



Native Korean listeners' perception of tensification in English loanwords in Korean

Hyunjin Lee

(Pusan National University)

Lee, Hyunjin. 2026. Native Korean listeners' perception of tensification in English loanwords in Korean. *Linguistic Research* 43(1): 209-225. This study examines word-initial prevocalic tensification in English loanword adaptation in Korean from a perceptual perspective. Loanword tensification refers to the phenomenon whereby an initial consonant that would otherwise correspond to a Korean lax stop is realized as its tense counterpart depending on the linguistic context. The goal of the present study is to explain how three conditioning factors reported in prior work—(i) the type of the word-initial consonant, (ii) the height of the following vowel, and (iii) the tenseness of the following syllable onset—are reflected in the perception of tensification. To this end, an ABX perception experiment was conducted with native Korean listeners, using disyllabic English nonce words in which the initial consonant ([b, d, s]), vowel height (high, non-high), and the second-syllable onset ([s], [s']) were systematically manipulated. The results showed that perceived tensification was highest for [s]-initial stimuli, increased in non-high vowel contexts relative to high vowel contexts, and was also higher when the following onset was tense ([s']). These findings can be interpreted as indicating that loanword categorization is not determined solely by a direct mapping of acoustic cues; rather, listeners integrate acoustic evidence with internalized expectations derived from Korean phonological distributions. (Pusan National University)

Keywords loanword adaptation, tensification, speech perception, language experience

1. Introduction

In Korean, tensification is generally defined as a phonological process in which a lax consonant is realized as a tense consonant in a particular environment. Among the different types of tensification, tensification in English loanwords has been widely discussed. In this context, tensification refers to the phenomenon in which an English

consonant that would otherwise be realized as a Korean lax stop is instead realized as a tense consonant in English loanword adaptation into Korean. This phenomenon is restricted to a highly specific context—the word-initial, prevocalic position—and it primarily targets English voiced stops and affricates. Specifically, although English [b, d, ɡ] and [dʒ] are generally reported to be adapted as Korean lax consonants in loanword adaptation (e.g., *ballad* [pallat̪i], *guide* [kait̪i], *journal* [tɛʌnʌl]), production patterns in word-initial prevocalic position suggest that these segments may surface not only as Korean lax consonants [p, t, k, tɛ] but also as their tense counterparts [pʰ, tʰ, kʰ, tɛʰ] (e.g., *bag* [pʰæk], *game* [kʰeim], *jelly* [tɛʰelli]).

Tensification in English loanwords is not an exceptionless phonological rule, and various accounts have been proposed to explain the factors that condition it. First, some studies suggest that English loanwords may have entered Korean via Japanese, and that Japanese adaptation strategies and orthographic conventions may have influenced their forms in Korean. Under this view, tensification variants are interpreted not as outputs of a productive, systematic phonological rule but as residual effects of the borrowing pathway, as well as spelling- and transmission-based variation (Kwon 1995; Shin 2003). Next, a line of research has focused on phonetic factors that promote tensification. Two well-established predictors are the height of the vowel following the word-initial consonant and the tenseness of the onset consonant in the second syllable (Kim 2016; Oh 2017). Specifically, tensification is more likely when the following vowel is non-high and when the second-syllable onset is tense. Various approaches have been proposed to account for these phonetic effects from different perspectives. For example, Kim (2016) argues that Korean tense stops have shorter VOT than lax stops, and that VOT is generally longer before high vowels than before non-high vowels. As a result, non-high vowels create an environment in which VOT is more likely to be short, making tensification more likely in non-high contexts. With respect to the tenseness of the second-syllable onset, this effect has often been explained within a distributional approach, according to which tensification reflects how frequently particular phonological patterns occur in the lexicon (Kim 2016; Oh 2017). For instance, Kim (2016) argues that the native Korean lexicon shows a strong tendency for tense–tense onset pairs to co-occur, and that this pattern can be extended to English loanwords. Similarly, Oh (2017) claims that a Korean preference for tense–tense sequences plays an important role in English loanword tensification, thereby motivating word-initial tensification.

