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Exemplar Entrenchment and Effects of Word Familiarity in Korean /n/-insertion*

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Song, Jiyeon and Amanda Dalola. 2024. **Exemplar Entrenchment and Effects of Word Familiarity in Korean /n/-insertion.** *Korean Journal of Linguistics,* 49-3, 425-447. This study examines the relationship between frequency effects, specifically word familiarity, and sound change, focusing on Korean /n/-insertion, considering social factors such as dialect, age, and gender. The Frequency Actuation Hypothesis (FAH) identifies two sound change types: physiologically motivated, driven by frequent word usage reducing articulatory effort, and non-physiologically motivated, where high-frequency words resist change due to established usage. Data were collected from 20 native speakers of North Kyungsang Korean (NKK), a dialect characterized by its conservative inclinations to sound change, and 20 native speakers of Seoul Korean (SK), a dialect known for its innovative tendencies in sound change. Findings show that higher familiarity words exhibit a higher incidence of /n/-insertion compared to lower familiarity words, suggesting that /n/-insertion, being a traditional phonological phenomenon, persists more robustly in words that are more familiar to speakers despite the ongoing shift towards resyllabification in less familiar words. Additionally, social factors such as dialect, gender, and age influence linguistic variation, with older male NKK speakers adhering to /n/-insertion, while younger female SK speakers are more inclined towards the resyllabification. This trend is further supported by the weak tie hypothesis, which suggests that older, more conservative dialect groups are associated with greater linguistic entrenchment.
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Key words: Korean /n/-insertion, Frequency Actuation Hypothesis, Word familiarity

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1. Introduction

Phonetic exemplars, which are rich and complex units of speech, play a crucial role in our understanding of linguistic features (Bybee 1999, 2002, 2006; Pierrehumbert 2001, 2002). These exemplars carry a broad spectrum of information, including phonetic surroundings, as well as semantic, pragmatic, and social contexts. This multifaceted nature of phonetic exemplars highlights the intricate complexity inherent in linguistic features (Johnson 1997). Building on the understanding of phonetic exemplars and their role in linguistic complexity, it is crucial to consider the various factors and theoretical frameworks that influence phonological processes. Korean /n/-insertion is a multifaceted phenomenon where the insertion of the consonant /n/ can occur between morphemes, often influenced by a combination of phonological, social, and frequency-related factors. This complexity necessitates an exploration of several key theories, including the Frequency Actuation Hypothesis (FAH), which addresses how the frequency of word usage impacts phonological change (Phillips 1984; Hay et al. 1985; Bybee 1999, 2002, 2006), and the weak tie hypothesis (Milroy and Milroy 1985; Milroy and Milroy 1992), which examines the role of social networks in facilitating or hindering linguistic innovation. Additionally, phonological factors, such as the nature of the preceding consonant and the phonetic context, play a significant role in determining the occurrence and variability of /n/-insertion. Understanding these intersecting influences provides a comprehensive framework for analyzing this intricate linguistic feature.

There is a widespread agreement among linguists that grammar functions within a cognitive framework. Expanding on this idea, proponents of usage-based theory argue that grammar not only organizes an individual's linguistic experiences but also plays a crucial role in retaining spoken language in memory (Goldinger 1996). This preserved auditory information then influences both how speech is produced and perceived, according to Bybee (1999, 2002, 2006). The components of a speaker's phonological understanding consist of memorized phonetic representations of specific lexical items (Brysbaert et al. 2018). Building on this cognitive perspective, the FAH (Phillips 1984; Bybee 1999, 2002, 2006) posits that the effects of word frequency on sound changes will vary based

on the underlying motivation for the change. Specifically, FAH posits that two types of sound changes—physiologically motivated changes and non-physiologically motivated changes—exhibit distinct patterns influenced by the frequency of the affected words' usage (Phillips 1984). More specifically, as for physiologically motivated changes, words that are used more frequently can drive changes that reduce articulatory effort, such as in the example of t-tapping where "matter" comes to sound more like "madder" (Hay et al. 2015). In t-tapping, instead of making a full stop closure and release, the tongue makes a quick, light tap against the alveolar ridge. This is similar to producing a /d/ sound but even more reduced with even less articulatory effort and a shorter duration. On the other hand, non-physiologically motivated sound changes often occur in situations where specific forms are difficult to recall, leading to the regularization or modification of words to align with more familiar, common patterns (Phillips 1984). This phenomenon is particularly evident in the analogy-driven regularization of irregular forms. For instance, when the irregular past tense of a verb is not strongly remembered, the regular "-ed" ending may be used instead, as it aligns with more frequent and well-known patterns in the language. Such changes are not driven by ease of articulation but rather by cognitive processes that seek consistency and regularity in linguistic forms. The tendency to apply regular patterns to less frequently used or less familiar words reflects the underlying cognitive mechanisms that guide language change. Therefore, for non-physiologically motivated changes, high frequency words can resist change because they are more firmly established in the language and are used so often that they resist change and continue to be pronounced in their original form. The contrast between these two types of changes highlights the complexity of language change, underscoring the crucial roles of articulatory ease and cognitive processes, such as analogy and memory, in shaping the structure of linguistic systems.

