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Intelligibility of Korean-Accented English: Effects of Listener's Familiarity

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The present study investigated Korean-accented English (KoE) intelligibility and conducted experiments in Korea, Japan, and the USA to test the benefits of listener's familiarity and identify the key phonological features of KoE. In the experiments, the participants were asked to transcribe the target (KoE) of 100 English statements each containing a target word representing one of the nine features. The transcription data were administered to four groups, depending upon the degree of KoE familiarity (length of exposure). The results indicated that KoE was most intelligible to native English speakers with lower familiarity and least intelligible to the Japanese participants with low KoE familiarity. Although the listeners' familiarity did not necessarily either facilitate or impede the intelligibility of KoE, the listeners with higher familiarity with KoE tended to recognize the voiced consonants of KoE better. The findings also indicated which KoE characteristics affected the overall intelligibility level, suggesting ways to prioritize KoE features in English language learning in Korean classrooms.

Key words: Korean-accented English, intelligibility, accents, listener factors, phonological features

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1. INTRODUCTION

Intelligibility refers to "word and utterance-level of recognition" (Smith & Nelson, 2006, p. 429), and it is distinguished with two higher-level categories: comprehensibility and interpretability. Comprehensibility is concerned with a meaning attached to a word or utterance, and interpretability is associated with the degree to which one can read implicit messages of a speaker (Ibid.). In the quest to discover whether foreign-accented English speech affects intelligibility, both speakers of and listeners to English as an L2 have been examined in the literature. While speakers' factors, such as L1 influence (Best & Tyler, 2007; Eckman, 1977; Flege, 1995), age of acquisition (Abrahamsson, 2012; Munro & Mann, 2005), quality and quantity of L2 exposure (Flege & Liu, 2001), motivation (Derwing & Munro, 2013; Dörnyei, 1998) have been studied, various socio-linguistic aspects of listeners have also been explored. For example, there is some evidence that listeners would score a higher intelligibility level or perceive a variety of English as more intelligible, as a result of their English proficiency (Lim, Han, Choi, & Lee, 2016), along with the test environment where the listeners were surrounded by (Munro, 1998; van Wijngaarden, Steeneken, & Houtgast, 2002), their social group (Lippi-Green, 1997) or their linguistic identity (Abrar-ul-Hassan, 2010) of listeners.

Wide-ranging communities of various world Englishes, including Korean-accented English (KoE), exist in today's globalized world. Undoubtedly, multilingual encounters lead to the constant development of varieties of English, fostering abundant cultural diversity and increasing intercultural communication between different regions and populations. KoE has been its negative image to listeners of different language backgrounds, depicted as 'strange,' 'harsh,' and 'quarrel-like' (Jenkins, 2007), even though some Korean-speaking learners of English (KSLs) themselves appear to have some pride in their accent (Chung, 2018). As it was pointed out that intelligibility is largely influenced by the listener's factor (Giles & Niedzielski, 1998), it seems worth questioning to what extent this would be true in respect of KoE.

Focused on the fluid, flexible, contingent, hybrid and deeply intercultural nature (Dewey, 2007), intercultural communication between people with different native languages—both native and nonnative speakers of English—have been characterized in the field of English as a lingua Franca (ELF). Capturing the variety of ELF communication, large and rich corpora of reference materials have been established (e.g., the Vienna-Oxford International Corpus of English, and the corpus of English as a Lingua Franca in Academic Settings). ELF research has covered various linguistic levels, including lexis, phonology (e.g., Lingua Franca Core features, Jenkins, 2000, 2002), and pragmatics (e.g., pre-empting strategies, Kaur, 2009, 2010).

In ELF research focusing on phonological description, the notion of intelligibility has come to prominence. Indicating the level of mutual understanding between interlocutors with different linguistic backgrounds (Derwing & Munro, 2015), an increased number of studies made a case that nonnative English speech by secondary/additional language (L2) speakers should be intelligible enough to foster mutual understanding and communication (Derwing & Munro, 2015; Jenkins, 2000; Matsuura, 2012; Smith & Nelson, 2006; Walker, 2010). That is, it is necessary to attain 'comfortable intelligibility' as proposed in Kenworthy (1987).