This study investigates the phonetic factors that promote tensification from a perceptual perspective. Perceptual approaches to loanword adaptation emphasize how listeners perceive non-native sounds. Within this line of work, prior research (Silverman 1992; Kenstowicz 2003; Peperkamp and Dupoux 2003) maintains that perceived segmental correspondences between the source and recipient languages shape loanword patterns. In Korean, a large body of work has investigated perceptual aspects of loanword adaptation, with a particular focus on vowel epenthesis. For example, studies of Korean /i/ epenthesis (Kang 2003; Kim 2008; Kim 2021) show that native Korean listeners often judge some English forms as more perceptually similar to Korean counterparts with epenthetic /i/ than to those without it, and that this perceived similarity is modulated by phonetic factors. In contrast, perceptual research on tensification in English loanwords has been relatively limited. To date, word-initial prevocalic tensification has primarily been discussed on the basis of corpus data or production patterns, with little controlled experimental evidence testing whether the same English input is perceived as closer to a lax or a tense category. A perceptual design can therefore directly probe listeners' category mapping, complementing accounts based on corpus and production outcomes.

The goal of the present study is to test, using perceptual methods, hypotheses about the linguistic factors that condition tensification in English loanword adaptation. First, while English [b, d, g, ɟʒ] may or may not undergo word-initial tensification in prevocalic contexts, English [s] is reported to be mapped to Korean [s'] more consistently in the same context (Oh 1996; Kang 2008; Kim 2016). Thus, the first hypothesis is that native Korean listeners will perceive tensification more frequently in English forms beginning with [s] than in forms beginning with other consonants. Second, prior work has reported that word-initial tensification is more likely before non-high vowels than before high vowels (Oh 1996; Kim 2016). Accordingly, the second hypothesis is that native Korean listeners will perceive tensification more frequently when the vowel following the word-initial consonant is non-high than when it is high. Third, tensification has also been reported to be more likely when the onset consonant in the second syllable is tense (Oh 1996; Kim 2016; Oh 2017). Thus, the third hypothesis is that native Korean listeners will perceive tensification more frequently when the onset consonant in the second syllable is tense than when it is lax.

2. Methodology

2.1 Participants

Ten female and ten male native Korean listeners (mean age = 33.49 years) took part in the study. To minimize dialectal variation, all participants were born and raised in Seoul, Korea. Eighteen participants had never lived in an English-speaking country, whereas two had lived in Georgia, USA, for an average of about three weeks.

According to Escudero et al. (2014), monolinguals are individuals who primarily rely on their first language for everyday communication, have not lived in an environment where another language is spoken for more than a month, and have had minimal exposure to a second language—typically limited to reading and grammar-focused classroom instruction. Such individuals are sometimes referred to as “functional monolinguals.” According to this definition, all 20 participants in the present study can be classified as functional monolinguals.

English ability was assessed through the English Proficiency Self-Rating Questionnaire. The measure follows the Common European Framework of Reference for Languages (CEFR) and draws on the questionnaire developed by Park and Ziegler (2014). Using a five-point rating format (1–5), participants reported both how often they use Korean in everyday life and how competent they consider themselves in English across four domains—reading, listening, speaking, and writing. Their overall English proficiency was estimated by summing the scores across the four skills.

2.2 Stimuli

In the present study, the ABX design was adopted to determine which of the two Korean adaptation candidates (lax vs. tense) the English input is perceived as more closely aligned with. In the ABX experiment, participants heard stimuli A, B, and X sequentially and indicated whether X matched A or B. Gorilla Experiment Builder was used to construct and administer the experiment. All stimuli consisted of disyllabic nonce words because lexical usage and familiarity can influence tensification patterns (Kang 2008) and word length can also affect tensification (Kim 2016).

For clarity, in this study the labels English vs. Korean refer to the language of

stimulus production and to each stimulus's role in the ABX task (X vs. A/B), not to whether IPA strings are identical across languages. The English X stimuli were English disyllabic nonce-word tokens produced by a native English speaker as intended realizations of the English source input, and the Korean A and B stimuli were the corresponding Korean disyllabic nonce words constructed as Korean adaptation candidates for each X token. For example, the English X stimulus was [sise], and the corresponding Korean A and B stimuli included two options: a non-tensified [sise] and a tensified [s'ise]. Some items can be segmentally identical across languages, such as English and Korean [sise]; an IPA-identical form may occur both as an English X token and as a Korean non-tensified A (or B) token. These are nevertheless treated as distinct stimuli because they differ in the language of stimulus production (English vs. Korean) and in their experimental role (X vs. A/B).