Given the insights from the FAH, it is essential to consider the methods used to measure frequency in linguistic research. Traditionally, studies have predominantly relied on corpus-based word frequency metrics. However, it has been reported that there is a crucial distinction between word frequency and word familiarity (Connine et al. 1990; Tanaka-Ishii and Terada 2011). Their research demonstrates that while high-frequency words are typically familiar

to most speakers, a word's familiarity does not necessarily correlate with its high frequency in language corpora. This discrepancy highlights a significant limitation of corpus-based or data-based frequency measures, which may fail to accurately capture an individual's word familiarity. Corpus-based frequency measures are derived from extensive datasets that reflect general language usage patterns, which may not correspond to individual linguistic experiences and exposure. For example, agricultural terms were less familiar to younger generations than to older generations, resulting in younger speakers exhibiting less /n/-insertion compared to older speakers (Kook et al. 2005). Consequently, self-rated word familiarity (SRWF) measures, which rely on individuals' subjective assessments of their familiarity with specific words, can offer a more accurate and personalized reflection of frequency effects, thereby providing a more valid measure that captures the personalized linguistic experience of individuals.

The weak/strong tie hypothesis, as proposed by Granovetter (1973) and later expanded upon by Milroy and Milroy (1985) and Milroy and Milroy (1992), offers a sociolinguistic framework for understanding how social networks influence language change. According to this hypothesis, the strength of social ties—defined as the frequency and emotional intensity of social interactions—plays a crucial role in the diffusion of linguistic innovations. Weak ties, which are characterized by infrequent and less emotionally intense interactions, are more effective at spreading new linguistic forms across different social groups. This is because weak ties serve as bridges that connect otherwise unconnected social networks, facilitating the flow of innovative language features. In contrast, strong ties, which involve regular and emotionally close interactions, tend to reinforce existing linguistic norms within tightly knit social groups, thereby inhibiting linguistic change. In a related vein, Labov (1984) adds another dimension to our understanding of language change by examining how gender intersects with social factors to influence linguistic variation. His research demonstrates that women, especially in urban settings, often lead in the adoption of new linguistic forms, using their social networks to spread these innovations. This interaction between gender and social factors provides further insight into the mechanisms of linguistic change. In applying these concepts to our study, we collected data from two distinct dialects: North Kyungsang Korean (NKK),

known for its conservative approach to sound change, and Seoul Korean (SK), recognized for its innovative tendencies. The weak tie hypothesis and Labov's findings on gender effects provide a framework for exploring how social networks and gender dynamics influence linguistic behaviors in these dialects, particularly in terms of how these factors may affect the processes of /n/-insertion.

The Korean /n/-insertion process takes place between two morphemes (the morpheme juncture marked with "-" in Table 1) when the initial morpheme ends in a consonant and the subsequent morpheme starts with a high front vocoid (/i/ or /j/) as in option Z in Table 1. However, /n/-insertion can be optional and can be substituted by simply resyllabifying the preceding consonant as in option Y in Table 1. The /n/-insertion phenomenon happens over various morphological categories: the juncture of two morphemes comprising a compound (a), a derivational word (b), or a syntactic phrase (c) in Table 1.

Table 1. Instances of /n/-insertion in Korean

underlying form	Resyllabification (option Y)	/n/-insertion (option Z)	morphological category	gloss
a. /som-i.pul/	[so.mi.pul]	[som.ni.pul]	compound	'cotton comforter'
b. /sɛk-jʌn.pʰil/	[sɛ.kjʌn.pʰil]	[sɛ ŋ .njʌn.pʰil]	prefix-stem	'colored pencil'
c. /os-ib.ta/	[o.tib.ta]	[on.nip.ta]	noun-verb	'put on clothes'

There is a variant of /n/-insertion in which the nasal /n/ does not appear and instead the resyllabification of a morpheme-final consonant takes place, as in option Y in Table 1. Both /n/-insertion (option Z) and the variant without /n/-insertion (option Y) produce acceptable surface forms.