The question then arises of the extent of KoE intelligibility which is particularly relevant to the context where English is used as a lingua franca. As Smith (1992) has pointed out, "native speakers were not found to be the most easily understood, nor were they, as subjects, found to be the best able to understand the different variesties of English" (p. 88). Moreover, with estimates that L2 speakers outnumber native English speakers, L2 speakers are more likely to engage in English conversation with fellow L2 speakers than with native English speakers (Crystal, 2003). This offers ground for attempts to judge the intelligibility by native English speakers and various L2 English speakers. Thus, the current study attempts to examine the intelligibility of KoE not only to native English speakers but also to other L2 speakers, namely, Japanese-speaking learners of English (JSLs) and KSLs. Additionally, the study also highlights factors influencing intelligibility beyond national borders. As accent familiarity of listeners resulted in affecting intelligibility measurement, as theorized in the *Interlanguage Speech Intelligibility Benefit* (Bent & Bradlow, 2003) or a *Shared-L1 Advantage* (Harding, 2012), listener familiarity with KoE is taken as a possible influence on KoE intelligibility. Findings from this research, which adopts the ELF view, are expected to provide evidence to describe KoE intelligibility in two aspects: listeners' accent familiarity and speakers' phonological factors. In the current study, we have investigated the effect on KoE intelligibility of both segmental and suprasegmental features while paying special attention to one listener characteristic, namely familiarity with KoE. Based on the previous research and the purpose of the study, three research questions are generated as follows:

1. How intelligible is KoE to four groups of listeners—native English-speaking professors residing in Korea, native English-speaking college students, JSLs, and KSLs?
2. Does familiarity with KoE enhance the level of intelligibility?

2-1. How intelligible is KoE to Korean and native English speakers residing in Korea with higher familiarity with KoE?

2-2. How intelligible is KoE to inner-circle and expanding-circle listeners with lower familiarity with KoE?

3. Which segmental or suprasegmental features of KoE should be prioritized for KSLs?

2. REVIEW OF THE LITERATURE

2.1. Listener's Familiarity

One important factor affecting 'intelligibility' is the listeners' familiarity with nonnative or L2 English sounds. Gass and Varonis (1984) compared familiarity with various categories, namely, speech accent, the topic of discussion, and speaker. The findings indicated that the different familiarities facilitated understanding of both meaning and sounds of nonnative speech. Similar research was done by Smith (1992), defining intelligibility as word and utterance-level of recognition along with two higher-level categories: comprehensibility referring to a meaning attached to a word or utterance, and interpretability concerning the degree to which one can read implicit messages of a speaker. This study found that accent familiarity helps perform better particularly in interpretability than intelligibility and comprehensibility. The significance of familiarity with different English varieties was supported in the study by Smith and Nelson (2006), in which a mixed group of listeners including native and nonnative speakers was best performed in interpreting ELF communication. In addition, Matsuura (2007) confirmed that familiarity with different English accents was the best predictor of intelligibility. The study compared intelligibility levels of two accents, general American English (AmE) and Hong Kong English, and found that what a listener is familiar with makes the accent more intelligible. Thai English showed a similar advantage of familiarity in the study by Kim (2017). In the study, listeners who have more experience with Thai English were best able to perform the intelligibility test. In the case of mainland Europe, where frequent exposures to a diversity of languages occurs, Newbold (2017) pointed to this naturally occurring familiarity with various English accents as a factor more important than the speakers' accents themselves in explaining the level of intelligibility.

More specifically, the advantage of familiarity arising from a language background shared with speakers was theorized as the interlanguage speech intelligibility benefit (ISIB) by Bent and Bradlow (2003). Bent and Bradlow (2003) argued that nonnative speakers would find an English accent from the same first language (L1) background more intelligible than any other L2 English varieties. Comparing the word recognition rate for speech produced by L1 Mandarin, and L1 Korean speakers showed that the rate was higher for shared-L1 speech than for different L2 proficient speech. Employing a further division into two subfactors, that is, ISIB for listener and ISIB for talkers (Hayes-Harb, Smith, Bent,

& Bradlow, 2008), the subsequent studies continued to prove the benefits for intelligibility of a language background shared by interlocutors (Wang & Heuven, 2015; Xie & Fowler, 2013). In a similar vein, the advantage for interlocutors sharing the same L1 was supported by Harding (2012), who yet used another term: a shared-L1 advantage.

