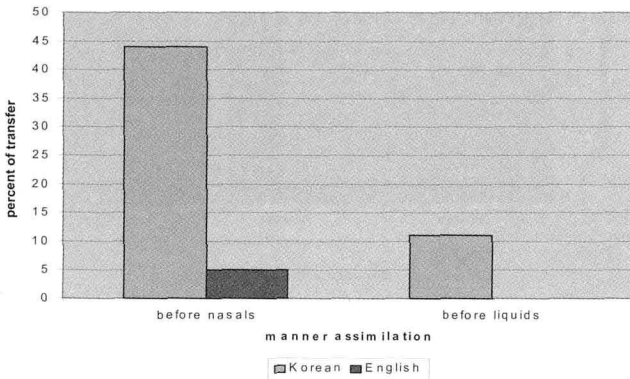


Figure 1. Manner assimilation rate of stops before nasals and liquids.

Not only was assimilation less common before liquids but there were also noticeable differences in assimilation patterns as shown in Figure 2. L-nasalization from 'bilabial/velar obstruent + liquid' was rare, at 1.9% of the transfer, but lateralization from 'alveolar obstruent + liquid' was rather productive before liquids at 22.6% of transfer.

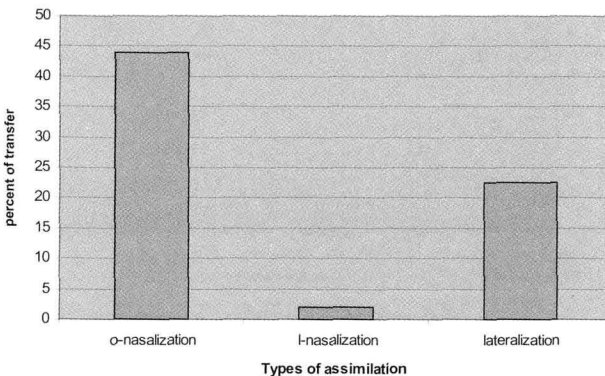


Figure 2. Occurrence rate of three types of assimilation.

Nasalization from 'alveolar obstruent + liquid' was also low at 2% of transfer as seen in Figure 3.

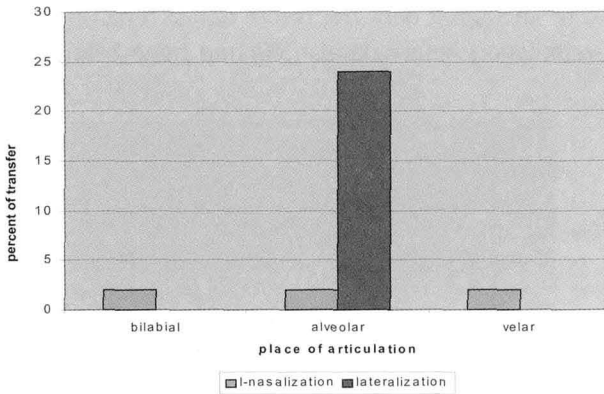


Figure 3. Assimilation of obstruents before liquids.

When we look at the individual production, the results show that l-nasalization carried over considerably low when compared to other two types of assimilation. As seen in Figure 4, o-nasalization and lateralization fluctuate from more than 60% of the transfer to zero% by subjects who may have different English proficiencies, but l-nasalization was transferred less than 10% for all subjects in the study.

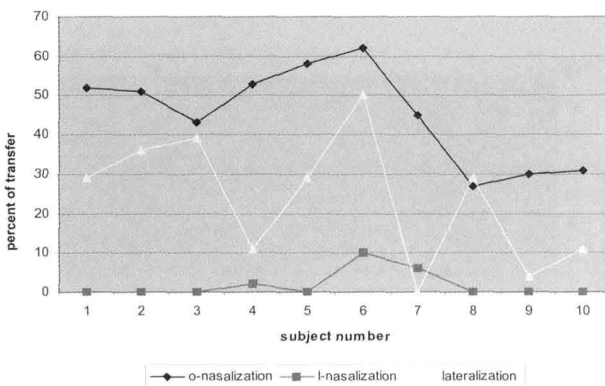


Figure 4. Individual transfer of three types of assimilation.