Recent studies have observed that /n/-insertion has been replaced by the resyllabification of the final consonant in the first morpheme to serve as the onset of the second morpheme as in option Y in Table 1. From the perspective of FAH, the change in /n/-insertion can be interpreted in two ways. First, high frequency lexical items can change into the resyllabification faster than low frequency lexical items probably by reducing articulatory efforts as

physiologically motivated changes. The change from /n/-insertion to the resyllabification may be associated with temporal reduction which involves shortening the entire sequence of gestures. More specifically, as in t-tapping, the lengthened /n/ duration across two morphemes in /n/-insertion can be reduced to shorter temporal compression in the resyllabification (e.g., from [som.ni.pul] in /n/-insertion to [so.mi.pul] in the resyllabification), making it predictable that high-frequency words would change to the resyllabification. Conversely, high frequency can also reinforce the phonological constraints associated with /n/-insertion, preventing change, as non-physiologically motivated changes. This is because high-frequency words are so deeply entrenched in the language and used so often that they tend to resist changes and maintain their original form.

The insertion of the relatively marked nasal /n/ through the process of Korean /n/-insertion raises the question of why the coronal nasal /n/ is chosen over other less marked coronals. Korean possesses several less marked consonants, such as /h/ and /t/, that could potentially be used for epenthesis (Vaux 2002). Kim et al. (2007) provided evidence for a phonetic motivation by comparing the first formant (F1) and second formant (F2) transitions of /i/ after /n/ and /l/. They found that /n/ and /l/ are "legitimate candidates" because they maintain continuing sonority across a syllable boundary (known as the Syllable Contact Law) and have "phonetic similarity to vowels" (Kim et al. 2007: 194). Their results indicate that /n/ is less salient before /i/ than /l/, as the F1 and F2 transition from /l/ to /i/ shows more radical changes than the transition from /n/ to /i/. Thus, the nasal /n/ is considered epenthetically ideal due to the smooth sonority transition it provides between a morpheme-final consonant and a morpheme-initial vowel. According to Kim et al. (2007), if there is no /n/-insertion, radical transition from C1 to the following vocoids will occur in the formants and the sonority slope will also starkly rise. Thus, resyllabification without /n/-insertion may be viewed as a less preferred strategy than /n/-insertion. However, since free variation between /n/-insertion and resyllabification is readily attested, it is apparent that sonority may not be sufficient to explain the phenomenon.

Previous studies have extensively explored the multifaceted aspects of Korean /n/-insertion. Johnson (1997) emphasized the broad spectrum of information

that phonetic exemplars carry, including phonetic surroundings and semantic, pragmatic, and social contexts, highlighting the complexity of linguistic features. This broad contextual framework underpins current research into the conditioning effects of frequency, phonological contexts, and social factors on /n/-insertion (Choi 2002; Kim 2003; Kang and Kim 2004; Kook et al. 2005; Kim 2013; Jun 2015; Song and Dalola 2018; Jun 2021).

Research on Korean /n/-insertion has identified several factors influencing this phonological process. Phonological factors are crucial in this process. Studies have shown that Sino-Korean words, especially those with sonorant consonants such as /m/, /n/, and /ŋ/ in the first morpheme, exhibit a higher propensity for /n/-insertion, and additionally, there is a greater likelihood of /n/-insertion occurring before the vocoid /j/ compared to /i/ (Kook et al. 2005; Hwang 2008; Um 2010; Jun 2021). Age plays a significant role, with Kook et al. (2005) revealing that older Seoul Korean speakers show a stronger preference for /n/-insertion compared to younger speakers, indicating significant age-related variation. Dialect differences are evident, as Kim (2013) and Jun (2021) found that NKK speakers exhibit more /n/-insertion. Regarding word frequency, high-frequency words are significantly more likely to exhibit /n/-insertion compared to low-frequency words, although this effect is observed only in the Seoul dialect and not in the NKK dialect (Jun 2021).

However, there is no previous research on the impact of word familiarity and gender on /n/-insertion, indicating areas for future investigation. This comprehensive analysis underscores the multifaceted nature of /n/-insertion, shaped by age, dialect, phonological factors, and word frequency, with potential for further exploration into the influences of word familiarity and gender. Investigating the role of word familiarity could provide insights into how individual linguistic experiences and exposure affect phonological processes. Additionally, exploring gender differences could reveal sociolinguistic patterns and contribute to a deeper understanding of how social factors intersect with phonetic phenomena. Addressing these unexplored areas could significantly enhance our comprehension of /n/-insertion and its underlying mechanisms.

2. Methods

2.1. Participants

20 native NKK speakers and 20 native SK (Seoul Korean) speakers balanced for gender from two different generation groups (young vs. old groups) were recruited via their indication of dialects/parent dialects on a self-reporting survey. All participants and their parents were born and grew up in their reported speech communities. The mean, standard deviation, and range of participants' ages are presented in Table 2.