In the English X stimuli, the word-initial prevocalic consonant was [b], [d], or [s]. Accordingly, the Korean A and B stimuli either lacked tensification (e.g., [p], [t], [s]) or exhibited tensification (e.g., [p'], [t'], [s']). In addition, the height of the vowel following the word-initial consonant was controlled in the English X stimuli by including either high vowels [i, u] or non-high vowels [a, ʌ]. The same manipulation was applied to the Korean A and B stimuli.

In the Korean A and B stimuli, the tenseness of the onset consonant in the second syllable was manipulated using the [s]–[s'] contrast. This contrast provides a minimal pair that allows tenseness to be varied while holding place and manner of articulation constant. In addition, previous studies have reported that word-initial tensification occurs at particularly high rates when the following onset is tense, especially when it is [s']. Therefore, including this condition makes the present design well suited to testing the relevant hypothesis.

In all ABX stimuli, the vowel of the second syllable was fixed as [ɛ] for three reasons. First, the high vowels /i, u/ and the non-high vowels /a, ʌ/ were already used in the first syllable of the stimuli. Second, using some vowels in the Korean stimuli would increase the likelihood of accidentally forming real Korean words. For instance, if /ʌ/ is used, a form similar to an existing word such as [pisʌ] 'secretary' can be created (e.g., A: [p'isʌ], B: [pisʌ], X: [bisʌ]). This raises the risk that participants may treat the Korean stimuli as familiar lexical items rather than as novel nonce words and respond on the basis of lexical familiarity. Thus, [ɛ] was chosen to minimize

the chance of forming existing Korean words. Third, [ɛ] was chosen because it has a clear one-to-one correspondence in both Korean and English. If the vowel does not have such a correspondence across the two languages, vowel-category mapping may impose additional processing demands, potentially confounding judgments intended to target tensification.

A total of 24 ABX stimuli were created by crossing three factors: the word-initial prevocalic consonant ([b] vs. [d] vs. [s]), vowel height ([i, u] vs. [ɑ, ʌ]), and the tenseness of the onset consonant in the second syllable ([s] vs. [s']). The full list of stimuli is provided in Appendix A. A total of 960 ABX trials were collected from 20 participants, as each ABX condition was repeated twice.

Recordings were provided by one male native speaker of English for the English X stimuli and by two female native speakers of Korean who spoke Standard Korean for the Korean A and B stimuli. Each trial combined Korean A and B stimuli from two female native Korean speakers with an English X stimulus from a male native English speaker. The order of the Korean speakers varied randomly across trials, but the English stimulus consistently followed the Korean stimuli. Also, each trial was randomized with respect to the placement of the tensified and non-tensified options in the A and B positions and their presentation order, so that the tensified stimulus was not consistently presented as A (or consistently as B). As a result, tensified and non-tensified stimuli were evenly distributed across the A and B positions.

2.3 Procedures

The experiment was conducted in two settings: eighteen participants were tested in quiet rooms in Seoul, Korea (a library study room and a seminar room), and two participants were tested in a sound-attenuated booth at the Linguistics Laboratory of the University of Georgia, USA. Detailed ABX instructions were provided in Korean on the computer screen prior to testing. Each trial consisted of a single presentation of A, B, and X, with 0.5-second inter-stimulus intervals. Visual cues (“1,” “2,” and “3” in blue circles) were displayed to index the three sounds. Participants responded via the keyboard to indicate whether X more closely resembled A or B. Responses were required within 2 seconds of X. A blank screen then appeared, and the subsequent trial began 1 second later. The experiment was administered in two blocks, separated

by an optional 5-minute rest period.

3. Results

Perceived tensification was calculated as the proportion of trials in which the tensified option was selected out of the total number of trials in which tensification was possible within each condition. As the experiment used an ABX task, responses were limited to either tense or lax selections.

Descriptively, each factor appeared to influence Korean listeners' perception of tensification. Figure 1 presents perceived tensification rates by word-initial prevocalic consonant.