Nonetheless, it remains necessary to consider that familiarity may negatively affect intelligibility. Fuse, Navichkova, and Alloggio (2018) found evidence that familiarity with L2 accent was not a strong indicator of intelligibility. Even though bilingual listeners outperformed monolingual listeners in understanding nonnative English varieties, a shared L1 advantage was not observed. There were no statistically significant differences in perception of intelligibility for those who share the L1 of the speaker over others. In Korea, on the other hand, it was reported that KSLs showed a greater familiarity with general American English, possibly owing their exclusive exposure to the AmE accents throughout the school years. This is so-called *institutionally-driven familiarity*, seemingly not only influences the way KSLs consider AmE to be the most privileged accent of all, but also causes difficulties in classifying different English varieties (Chung & Bong, 2017). In the following study, Korean college students found the sounds of British English more intelligible than the general American variety (Chung & Bong, 2019), which contrasts with the attitudes which may have formed by the institutionally-driven familiarity.

Recent research has shown that familiarity may either promote or impede intelligibility. Therefore, KoE should be scrutinized from both perspectives of both those who are familiar with and those who are less familiar with KoE. The familiarity with the KoE was defined in this study by participants' length of exposure to KoE and by the place of residence of participants. Among four groups of listeners who participated in the experimental study, two groups were regarded as having higher (greater) familiarity with KoE: Korean college students (KSLs) and native English speaking professors residing in Korea over a decade (NTs). On the other hand, two different groups represented lower familiarity with KoE: college students in Japan (JSLs) and Native English college students (NSs). Given the characterization of participants being more familiar with KoE or not, their effects on KoE intelligibility are investigated in this study.

2.2. Phonological Factors

Scholars have considered speaker variables as relevant to intelligibility. Closely related to pronunciation variations (Jenkins, 2000, 2002), researchers have been exploring the boundaries of ELF, and the possibility of norm properties of intelligible interaction between interlocutors with different language backgrounds. Jenkins (2000), for example, proposed an identification of main sources of phonological problems that are likely to compromise effective communication in the context of ELF. To probe the phonological

norms by exploring communication between two-second language learners (Japanese and Swiss-German), she theorized the core phonological features by framing them as the Lingua Franca Core (LFC). The study (Jenkins, 2000) emphasized that (1) all the consonants except dental fricatives and dark /l/, (2) consonant clusters in initial and medial word positions, (3) vowel length difference, and (4) tonic stress placement should be properly articulated. Meanwhile, much follow-up research in different communication settings was done: Deterding (2013) and Deterding and Mohamad (2016) expanded the examination in Southeast Asia to examine the causal factors of misunderstandings in ELF, Rahimi and Ruzrokh (2016) and Walker (2010) in the Middle Eastern context, and Wach (2011) in Europe. The studies have rightly broadened the LFC features or intelligible phonological characteristics in more specific contexts of interaction. Moreover, it has been suggested that different pronunciation priorities should be taken into account in accommodation with a distinctive cultural background to achieve effective communication.

In South Korea, there is a growing number of studies in support of incorporating the concept of intelligibility into L2 pronunciation studies, yet research that addresses the intelligibility of KoE has failed to uncover phonological priorities for KSLs. Lee (2014) investigated the intelligibility of focus intonation, comparing natives and nonnatives (Korean). It was confirmed that no significant difference between the two speeches. Kang and Ahn (2013) compared the third formant (F3) transition of [r] phoneme by KSLs and that of native English speakers, along with perceptional intelligibility. While native and KSLs displayed contrasts in the F3 range, it was suggested that the broader range of F3 measurement was considered intelligible to native English speakers. Meanwhile, Chung, Lee, and Kim (2016) compared the effects of personal qualities on intelligibility using acoustically measurable speech rhythms (%V, ΔV, VarcoV, and nPVI-V) of speakers from Korea and Hong Kong. In a recent study by Barrass, Baffoe-Djan, Rose, and Boggs (2020) KoE intelligibility was examined, focusing on segmental features targeting Mandarin-speaking learners of English, indicating three KoE reducing factors: vowel epenthesis, incorrect substitution for plosives, and the consonant-vowel combination.