Table 2. Range, Mean, and Standard Deviation of Participants' Age by Dialect and Age Group

	Seoul		NKK	
age group (range)	young (19-20)	old (56-68)	young (19-28)	old (60-70)
mean (standard deviation)	19.30 (0.95)	63.10 (3.73)	24.00 (3.13)	66.10 (5.26)

2.2. Stimuli

The wordlist consisted of 42 words ranging from two to four syllables in length. 35 nouns and 7 verbs were included. Phonological contexts for /n/-insertion are (i) nature of vocoid (/i/: 22, /j/: 20), (ii) prefix type (9 sino-Korean prefixes and 33 native Korean prefixes), (iii) voicing of C1 (obstruents: 32, sonorant: 10). As the focus of this study was on the language change from /n/-insertion to resyllabification, words with obligatory /n/-insertion were not included.[1)] The words that show 100% /n/-insertion[2)] were excluded from the

[1)] According to Song and Dalola (2018), when C1 is a trace of a genitive case marker from Middle Korean, it is highly possible that resyllabification is not allowed (e.g. /namunnip/ 'leaf' and /pekennit/ 'pillowcase'). Additionally, some verb phrases including sentence ender 'ta' do not allow /n/-insertion (e.g. /masitt'a/ 'delicious' and /məsitt'a/ 'stylish') (Ko 1992: 32).

data analysis, which partially resulted in an imbalance in the number of data points across variables except for the nature of the vocoid. The words were presented in Korean Hangul script. The orthographic representation of the words in the list does not reflect the full range of their surface pronunciations. Specifically, the script does not visually distinguish between the two possible pronunciations involving /n/-insertion and resyllabification; it only provides the standard orthographic form, which does not explicitly indicate the presence of an inserted /n/.

2.3. Procedure

The participants completed a wordlist reading task. They were instructed to read the script naturally in a way deemed acceptable by their speech community. Recordings were made on a Marantz Professional PMD661 MKIII, digitized at a 44100 Hz with 16-bit accuracy in a quiet room. Since the stimuli consist of two morphemes, when participants put a pause which interrupts natural transition from the first morpheme to the second morpheme, they were asked to read it again.

After each word was articulated by the participants, they were asked to evaluate how familiar each word was to them, categorizing their familiarity as low, intermediate, or high. They were instructed to assess their personal recognition and understanding of each word independently from corpus-based word frequency measures, to capture a more individualized and subjective measure of word familiarity.

2.4. Measurement

Presence/absence of /n/-insertion was determined via auditory observation and the identification of nasal formants arising from nasal resonance (Boersma 2001). Each of the words was examined for the presence of the nasal /n/

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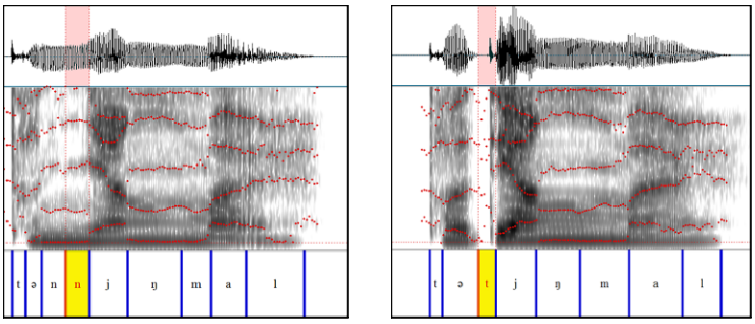
[2] Words such as 산업용 /sanʌp-yoŋ/ 'industrial use', 색연필 /sek-jʌnphil/ 'colored pencil', and 소독약 /sotok-yak/ 'disinfectant' exhibited 100% /n/-insertion and were consequently excluded from the data analysis.

using the waveform and the spectrogram, as in Figure 1.



a. [tən.nja ŋ.mal][3] b. [tə.tja ŋ.mal]
'liner (or ankle) socks'

Figure 1. Presence and Absence of /n/-insertion

Tokens were labeled as NA when background noise or unnatural speech was observed. Additionally, tokens that were difficult to judge were also labeled as NA.

2.5. Statistical Analysis

A generalized linear mixed-effects analysis was performed using the glmer() function of the lme4 and lmerTest (Bates et al. 2015) packages in R statistical software (R Core Team 2018), to analyze the role of the independent variables to condition the appearance of /n/-insertion. Statistical analyses were computed using the parameter family=binomial in the glmer() function in the statistical tool R (R version 4.1.2, 2021). Six categorical independent variables (IVs) were identified as predictors for the binary dependent variable (DV) indicating the presence or absence of /n/-insertion. These IVs included (i) dialect (Seoul, NKK), (ii) age (young, old), (iii) gender (female, male), (iv) word type of the first morpheme (sino, native), (v) manner of C1 (sonorant, obstruent), (vi) nature of vocoid (/i/, /j/), and (vii) SRWF (low, intermediate, high). The analysis included

[3] Although these two instances of /n/ cannot be identified separately, a boundary was placed between them for the convenience of data analysis.

social factors (dialect, age, gender), phonological contexts (manner of C1, nature of vocoid), and SRWF as fixed effects, with participants as random effects. For each variable, the first level listed serves as the reference group.