7. Discussion

Manner assimilation in English produced by Korean speakers showed significant differences between nasals and liquids, and thus the *Hypothesis* was not confirmed. For a better discussion, the three types of manner assimilation in Korean are rewritten in (11):

- (11) a. *o-nasalization*
 'bilabial/alveolar/velar obstruent+nasal' → [nasal + nasal]
 b. *l-nasalization*
 'bilabial/velar obstruent+liquid' → [nasal + nasal]
 c. *lateralization*
 'alveolar obstruent+liquid' → [liquid + liquid]

Transfer of the types in (11a) and (11c) was discovered to be common in the English produced by Korean speakers, though the type found in (11b) was much less so. This study needs to answer to the question of why l-nasalization takes place in Korean as a mandatory phonological process but rarely appears in the English produced by Korean speakers.

Accounting for l-nasalization has been complicated because there is no source for nasalization. In order to explain the l-nasalization, generative phonologists, among other first theorists, have proposed earlier that syllable-initial liquids become nasals due to the preceding stops, and that the stops then assimilate to the nasals as in (12) (Kim-Renaud, 1974).

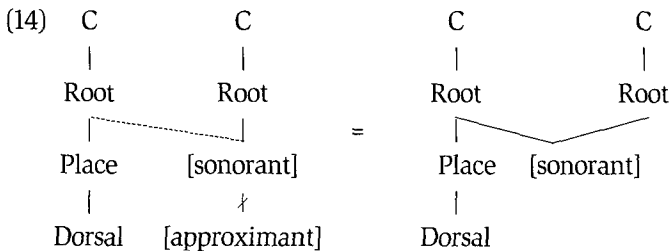
- (12) a. /kuk.lan/ national disaster
 b. kuk.lan obstruent unreleasing
 c. kuk.nan l-nasalization
 d. [ku_ŋ.nan] stop nasalization

The reason for the nasalization of the following liquid by the preceding stops, however, could not be answered by the rule-based analysis.

In the framework of Feature Geometry, in which assimilation is explained by spreading and deleting of features, the syllable contact constraint also plays a key role. Spreading of [sonorant] feature from the following onset to the preceding coda is required for sonority adjustment when the sonority of a preceding coda is lower than that of the following onset. Iverson and Sohn (1994) suggest the following rule:

- (13) Sonorant assimilation (Iverson & Sohn, 1994, p. 81)
 Spread [sonorant] from syllable-initial C to adjacent syllable-final C.

Iverson and Sohn account for l-nasalization by deletion of an [approximant] feature from liquid via Structure Preservation Principle as in (14) (1994, p. 83). That is, liquids have both [sonorant] and [approximant] features, but there are no bilabial or velar liquids in Korean. Hence, an [approximant] feature cannot occur with bilabial or velar obstruents and must be deleted after the obstruents.



Oh (1994) claims that l-nasalization is a result of deletion of a [lateral] feature from a liquid for strengthening of an onset from a liquid to a nasal during the process of sonority adjustment.

Combining the accounts from the rule-based theory, Feature Geometry, and the Optimality theory from section 3, we see that l-nasalization requires the onset's feature change, which violates the positional faithfulness (Beckman, 1998). Positional faithfulness is claimed and supported based on cross-linguistic observation that some prominent positions such as onsets, first syllables, or stressed syllables are protected by faithfulness constraints (Kager, 1999; Lombardi, 1999; Smith, 1999; Borowsky, 2000). Based on the positional faithfulness, the lowering of the onset's sonority or changing the onset's feature is regarded as a rare case of sonority adjustment. Furthermore, accepting the claim that assimilation is opted for in Korean for sonority adjustment because codas are weakened by neutralization (Kim-Renaud, 1974; Song, 1990; Cho, H. 1997), the onset's change after a weak coda is considered to be a typologically rare or marked phenomenon (Spencer, 1996; Major, 2001). On the contrary, o-nasalization and lateralization require sonority adjustment that is yet to satisfy positional faithfulness, and thus they are typologically unmarked. Thus in the case of 'alveolar +

liquid', lateralization is a more natural process than l-nasalization, and it was proved by the transfer.

Arguing for the markedness of l-nasalization is not the ultimate goal of this study. The adjustment of the onset for l-nasalization occurring as a phonological process in Korean should be accounted for. I suggest that the positional alternation of a liquid is critical in the process of l-nasalization. Korean has a rule of avoiding liquids in a word-initial position, which has been treated as a phonological process such as delateralization (Han, 1993), a consequence of lateral onset constraint (Cho, Y. 1997), or neutralization (Iverson & Sohn, 1994). In Korean, there were historically no words with initial liquids even though a liquid existed as a phoneme. As a result, when Chinese words, which now constitute more than 60% of Korean vocabulary (Kim, 1990), were borrowed into Korean, word initial liquids were changed to alveolar nasals or deleted. For example, /l/ in the Chinese word /lon/ 론 'to discuss' became nasal [n] (/lon.mun/→[non.mun] 논문 'thesis') and /l/ in /li/ 리 'to regulate' was deleted (/li.hɛ/→[i.hɛ] 이해 'understanding') in word-initial positions (Sohn, 1999). However, in medial positions they were pronounced as flaps: /tʰo.lon/→[tʰo.ron] 토론 'discussion', /to.li/→[to.ri] 도리 'obligation'. This alteration phenomenon of /l/ in word-initial positions is still generally maintained for Sino-Korean vocabulary.