In hampering KoE intelligibility, L1 phonological influences have been a common attribution, for they are frequently considered a significant interference factor in perceiving and producing L2. In Flege's (1995) Speech Learning Mode, similarities between L1 and L2 features were considered an account of the difficulties in the perception of L2. As far as L2 productions are concerned, however, Major and Faudree (1996) pointed out that differences in phonetic categories between English and Korean often cause KSLs to properly pronounce. In terms of markedness (Eckman, 1977), voiced consonants in the initial position are a more marked feature than those in L1 to KSLs, and it led KSLs to find it more challenging to acquire it (Major & Faudree, 1996). The fact that the lack of voiced consonants in the Korean language has often been referred to as a source of the problem in

KoE (Chang, 2007; Choi, Kim & Cho, 2016; Kang, 2008; Shin, 2015). Further, difficulties in production L2 have been attributed to some English vowel sounds, back vowels, and /æ, ɪ, ɜ / considered *new* to KSLs (Kim, 2010; Lee & Cho, 2020; Shin, 2015), to the two allophonic realization /l/ and /ɾ/ of Korean liquid sounds (Chung, 2011; Jun, 2004; Kim, 2015; Shin, 2015), and Korean as a tonal language with no lexical stress (Jeon, 2015) pointed out to cause the difficulties in the production of English.

The previous studies have revealed a tendency to test the intelligibility of selective segmental or suprasegmental features. Also, experimental participant-judges involved in the intelligibility test showed a limited range of language backgrounds. Overall, endeavors to assign priority to the KoE intelligibility in preparation for effective ELF communication are inconclusive. Thus, comprehensive information about the intelligibility of KoE is likely to be beneficial.

3. RESEARCH METHODOLOGY

3.1. Participants

3.1.1. Listeners: Intelligibility test-takers

A total of 80 normally hearing adults from 14 countries — Brazil, Canada, China, India, Indonesia, Ireland, Jamaica, Japan, Korea, Thailand, United Kingdom, USA, and Venezuela — took part in the intelligibility test. The intelligibility test was administered to four different groups: Japanese-speaking learners of English (JSLs), Korean-speaking learners of English (KSLs), native English-speaking college students (NSs), and native English-speaking professors residing in Korea (NTs). Based on the length of exposure to the KoE accent, two of the four groups were regarded as more homogeneous in terms of familiarity with KoE. JSLs and NSs were categorized as being less familiar with KoE (lower familiarity), while KSLs and NTs were classified as being more familiar with KoE (higher familiarity).

Higher Familiarity category: This grouping was composed of 30 KSLs and ten NTs. KSLs included Korean students enrolled at a university in Daejeon, Korea whose ages ranged from 18 to 24 (mean age 20). NTs were English speaking faculty members at two universities in Daejeon, South Korea (mean age 44.6). It is reasonably assumed that they were familiar with KoE because they have been teaching KSLs for over a decade while residing in South Korea.

Lower Familiarity category: This grouping was made up of ten JSLs and 30 NSs. JSLs consisted of college students majoring in International Relations in Kyoto, Japan (mean

age 18.7). NSs were a fairly international group with seven nationalities represented, and all college students enrolled in a university in Durham, NC, USA (mean age 23.7). Two students in this group reported that they had migrated in early childhood (from China and Venezuela); they were bilingual in their first language and English.

At the same time, groupings with similar degree of KoE familiarity had conflicting characteristics concerning English usage settings, in that this group comprised of both native and nonnative speakers. The two groups of nonnative English users, JSLs and KSLs, were considered to have similar levels of English listening comprehension skills. Based on the listening scores in OPT by Allan (2004), these two groups of nonnative speakers were found to have no statistically significant differences in their English listening skills [M = 79 (out of 100), SD = 7.23, F (1, 38) = 2.770, p = 0.104]. Table 1 shows the characteristics of the listening test takers.