3. Results

After running a main effects model without interactions between the independent variables using the formula: glmer(presence or absence of /n/-insertion ~ dialect + gender + age + nature of vocoid + manner of C1 + SRWF + (1|participant), family = binomial), we observed that not all independent variables contributed significantly to predicting /n/-insertion, as shown in Table 3. Specifically, prefix type and voicing of C1 did not show significant results.

Table 3. A Generalized Linear Mixed-effects Model of /n/-insertion

	Estimate	Std. Error	p-values
(intercept)	1.1901	0.3238	0.000237 ***
dialect NKK	-0.6191	0.2113	0.003382 **
age old	-0.5454	0.2117	0.009996 **
gender male	-0.4732	0.2114	0.025178 *
prefix type native	0.1214	0.1588	0.444703
voicing of C1 obstruent	-0.3525	0.1211	0.147429
nature of vocoid /j/	-0.3525	0.1211	0.003610 **
SRWF intermediate	-0.6165	0.1835	0.000780 ***
SRWF high	-1.1291	0.1660	1.02e-11 ***

Note. .=.05<p<.1, *=p<.05, **=p<.01, ***=p<.001

To refine the model and improve its interpretability, we focused on the variables that showed significant results. Specifically, we constructed a new formula using only the significant predictors identified from the initial model. The model incorporates dialect, age, gender, nature of the vocoid, and SRWF, as these variables exhibited significant effects on /n/-insertion. However, the

model incorporating “the nature of vocoid” (presence or absence of /n/-insertion ~ dialect*gender*age*nature of vocoid*SRWF + (1|participant), family = binomial) failed to converge and was subsequently excluded from the analysis. Therefore, the final model formula employed in this research is: glmer(presence or absence of /n/-insertion ~ dialect*gender*age*SRWF + (1|participant), family = binomial). The results are presented in Table 4, highlighting the significant factors influencing /n/-insertion.

Table 4. Result of GLMER of /n/-insertion

	Estimate	Std.Error	p-value
(Intercept)	0.7845	0.4107	0.05613 .
dialectNKK	0.1636	0.5613	0.77067
ageold	0.9378	0.7242	0.19534
gendermale	0.7674	0.6281	0.22178
SRWFintermediate	−0.9398	0.431	0.02921 *
SRWFhigh	−0.8386	0.4069	0.03928 *
dialectNKK:ageold	−2.9509	0.9412	0.00172 **
dialectNKK:gendermale	−1.0572	0.8505	0.21385
ageold:gendermale	−2.9806	0.9408	0.00153 **
dialectNKK:SRWFintermediate	0.6101	0.6713	0.36343
dialectNKK:SRWFhigh	−0.5804	0.5504	0.29165
ageold:SRWFintermediate	−0.1587	0.8248	0.84742
ageold:SRWFhigh	−0.7204	0.7102	0.31043
gendermale:SRWFintermediate	−0.5119	0.6541	0.43384
gendermale:SRWFhigh	−0.8272	0.6256	0.18609
dialectNKK:ageold:gendermale	4.0744	1.2793	0.00145 **
dialectNKK:ageold:SRWFintermediate	1.3621	1.109	0.21935
dialectNKK:ageold:SRWFhigh	2.0092	0.9249	0.02984 *
dialectNKK:gendermale:SRWFintermediate	0.5833	0.9613	0.54402
dialectNKK:gendermale:SRWFhigh	0.3876	0.8467	0.6471
ageold:gendermale:SRWFintermediate	1.1295	1.0841	0.29748
ageold:gendermale:SRWFhigh	2.0315	0.9307	0.02905 *
dialectNKK:ageold:gendermale:SRWFintermediate	−2.1353	1.4956	0.15337
dialectNKK:ageold:gendermale:SRWFhigh	−2.9653	1.276	0.02013 *

*Note. .=.05<p<.1, *=p<.05, **=p<.01, ***=p<.001*

As shown in Table 4, there was a significant main effect of SRWF on /n/-insertion, along with significant interactions between dialect, age, gender, and SRWF. To further clarify these findings, separate graphs are provided for each significant result. When an interaction was present, the red rectangle highlighted the compared groups.

The raw counts of /n/-insertion related to the main effect of SRWF are presented in Figure 2.