The avoidance of the word-initial liquid does not, however, apply to loanwords that have been recently borrowed mostly from English, and researchers suggest that the phenomenon is no longer an active phonological avoidance (Chae, 1995; Lee, 2001; Lee, 2003). For example, the English words *ribbon* and *radio* are pronounced as [ri.bon] and [ra.di.o]. This avoidance of liquids in word-initial position seems not to affect Korean speakers' English production, either. Korean subjects in this study did not show a single case of nasalization or deletion of sentence-initial liquids for the 96 target forms. This indicates that Korean speakers do not have difficulty in producing word-initial liquids, and that avoidance of word-initial liquid is a fossilized lexical rule. The nasalization of onset liquids in l-nasalization is, then arguably, permitted because the phonotactic alternation of liquids is operating in Korean, even though the nasalization of liquids may not be phonetically motivated. Three supporting evidences that l-nasalization by the liquid-nasal alternation is not a phonetically motivated process are found from former studies by: Dziubalska-Kořaczyk, 1987; Eckman and Iverson, 1997; Kang, 1999; Jun, 2000; Kang and Hahn, 2000.

In general, phonetically motivated processes in a learner's NL have been

found to be more easily transferred than phenomena that are based on morphophonological rules in L1. The transfer of the two types of palatalization in Korean is a good example of a phonetically motivated process and a morphophonological rule. In Korean, phonemes /s, s', l, n/ are palatalized before high front vowels /i, j/. For example, /ka.su/ 'singer' is produced as [ka.su], but /ka.si/ 'thorn' becomes [ka.ʃi] or /si.hɜm/ 'examination' becomes [ʃi.hɜm]. Alveolar stops /t, t', tʰ/ also undergo palatalization before high front vowels. In this case, however, palatalization only occurs in morphological derivations. In other words, when the alveolars are followed by words that start with high front vowels that are not derivational morphemes, palatalization does not take place. For example, /patʰ.i/ 'field-subject marker' becomes [pa.cʰi], but /patʰ.il/ 'work in the fields' is [pan.nil] and /tʰi.nun/ 'corn' is still [tʰi.nun]. Discrepancy in the transfer between the two types of palatalization was found in Eckman and Iverson's (1997) study. In their study, Korean speakers pronounced English /s/ as [ʃ] in front of high front vowels as [riʃiv] for *receive*, or [mɛʃi] for *messy*. However, Eckman and Iverson found that the morphological palatalization did not transfer and no pronunciation such as [pæʃi] was found for *Patty* in English production by Korean speakers. For another example, in Dziubalska-Kořaczyk's (1987) study, Polish nasal consonants change to nasal glide [w] before continuant obstruents and vowels are nasalized before a nasal glide, both as phonetically motivated processes: *informacja* /inf-/ → [iŋwf-] → [iŋwf-]. These two processes are transferred to English words such as *emphasis* [ɛŋwf-], *sense* and *chance*.⁹⁾ However, place assimilation of coronal nasal /n/, which is an optional stylistic change, was transferred to English to a lesser degree than the former ones in the same study of Dziubalska-Kořaczyk (1987). The two transfer studies support the hypothesis that l-nasalization is affected by a lexical rule rather than by phonetic motivation and thus it was not carried over to the TL.

Data from Kang (1999) and Kang and Hahn (2000) also support the premise that an onset need not change from liquid to nasal in sonority adjustment when syllables meet in Korean. Yonbyon dialect, a Korean dialect spoken in Yonbyon, China, has no liquid-nasal alternation in word-initial position as in /lʃak.sa/ [rʃak.sa] 'history', /ljo.li/ [rjo.ri] 'cooking', or /li.pal/ [ri.ball] 'hair cutting' (Kang, 1999). Kang and Hahn (2000) examined nasalization before

9) Unfortunately, phonetic descriptions for *sense* and *chance* were not provided in the study.

a liquid in Yonbyon dialect of Korean and they found that the speakers of the dialect nasalize preceding codas without nasalizing of following liquid onsets. Speakers of Yonbyon dialect raised the sonority of a preceding coda without alternation of a following onset as in (15):

- (15) /kjɜk.ljɜ/ [kjɜŋ.rjɜ] 'encouragement'
 /kuk.ljɜk/ [kuŋ.rjɜk] 'a country's power'
 (Kang & Hahn, 2000, p. 116)

Examples in (15) evince that the changing of the onset's sonority in the Yonbyon dialect is prohibited even though the result violates the syllable contact constraint. In other words, positional faithfulness is more important than syllable contact constraint in this dialect unlike dialects in South Korea.