TABLE 1

Characteristics of Listening Test Takers

Familiarity with KoE	Group	Age Range (Mean)	Gender (%)	Country of Birth (%)
Higher	KSLs	18~24 (20.0)	F (56.7), M (43.3)	Korea (100.0)
	NTs	34~50 (44.6)	F (10.0), M (90.0)	Canada (60.0), Ireland (10.0), USA (30.0)
	JSLs	18~20 (18.7)	F (40.0), M (60.0)	Brazil (10.0), Indonesia (10.0), Japan (80.0)
Lower	NSs	18~54 (23.7)	F (60.0), M (40.0)	China (3.3), India (6.7), Ireland (3.3), Jamaica (6.7), UK (3.3), US (73.4), Venezuela (3.3)

Note. JSLs (N = 10); KSLs (N = 30); NSs (N = 10); NTs (N = 30)

3.1.2. Audio speakers

Six college students whose first language is Korean served as speakers for this study. Of the six speakers, three were female and three male, with ages between 18 and 23 (mean age 20.7). Institutional Review Board (IRB)-approved consent forms were obtained from all speakers. Efforts were made to include speakers with similar levels of English proficiency and linguistic background. All speakers were judged to be at an intermediate level of English based on results of the Oxford Placement Test 1 (OPT) (Allan, 2004). They were at level A2 of the Common European Framework of Reference (CEFR), without statistical differences [111.67 ± 15.055, χ^2 (3) = 0.194, p = 0.200]. In addition, speakers reported having no study abroad experience and had similar birthplace regions: the central part of South Korea, Chungcheong Province, and Daejeon. Individual differences of speakers, therefore, should not affect their performance in the intelligibility test.

3.2. Materials

3.2.1. Stimuli sentences

The stimuli were adapted from the listening session of the OPT (Allan, 2004) after permission to retest from the author was obtained. Totaling 100 items, items consisted of a sentence with a target word. An example item with the target word underlined from the assessment includes: *I gather you've been having trouble with your hearing*. Items had an average grade level of 4.35 in the Flesch-Kincaid Grade scale, or 'easy to read by nine- to ten-year-olds.' Moreover, the CEFR levels assigned to all target words in the sentences were found to be at A2 on average, classified as intermediate.

TABLE 2

Intelligibility Factors for Korean-speaking Learners of English (KSLs)

(Adapted from Chung & Bong, 2019)

Factor (*N* of items included)	Description	Example
[F1] [-voice] (15)	Voiceless consonants to be either in onset, medial, or coda position	Pre**c**edent, fi**s**cal, **k**inds
[F2] [+voice] (15)	Voiced consonants regardless of word positions	joy**s**, **D**ennis, **n**ewer
[F3] Lateral /l/ (7)	Lateral /l/ regardless of word positions	**l**oyal, arriva**l**, be**ll**y
[F4] Rhotic /r/ (7)	Rhotic /r/ regardless of word positions	**r**a**r**ely, t**r**ials, **r**eading
[F5] Front, central vowels (15)	/i, ɪ, e, ɛ, æ, ə, ɜ/	m**i**ni, m**e**nial, m**a**ss,
[F6] Back vowels (8)	/u, ʊ, o, ɔ, ɑ/	w**ou**ldn't, t**a**lk, **au**tistic
[F7] Vowel length (14)	Diphthongs, coda voicing effect	**o**ld, sh**o**d, injur**e**d
[F8] Stress (6)	Stress in polysyllabic words	Person**NEL**, **DELI**cate, de**FI**ance
[F9] Re-syllabification (7)	Syllable assimilation, consonant elision	hat**ch**, clock**s,** collect**ed**

Note. The main phonetic information of the target words in the *Example* column is highlighted in bold.

The stimuli sentences were divided into nine groups based on the intelligibility factors identified in the previous study (Chung & Bong, 2019). In that study, factors affecting the intelligibility of four English varieties toward KSLs were examined. The study identified five features that affect intelligibility: voicing, liquid sounds, vowel quality, vowel length, and suprasegmental features. Mainly rooted in the presence or absence of L2 phonological features in the L1, each factor was sub-divided into binary features which were presumed

to increase or decrease the intelligibility. Nonetheless, our study's difference from previous research is that all sub-features have been examined separately as primary factors to determine which factors have more significant impacts on KoE intelligibility. These factors provided a baseline to classify the target words into groups and to further compare them qualitatively and quantitatively. The list of intelligibility factors that served as the core reference in the categorization is shown in Table 2.