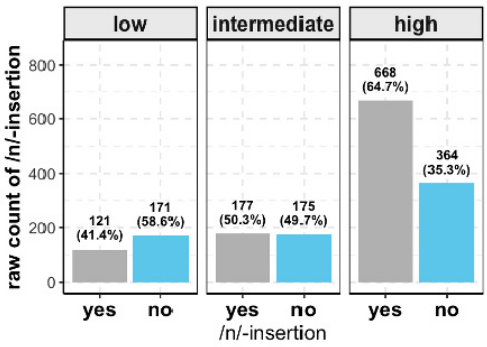
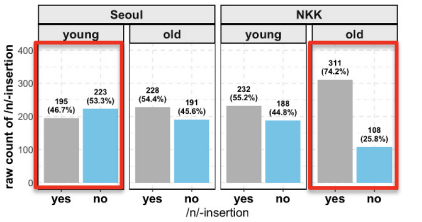


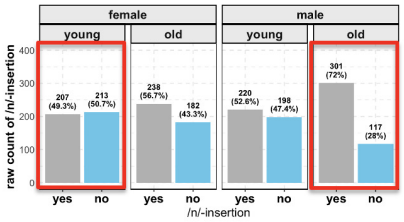
Figure 2. Raw Count of /n/-insertion by Word Familiarity (low vs. intermediate vs. high)

As illustrated in Figure 2, there was a significant main effect of SRWF on /n/-insertion. Specifically, intermediate SRWF was found to be more likely associated with /n/-insertion compared to low SRWF (β=-0.94, SE=0.43, $p<0.05$) and similarly, high SRWF was also more likely associated with /n/-insertion compared to low SRWF (β=-0.84, SE=0.94, $p<0.05$) as illustrated in Figure 2.

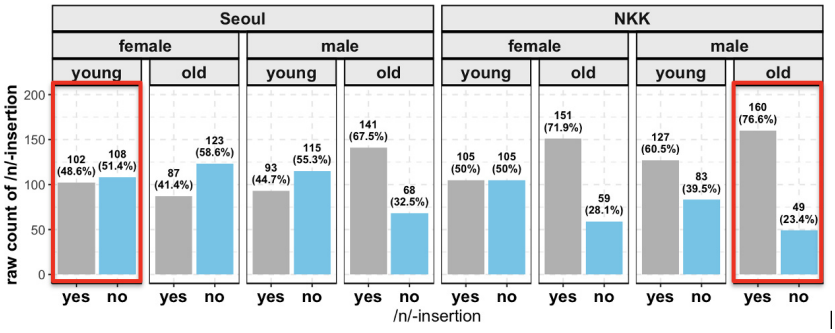
Significant interactions were observed between social factors, including dialect, age, and gender, demonstrating their combined influence on the occurrence of /n/-insertion. The raw counts of /n/-insertion related to the interaction effects of dialect, age, and gender are presented in Figure 3.



(a) Dialect and Age



(b) Gender and Age



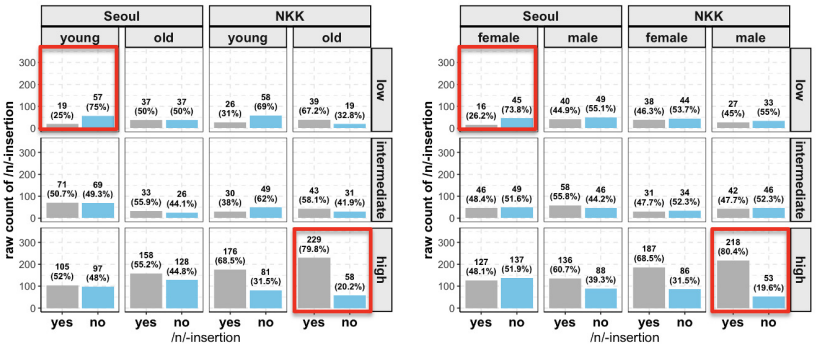
(c) Dialect, Gender, and Age

Figure 3. Raw Count of /n/-insertion by Dialect*Age, Gender*Age, Dialect*Gender*Age

As shown in Figure 3, significant interactions were found in the following pairs: (i) dialect and age, (ii) gender and age, and (iii) dialect, gender, and age. Specifically, older speakers from the NKK dialect group exhibited a higher likelihood of /n/-insertion compared to younger speakers from Seoul (β=-2.95, SE=0.41, p<0.01) as shown in Figure (3a). Additionally, significant interactions were observed between age and gender, revealing that older male speakers are more likely to exhibit /n/-insertion compared to younger female speakers (β=-2.98, SE=0.94, p<0.01), as depicted in Figure (3b). Older males from the NKK dialect group exhibit a statistically greater likelihood of /n/-insertion, compared to their counterparts—younger females from Seoul (β=4.07, SE=1.27, p<0.01) as in (3c).

Significant interactions were also found between social factors (dialect, age, and gender) and SRWF. The raw counts of /n/-insertion associated with these

interaction effects are illustrated in Figure 4.



(a) Dialect, Age, and SRWF (b) Dialect, Gender, and SRWF

Figure 4. Raw Count of /n/-insertion by Dialect*Age*SRWF and Dialect*Gender*SRWF

As in Figure 4, significant interactions were found in the following pairs: (i) dialect, age, and SRWF, (ii) dialect, gender, and SRWF. Older speakers from the NKK dialect group are significantly more likely to exhibit /n/-insertion when SRWF is high, compared to the younger SK group, where SRWF is low (β =2.00, SE=0.92, p<0.05) as in Figure (4a). Older males significantly increase the likelihood of /n/-insertion when SRWF is high, compared to younger females where SRWF is low (β =2.03, SE=0.93, p<0.05) as in Figure (4b).