More interestingly, Korean speakers in South Korea in Jun (2000) produced 96% of obstruent codas as nasals even though they produced liquid onsets as liquids. In his study, subjects were asked to produce the spelling pronunciation of the liquid.¹⁰ The results indicated that the subjects produced the liquid onsets of the next syllable as liquids 50% of the time, and produced the rest of the liquid onsets as full nasals or partially nasalized liquids. Regardless of the sound of the following onsets, the subjects produced the preceding coda stops as nasals in 98% of all targets. If we exclude the nasalized onsets in Jun's (2000) study and only look at the results in which the onsets are pronounced as liquids (that is, 50% of the total onsets), then we can calculate that the l-nasalization occurs in at least 96% of the targets. The result of Jun (2000) implies that even for speakers of Korean dialects in South Korea, the sonority lowering of an onset is not mandatory even though the result does not satisfy the syllable contact constraint. As a matter of fact, Jun concludes that l-nasalization is triggered by "historical reanalysis", rather than the syllable contact constraint. That is, when Korean speakers see 'obstruent + liquid' sequence they reanalyze the liquid as a nasal because liquids have been realized as nasals in word-initial positions, and nasalize the obstruent without nasalization of the liquid. Thus, Jun's conclusion supports that

10) The ten words were: /toklɪp/ 독립 'independence', /tɛ.haklo/ 대학로 'university street', /kukljɜk/ 국력 'national power', /mun.haklon/ 문학론 'literature theory', /pak.lam.hwɛ/ 박람회 'exposition', /kuklɪp/ 국립 'national', /c^hok.sɜklu/ 축적루 'the name of a kiosk', /hakljɜk/ 학력 'academic career', /pa.lɪpli/ 팔십리 '80 li', and /hapli.cu.i/ 합리주의 'rationalism' (Jun, 2000, p. 194).

l-nasalization in Korean is not a phonetically motivated process, which is the claim of this study.

Jun's (2000) conclusion and the result of this study are important in understanding how Korean speakers distinguish a Korean liquid and English liquids: In Jun's study, Korean speakers nasalized preceding codas leaving liquids as they are, but in this study, no sonority rising of codas was observed when following onsets remained as liquids. This indicates that Korean speakers do not alternate English liquids with nasals as they do in their NL.

In sum, accepting the claim that phonetically motivated processes are easily transferred, o-nasalization and lateralization are very natural phenomena which are explained by the sonority contact law between two syllables. However, l-nasalization, where both stop codas and a liquid onset are nasalized through the result of positional faithfulness violation, apparently was not transferred productively. Thus, the sonority contact law may not be the sole explanation for the phenomena that occur l-nasalization; if it were the only explanation, this type of assimilation should have been transferred as readily as o-nasalization and lateralization.

8. Conclusion

This study on the transfer of phonological process has examined the interference of Korean in the production of English. In particular, it investigated the tendency of Korean speakers to assimilate syllable-final obstruents before nasals and liquids in English. It was found that the manner assimilations in Korean that are unmarked processes in languages affect TL more than one that is typologically marked. More specifically, sonority increasing of codas in o-nasalization and lateralization was transferred more easily to English than the l-nasalization. Based on the result, a tentative suggestion would be that l-nasalization in Korean is not explained solely by the sonority contact constraint, and that the lexical rule of word-initial liquid avoidance might account for this type of nasalization.

It should be also clear, however, that this study needs more data in order to make stronger conclusions about the type of transfer. In particular, if this study was to be replicated, it would require more subjects of NL and TL speakers in order to provide more significant data analysis. Also, such a study needs more tasks that elicit target forms in order to see the

possible effects of tasks in producing the TL.