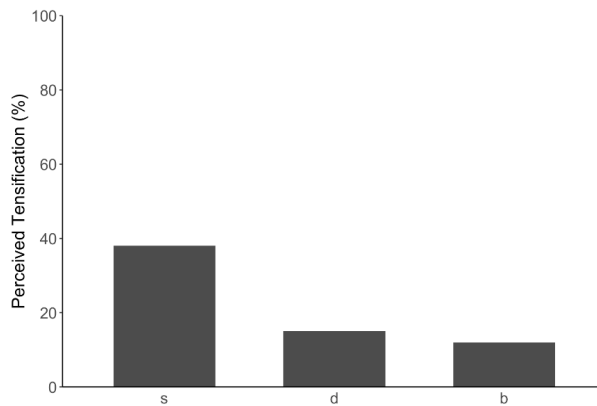


Figure 1. The word-initial prevocalic consonant

In Figure 1, perceived tensification varied by the word-initial consonant, with the highest rate observed for [s] (38.2%) and lower rates for [d] (15.6%) and [b] (12.8%). Second, the height of the vowel following the word-initial consonant was also associated with perceived tensification: English stimuli with non-high vowels were more likely to be mapped onto tensified Korean forms than those with high vowels.

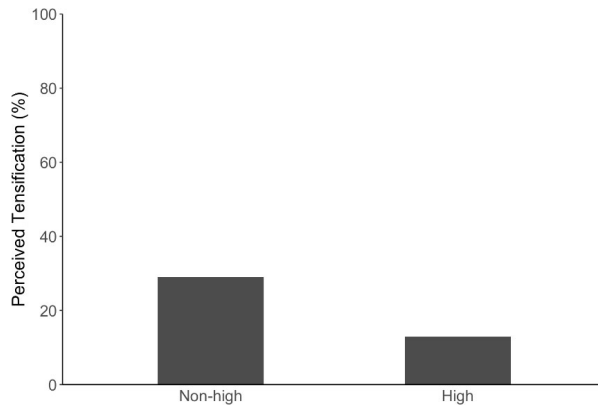


Figure 2. Height of the vowel following the word-initial consonant

As shown in Figure 2, perceived tensification was higher for non-high vowels than for high vowels (29.4% vs. 13.9%). Next, tensification was more likely to be perceived when the following syllable's onset consonant was tense.

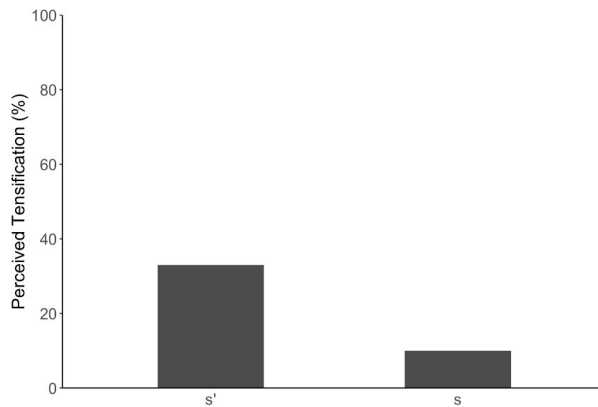


Figure 3. Tenseness of the onset consonant in the following syllable

Figure 3 shows the effect of the second consonant's tenseness on perceived tensification. The tensification rate was higher when the second consonant was tense (33.5%) than when it was lax (10.3%).

At the descriptive level, tensification was perceived more often when the initial consonant was [s], when the following vowel was non-high, and when the

second-syllable onset was [s']. Statistical significance was evaluated by fitting a mixed-effects logistic regression model with `glmer()` in R (R Core Team 2026). To determine the fixed-effects structure, nested models were compared using likelihood ratio tests (anova). The initial model included the word-initial prevocalic consonant ([s] vs. [b] vs. [d]), vowel height (non-high vs. high), the second-syllable onset ([s] vs. [s']), and participants' English proficiency, along with random intercepts for Speaker and Word. All categorical predictors were treatment-coded with specified baselines: [b] for the word-initial prevocalic consonant, high vowels for vowel height, and [s] for the second-syllable onset. As a result, the intercept estimates the baseline log-odds, and each fixed-effect estimate represents a contrast against that baseline. Random effects were limited to intercepts for Speaker and Word, with random slopes omitted, as the study focused on group-level perceptual trends and the number of observations per condition was limited.