Finally, there was an interaction between social factors and SRWF. The raw counts of /n/-insertion associated with the interaction effect are illustrated in Figure 5.

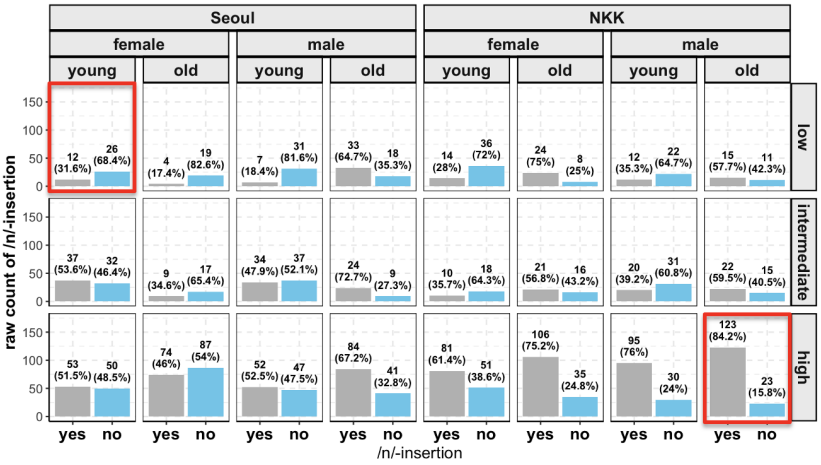


Figure 5. Raw Count of /n/-insertion by Dialect*Gender*Age*SRWF

As described in Figure 5, older male NKK speakers exhibited a significantly higher propensity for /n/-insertion with high SRWF words, compared to younger female SK speakers using words with low SRWF (β =-2.96, SE=1.28, p<0.05).

4. Discussion and Conclusion

The research identified a significant main effect of word familiarity on /n/-insertion, providing evidence that word familiarity can serve as a more comprehensive metric of frequency in studies of variation and language change. This finding advances our understanding of the interplay between word familiarity and phonological change within Korean /n/-insertion, particularly expanding upon the Frequency Actuation Hypothesis (Phillips 1984; Bybee 1999, 2002, 2006).

Our findings indicate that high SRWF words tend to resist phonological changes such as resyllabification, maintaining their original phonological forms despite the potential for reducing articulatory effort. In contrast, low SRWF words are more likely to undergo resyllabification, driven by more commonly used analogy-induced regularization, where the preceding coda consonant becomes

the onset of the following syllable. This suggests that less frequent usage allows for greater flexibility and adaptability in phonological structure.

The persistence of /n/-insertion in high familiarity words underscores their entrenched role in the linguistic system, reflecting their stability and resistance to change due to frequent activation and reinforcement in everyday language use. This phenomenon aligns with studies suggesting that frequent repetition solidifies lexical items in their conventional forms, making them less susceptible to alteration. Conversely, the adaptation observed in low familiarity words may be attributed to lesser degrees of phonological entrenchment, providing the phonetic environment conducive to undergoing more significant modifications such as resyllabification. High familiarity enhances the cognitive representations of words or phrases, solidifying their retrieval as whole units and thus diminishing their likelihood of undergoing analogical changes. In contrast, infrequent words lack this protective effect of exemplar entrenchment and are consequently more susceptible to linguistic modifications (Phillips 1984; Bybee 1999; Bybee 2006). When specific forms are less readily recalled, they are more likely to be adjusted to fit more familiar, common patterns, leading to their regularization or modification, as observed in resyllabification in this study. Accordingly, we propose that the coexistence of two surface forms in Korean /n/-insertion—/n/-insertion and resyllabification—may be non-physiologically motivated. Specifically, infrequent usage makes /n/-insertion less likely to be recalled, leading to the application of the more commonly used resyllabification, while frequent usage favors /n/-insertion due to linguistic entrenchment.