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Appendix

Emily is his stepmother. (/p/+m/)

My grandfather was a famous mapmaker. (/p/+m/)

With the right equipment, people can live in strange places. (/p/+m/)

A ship is moving down the left side of the submarine. (/b/+m/)

I often rub my Dad's back. (/b/+m/)

Technical problems should be reported to the webmaster. (/b/+m/)

Nancy laughed at him and he got mad. (/t/+m/)

When Kevin showed up that morning, he was wearing a blue t-shirt and a baseball cap. (/t/+m/)

Low-fat milk gained 10% of the consumer milk market. (/t/+m/)

That is a commitment of a lifetime. (/t/+m/)

Don't bad-mouth divorced parents in front of children. (/d/+m/)

Let's go to a sad movie this weekend. (/d/+m/)

Rick has been placed in a good many awkward situations. (/d/+m/)

Don't forget, you're a very sick man. (/k/+m/)

I hate people who blackmail other people. (/k/+m/)

My mom's going to pick me up any minute. (/k/+m/)

George's leg muscles had weakened. (/g/+m/)

I had to drag myself out of bed. (/g/+m/)

Scott thought it was a big mistake. (/g/+m/)

Even though you drop names, it's no use applying for the job. (/p/+n/)

Flip noticed for the first time that he was having trouble. (/p/+n/)

Jack's been in a hypnotic state all day. (/p/+n/)

My three-month-old daughter is already too long for her tub now. (/b/+n/)

The clock is ticking abnormally loud. (/b/+n/)

What is this obnoxious smell? (/b/+n/)

A pet name is an affectionate name given by family or friends. (/t/+n/)

This difficult book doesn't have footnotes. (/t/+n/)

Whenever I get nervous, I drink warm milk. (/t/+n/)

I searched in vain for a good name for my cat. (/d/+n/)

She's been burning the midnight oil studying for the test. (/d/+n/)

Here's bad news for music lovers. (/d/+n/)

David has a basic knowledge of Korean history. (/k/+n/)

I want to look nice when Julie comes. (/k/+n/)

Paul took no part in the conversation, but sat deep in thought. (/k+/n/)

Traditionally, a stag night takes place on the eve of the wedding. (/g+/n/)

We guarantee big name quality without big price. (/g+/n/)

It became big news nationwide. (/g+/n/)

Elizabeth never goes out without her lip liner. (/p+/l/)

Here are some uploaded photos. (/p+/l/)

The ship lost it's masts in the storm. (/p+/l/)

Have you tried to catch a cab lately? (/b+/l/)

She sublets a room to a student. (/b+/l/)

The Web Lecture Project is a joint venture between two universities. (/b+/l/)

I'm not leaving until I get results. (/t+/l/)

It's easy to get lost in an old Japanese city. (/t+/l/)

Jason was a pet lover as a child. (/t+/l/)

There is a saying the opera isn't over 'til the fat lady sings. (/t+/l/)

I just wanted to stop by and wish you good luck. (/d+/l/)

The amount of space where humans could live is getting smaller and smaller. (/d+/l/)

We had lunch in the sun on the bench. (/d+/l/)

Here's bad news for music lovers. (/k+/l/)

What do the symptoms of the disease look like? (/k+/l/)

You look good in black leather. (/k+/l/)

At the farm, we saw a cute piglet. (/g+/l/)

I saw a bag lady on the corner. (/g+/l/)

It's a true story of a high school baseball coach's road to the big leagues. (/g+/l/)

Here is a registration application for the ownership right of land. (/p+/r/)

I learned lip-reading when I was young. (/p+/r/)

This is the background for the uprising. (/p+/r/)

Charlie is a cub reporter for our newspaper. (/b+/r/)

Why dont we try that rib restaurant? (/b+/r/)

You can check our weekly web review for the latest movies. (/b+/r/)

Why don't we try that rib restaurant? (/t+/r/)

Franks words cut right through me. (/t+/r/)

I think that's a bit rude. (/t+/r/)

I'm not leaving until I get results. (/t+/r/)

Monica noticed that his eyes were red-rimmed. (/d+/r/)
The UN says the number of the dead could rise to 1,000. (/d+/r/)
You shouldn't do this unless you have a good reason. (/d+/r/)
Email your question or fill out our form for a quick reply. (/k+/r/)
This may not be used for public readings. (/k+/r/)
What is that black ring around your finger? (/k+/r/)
Are bug-repellent sprays safe for my children? (/g+/r/)
Every serious runner likes to warm up before a big race. (/g+/r/)
Our passengers find plenty of legroom. (/g+/r/)

Kim, Mi-Hyun
Department of East Asian Languages and Literatures
University of Hawaii at Manoa
Honolulu, HI 96822
U.S.A.
E-mail: mihyunk@hawaii.edu

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