Table 1. Statistical results for perceived tensification

	Estimate	Std. Error	z value	Pr (> z)
(Intercept)	-2.301	0.248	-9.201	<.001 ***
Prevocalic Consonant [d]	0.189	0.203	0.949	.341
Prevocalic Consonant [s]	1.452	0.182	8.056	<.001 ***
Vowel Height non-high	1.011	0.409	2.482	.013 *
2ndOnset[s']	1.493	0.174	8.765	<.001 ***

Table 1 shows significant effects of several predictors on perceived tensification. Relative to the reference level, the word-initial prevocalic consonant [s] significantly increased tensification judgments ($p < .001$), whereas [d] did not ($p = .341$). Vowel height was also significant, with non-high vowels yielding higher tensification rates than high vowels ($p = .013$). In addition, a tense second-syllable onset [s'] significantly increased perceived tensification compared with [s] ($p < .001$). Taken together, the model results indicate that tensification is more likely to be perceived when the initial consonant is [s], the following vowel is non-high, and the second-syllable onset is [s'].

4. Discussions

Previous studies argue that English word-initial prevocalic [s] is consistently adapted

as Korean [s'] (Kim 1999; Kang 2008; Kim 2016; Oh 2017). One explanation for this mapping focuses on frication duration (Kim 1999; Kim and Curtis 2002). Korean [s] is shorter than [s'] (Song 1999; Cheon and Anderson 2008; Cheon 2019). In English, [s] in consonant clusters is shorter than prevocalic [s]. Given these frication-duration patterns, English [s] is likely to be mapped to the Korean category with the most similar frication duration. Thus, cluster [s] tends to map to Korean [s], whereas prevocalic [s] maps to Korean [s']. Therefore, the significant effect of [s] observed in the present study can be interpreted in light of the phonetic similarity between English [s] and Korean [s'] proposed in previous research: Korean listeners may have mapped English word-initial [s] more closely to tense [s'] than to lax [s]. That is, the acoustic cues provided by English [s] may align more closely with the properties of Korean [s'], thereby tending to shift listeners' perceptual judgments toward [s']. In addition, Kang (2008) argues that the [s]–[s'] split in Korean adaptations of English [s] can be adequately explained in terms of H1–H2. H1–H2 refers to the amplitude difference between the first harmonic (H1) and the second harmonic (H2) measured at the onset of the following vowel; larger values are taken to reflect a breathier voice quality. Kang (2008) reports that in Korean, H1–H2 values are systematically higher in vowels following [s] than in vowels following [s'], indicating that vowels after [s] tend to be breathier, whereas breathiness is relatively reduced after [s']. Kang (2008) further notes that H1–H2 values after English word-initial prevocalic [s] are generally quite low and suggests that English [s] may therefore be more similar to Korean [s'] in terms of H1–H2. Kang (2008) emphasizes, however, that this result remains tentative due to the small dataset size.

In this study, tensification is perceived more often when the word-initial prevocalic consonant is [s] than when it is another consonant. This pattern may be explained by perceptual similarity between English [s] and Korean [s'], grounded in their acoustic properties. In perceptual approaches to loanword adaptation, borrowing outcomes are generally assumed to originate not from a direct transfer of the source-language surface form, but from how listeners perceive and categorize non-native speech sounds into native phonological categories. That is, listeners map an input sound onto the native category that is perceived as acoustically most similar, integrating multiple cues, such as VOT and duration. Accordingly, the higher rate of tense responses for word-initial prevocalic [s] observed in the present study can be interpreted as reflecting that English [s] is perceived as more similar to Korean [s'] than to Korean [s], thereby promoting

mapping to the [s'] category based on acoustic cues.

Next, perceived tensification was higher for non-high vowels in the present study. Kim (2016) explains this vowel-height effect in terms of short voice onset time (VOT) as a primary cue to Korean tense consonants. Thus, when native Korean listeners map English word-initial voiced stops onto Korean categories, how quickly voicing begins after release can strongly influence whether a stop is judged as tense. In other words, the shorter the VOT is perceived to be, the more compatible the sound is with the Korean tense category. When vowel height is taken into account, a well-attested phonetic generalization becomes relevant. VOT tends to be longer before high vowels, whereas it tends to be relatively shorter before non-high vowels. This pattern may arise because, in high-vowel contexts, articulatory configuration and aerodynamic or pressure conditions can delay the attainment of the voicing conditions required for vocal-fold vibration. As a result, voicing onset may be postponed. Consequently, even the same English stop may be perceived as having a longer VOT before high vowels than before non-high vowels, making perceived tensification less likely in high-vowel contexts. Before non-high vowels, by contrast, the same stop may be heard as having a shorter VOT, which can increase the likelihood of perceived tensification. Also, Kim (2016) argues that the distribution of Korean common nouns shows that the combination of a word-initial tense consonant followed by a high vowel is less frequent. This suggests that native Korean speakers may extend distributional generalizations from the native lexicon to the adaptation of English loanword inputs. Therefore, perception may also be influenced by listeners' internalized knowledge of native lexical distributions, yielding a height effect whereby perceived tensification is less likely before high vowels in English loanwords.