Moreover, the interaction of these frequency effects with sociolinguistic factors—namely, dialect, age, and gender—reveals a complex landscape of phonological variation and change. According to the Weak Tie Hypothesis and Labov (1984), linguistic innovations spread more readily through weak social ties and urban females, such as those found among Seoul's young females, as evidenced in our study, who typically participate in broader social networks. Consequently, urban young females are more likely to undergo resyllabification. In contrast, tightly-knit communities, like those of older NKK male speakers, as documented in our study, tend to adopt new forms more slowly (Milroy and Milroy 1985). The observed interactions between dialect and age highlight a significant tendency for older speakers from the NKK dialect group to exhibit

higher instances of /n/-insertion compared to younger speakers from the Seoul dialect. This pattern may suggest that older NKK speakers maintain more traditional linguistic practices, possibly due to stronger community ties and less exposure to linguistic innovations prevalent in younger, more urbanized Seoul speakers. The preservation of traditional phonological processes like /n/-insertion among older NKK speakers underscores the influence of age and regional dialect in shaping phonological variation and resistance to change. Gender and age interactions reveal a pronounced likelihood of /n/-insertion among older male speakers compared to younger female speakers. This finding could reflect broader sociolinguistic trends where older males adhere more strongly to traditional speech forms, possibly due to their social roles and cultural expectations. Conversely, younger females, often at the forefront of linguistic change, exhibit less /n/-insertion, aligning with their tendency towards adopting innovative speech patterns. This gender-based distinction emphasizes how sociocultural dynamics contribute to phonological variation and change.

The significant interaction between dialect, gender, and age further elucidates the complexity of /n/-insertion patterns. Older male speakers from the NKK dialect group demonstrate a markedly higher propensity for /n/-insertion, especially with high SRWF words, compared to younger female speakers from Seoul using low SRWF words.

The multifaceted interaction in Korean /n/-insertion underscores the interplay between linguistic familiarity, social factors, and regional dialects in phonological processes. It suggests that traditional linguistic features are more robustly retained in contexts where social conservatism and linguistic familiarity intersect, thereby resisting phonological innovation and change.

The findings significantly enhance our understanding of how phonological changes are influenced by frequency, more specifically word familiarity, and social variables. They also underscore the necessity for further research into how these factors interact over time to shape the evolution of language. However, a limitation of the current research is the comparatively smaller number of low familiarity words included in the study, which may affect the generalizability of the results. Future research should aim to include a more balanced dataset to provide a more comprehensive analysis. Such research could lead to broader generalizations about the mechanisms underpinning language change.

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Appendix (the script used in the experiment)

The "-" in IPA denotes the morpheme boundary, which is the focus of this research.

	Hangul	IPA	meaning
1	잡일	tsap-il	chores
2	겹이불	kjʌp-ipul	multi-layered blanket
3	겹잎	kjʌp-ip	compound leaf
4	겹열매	kjʌp-jʌlme	compound fruit
5	톱양	thop-nya ŋ	the long, thin metal pieces that make up the teeth of a saw
6	앞이마	ap-ima	the middle part of the forehead
7	앞일	ap-il	things to come
8	옆옆*	jʌp-jʌp	side by side
9	맏양반	mat-ja ŋ pan	an honorific term used to refer to someone else's eldest son
10	바깥일	pak*at-il	economic and social activities conducted outside the home
11	밭일	pat-il	work done in the field
12	밭이랑	pat-ila ŋ	furrow in a field
13	바깥양반	pak*at-ja ŋ pan	the term a wife uses to refer to her husband
14	막일	mak-il	labor performed indiscriminately without any selection or preference
15	색유리	sek-juli	stained glass
16	늑막염	nɨkmak-jʌm	pleurisy
17	내복약	nepok-jak	medicine for internal use
18	윗입술	wit-ipsul	the upper lip
19	옷입다	ot-ipta	to put on clothes
20	첫이레	chʌt-ile	the seventh day after a child is born
21	덧입다	tʌt-ipt*a	to layer clothes
22	덧양판	tʌt-yaphan	a narrow, elongated piece of wood placed on top of a board when planing

* This word comes from the word "옆옆이" in which 옆옆 is a noun and 이 is an adverbial suffix.

23	갓양태	kat-ya ŋ the	the broad, flat part that extends outward from the brim of a gat hat (Korean traditional hat made of bamboo and horsehair)
24	숫염소	sut-yʌmso	male goat
25	첫여름	tsʌt-yʌlim	early summer
26	덧양말	tʌt-ya ŋ mal	short socks worn over regular socks
27	낮일	nat-il	daytime work
28	늦익다	nɨt-ikt*a	to be slow to ripen
29	늦여름	nɨt-jʌlim	late summer
30	낯익다	nat-ikt*a	familiar-looking
31	낯익히다	nat-ikhita	to get accustomed to
32	꽃양배추	k*ot-ya ŋ betsu	cauliflower
33	솜이불	som-ipul	cotton comforter
34	반영구	pan-yʌ ŋ ku	semipermanent
35	콩잎	kho ŋ -ip	soybean leaf
36	단풍잎	tanphu ŋ -ip	maple leaf
37	콩엿	kho ŋ -yʌt	soybean taffy
38	금융예산	kim-nyu ŋ yesan	financial budget
39	일요일	il-yoil	Sunday
40	설익다	sʌl-ikt*a	to be half-cooked or undercooked
41	월요일	wʌl-yoil	Monday
42	잘입다	tsal-ipt*a	to dress well

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