In addition, Oh (2017) argues that the duration of the vowel following the word-initial consonant may also affect tensification. Since vowels are significantly longer after Korean tense stops than after other stop types (Cho 1996; Chung et al. 1999), Oh (2017) proposes that native Korean speakers may associate tenseness with a broader bundle of cues, including the expectation that vowels following a tense consonant are relatively long. Under this view, mapping an English consonant to a Korean tense category would implicitly activate this expectation. Since high vowels are generally shorter in duration than non-high vowels, the combination of a tense consonant plus a high vowel is less consistent with this Korean-internal expectation, making tensification less likely in high-vowel contexts. In contrast, non-high vowels

are more compatible with the expectation of a relatively long following vowel, weakening the constraint against tensification and thereby increasing the likelihood of perceived tensification in non-high-vowel contexts.

Perceived tensification increased in the present study when the onset consonant in the following syllable was tense. According to Kim (2016), tensification is sensitive to the type of the second-syllable onset, occurring most frequently when it is [s']. In the sense of Gallagher (2010), this pattern is characterized as an “assimilation type of long-distance laryngeal co-occurrence restriction” and is referred to as an assimilation effect. Kim (2016) argues that this pattern can be characterized as an assimilation-type long-distance laryngeal co-occurrence restriction, whereby laryngeal (tense) specifications tend to be harmonized, favoring tense–tense combinations. According to Kim (2016), the preference for tense–tense combinations is supported by distributional patterns in the Korean native lexicon (common nouns), which exhibits a strong tendency for tense–tense onset pairs to co-occur. In particular, based on observed/expected (O/E) calculations over onset pairs in Korean common nouns (excluding monosyllables), the tense–tense onset pair is reported to have the highest O/E value (3.72), indicating overrepresentation. Similarly, Oh (2017) finds that tensification of a word-initial prevocalic stop is substantially more likely when the onset consonant in the following syllable is tense, and attributes this asymmetry to a Korean-lexicon tendency favoring tense–tense sequences. This tense–tense preference may be internalized as a distributional tendency and extended to loanword adaptation, such that [s'] in the second syllable increases the likelihood that a preceding English voiced stop is mapped to a Korean tense stop.

According to Bayesian approaches (Norris and McQueen 2008; Feldman et al. 2013; Kleinschmidt and Jaeger 2015; Norris et al. 2016), such a distribution-based tendency can also extend to speech perception. In Bayesian approaches to speech perception, listeners are assumed to infer phonological categories from inherently uncertain acoustic input. They do so by combining two sources of information: acoustic evidence (likelihood)—that is, how well the incoming signal matches the typical cues for a given category and experience-based expectations (priors), which reflect what listeners have learned from their language experience. By integrating these sources, listeners arrive at a posterior judgment: a final categorization that favors the interpretation that is most plausible given both the signal and their prior knowledge, especially when the acoustic input is ambiguous. From this perspective,

distribution-based tensification generalizations can function as priors, increasing the posterior probability of a tense interpretation when the acoustic evidence is weak or ambiguous. Accordingly, the tendency for word-initial prevocalic [s] to be more often perceived as tense, whereas [b, d] show probabilistic increases in tensification conditioned by context, is compatible with a probabilistic inference view of speech perception. Specifically, the more frequent perception of English word-initial prevocalic [s] as Korean [s'] can be interpreted as reflecting relatively consistent acoustic evidence—such as frication duration and H1-H2—that aligns more closely with the Korean [s'] category, yielding a posterior judgment that favors [s']. In addition, tensification is perceived more often before non-high vowels, which is compatible with an interaction between relatively clear phonetic evidence (e.g., VOT differences by vowel height) and experience-based expectations, given that word-initial tense consonants followed by high vowels are relatively rare in Korean. Finally, with respect to the tenseness of the onset consonant in the following syllable, listeners' language experience with tense–tense onset pairs may play a substantial role as a prior.

Although an explicit Bayesian model was not implemented as part of the statistical analysis in this study, the findings are well explained within the framework in which listeners combine acoustic evidence with experience-based expectations. Therefore, future research could directly apply this model to the data to provide a more explicit test of the proposed probabilistic inference account.

Lastly, in the present study, the stimuli were based on recordings from human speakers. To minimize phonetic variability, speakers were instructed to maintain consistent prosodic and phonetic features during recording. However, as the stimuli were derived from human speech, it is difficult to assume that subtle phonetic differences were completely eliminated. Such fine-grained acoustic variation may have influenced participants' perceptual choices to some extent, and this is acknowledged as a limitation of the present study. Specifically, factors not directly manipulated in the present design, such as prosodic prominence (e.g., stress realization), segmental timing (e.g., duration), and speaker-specific voice characteristics, may also modulate tensification judgments in ABX tasks. For example, greater prosodic prominence or longer segmental durations may make a sound perceptually stronger, which may influence listeners' selection of the tense candidate. Future research may address this more systematically by employing speech synthesis or by exerting stricter control over specific acoustic parameters and by directly measuring and modeling these additional cues.

5. Conclusion

This study examined Korean listeners' perceived tensification in English loanword-like stimuli and found that responses varied systematically by word-initial onset type, vowel height, and the tense status of the following onset. Across conditions, [s]-initial stimuli elicited especially high rates of tense responses, supporting prior claims that English word-initial prevocalic [s] tends to be mapped to Korean [s']. This mapping may be grounded in phonetic similarity between English [s] and Korean [s'], reflected in acoustic properties such as frication duration and H1–H2. In contrast, categorization of word-initial [b, d] was more ambiguous, yielding probabilistic shifts in tensification rather than deterministic outcomes. The heightened tensification before non-high vowels is consistent with accounts that link Korean tenseness to short VOT and with phonetic generalizations whereby VOT is relatively longer in high-vowel contexts. Distributional knowledge from the Korean lexicon—such as the relative rarity of tense and high-vowel sequences—may further contribute to the vowel-height effect. The finding that tense categorization increases when the second consonant is tense also supports the idea that a tense–tense preference extends from lexical distributions to perceptual categorization. Taken together, these results may be interpreted as consistent with Bayesian accounts of speech perception, in which listeners integrate acoustic cues with experience-based expectations. Future research can strengthen this account by implementing an explicit Bayesian model and testing whether incorporating distribution-based priors improves prediction of listeners' categorizations.

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Appendix A

Korean A or B		English X
[pis'ɛ]	[p'is'ɛ]	[bisɛ]
[p'ise]	[pise]	[bisɛ]
[pus'ɛ]	[p'us'ɛ]	[busɛ]
[pu'sɛ]	[puse]	[busɛ]
[pʌs'ɛ]	[p'ʌs'ɛ]	[bʌsɛ]
[p'ʌsɛ]	[pʌsɛ]	[bʌsɛ]
[pas'ɛ]	[p'as'ɛ]	[basɛ]
[p'asɛ]	[pasɛ]	[basɛ]
[tis'ɛ]	[t'is'ɛ]	[disɛ]
[t'ise]	[tise]	[disɛ]
[tus'ɛ]	[t'us'ɛ]	[dusɛ]
[t'usɛ]	[tusɛ]	[dusɛ]
[tʌs'ɛ]	[t'ʌs'ɛ]	[dʌsɛ]
[t'ʌsɛ]	[tʌsɛ]	[dʌsɛ]
[tas'ɛ]	[t'as'ɛ]	[dasɛ]
[t'asɛ]	[tasɛ]	[dasɛ]
[sis'ɛ]	[s'is'ɛ]	[sisɛ]
[s'ise]	[sise]	[sisɛ]
[sus'ɛ]	[s'us'ɛ]	[susɛ]
[s'usɛ]	[suse]	[susɛ]
[sʌs'ɛ]	[s'ʌs'ɛ]	[sʌsɛ]
[s'ʌsɛ]	[sʌsɛ]	[sʌsɛ]
[sas'ɛ]	[s'as'ɛ]	[sasɛ]
[s'asɛ]	[sasɛ]	[sasɛ]

Hyunjin Lee

Lecturer

Department of Language and Information

Pusan National University

2 Busandaehak-ro 63beon-gil, Geumjeong-gu,

Busan, 46241, Korea

E-mail: hjlee66904@gmail.com

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