The classification procedure was done based on distinctive features emerged between target words and their commonly misrecognized words. For example, the target word "horrid day" in item 14 was classified as F4 Rhotic /r/, owing to liquid contrast found in the most frequent error, "holiday." The first factor of the 15 target words was devoiced obstruent regardless of which word position the feature was placed in. The second factor included fifteen target words with voiced consonants irrespective of word position. The third and fourth factors included seven words with lateral /l/ and rhotic /r/, respectively, without any contrast in place. The fifth factor involved 15 target words with front and central vowels /i, ɪ, e, ɛ, æ, ə, ɜ/; eight target words including back vowels /u, ʊ, o, ɔ, ɑ/ were included in the sixth factor. The seventh factor consisted of 14 target words with two contributing factors, diphthongs, and the coda voicing effect (effects of coda voicing on vowel duration). The last two factors were associated with suprasegmental features, one with stress placement in polysyllabic words and the other with re-syllabification through assimilation to nearby consonants or through consonant elision.

3.2.2. Recordings and test material

Recordings of the six speakers were made in a quiet office at a university. Stimuli sentences were read aloud as practice before the recordings. A Zoom H1 microphone was mounted adjacent to a speaker, and sentences were recorded one at a time. Recordings of sentences were repeated until satisfactory quality was obtained, since a few sentences were difficult for the speakers to read. All recording files were then digitized at 16 bits and 44 kHz and edited by a technician. From several versions, a hundred sentences were selected and randomly organized with different speaker order. Each sentence (item) was repeated two times with 5-second silent intervals between.

To measure the level of KoE intelligibility, a listening cloze test was conducted. A hundred sentences in which target words were deleted and replaced with a blank were given to be filled in after listening to the audio. Cronbach's alpha value indicated that the test instrument was highly reliable (α = 0.854).

3.3. Data Collection Procedures

The intelligibility tests were conducted in classrooms at four universities, differing by country: one in Kyoto, Japan, two in Daejeon, Korea, and one in North Carolina, US. All of the tests were administered at separate times for each country: from July 4 to July 11, 2019 in Japan, from November 29 to December 7, 2018 and on May 22, 2019 in Korea, and from January 24 to 27, 2020 in the US. Each session began with the researcher explaining the purpose of the study; participants were given IRB approved informed consent forms, test papers, and pens. Wearing a headphone or earphone, each participant then listened to the audio and filled in the blanks. They were told that they could pause the audio to write down the answers at their own pace but could not play back. This self-paced test method should have contributed to reducing the effects arising from test-takers' fatigue on the performance. For JSLs and KSLs whose native language is not English, an English listening test (OPT) (Allan, 2004) consisting of 100 items, was subsequently carried out. After the test was completed, participants received a small reward based on the average hourly wage of the host country or other equivalent benefit.

3.4. Data Analysis

The percentage of items transcribed correctly by intelligibility test-takers was calculated by the same researcher within a few days of test completion. A transcribed word scored correctly when all the written words were correctly spelled, including morphological affixes (e.g., *found* considered incorrect if the target word contained the past tense ending *founded*). In general, transcriptions were not considered incorrect for the following cases because these errors would not have an impact in spoken conversation: capitalization errors for proper nouns (i.e., Dennis = dennis), compound noun forms either spaced, hyphenated, or closed (i.e., hair dryers = hair-dryers = hairdryers), contraction of a verb (i.e., she's = she is), and numbers to spell out or to use numerals (i.e., 40p = forty p).

Subsequently, the mean rates were compared by listener group to test the assumption that familiarity affects intelligibility level of KoE. An independent t-test was carried out for this examination. In addition, each item was categorized into the nine phonetic factors that account for facilitating or impeding the intelligibility of KoE (Chung & Bong, 2019). This categorization allowed us to indicate which key factors should be prioritized for improving the intelligibility of KoE. According to the factor categorization, a Kruskal-Wallis H test (a nonparametric ANOVA) was done to compare mean rates among four listener groups. Since the number of participants in the two groups, JSLs and NTs, was less than 30, a non-parametric test instead of a parametric test (*t*-test or ANOVA) was conducted. Lastly, stepwise multiple regression analysis was conducted on the nine factors of KoE

intelligibility to find the most important determiners predicting the level of intelligibility of KoE speech.

4. RESULTS AND DISCUSSIONS

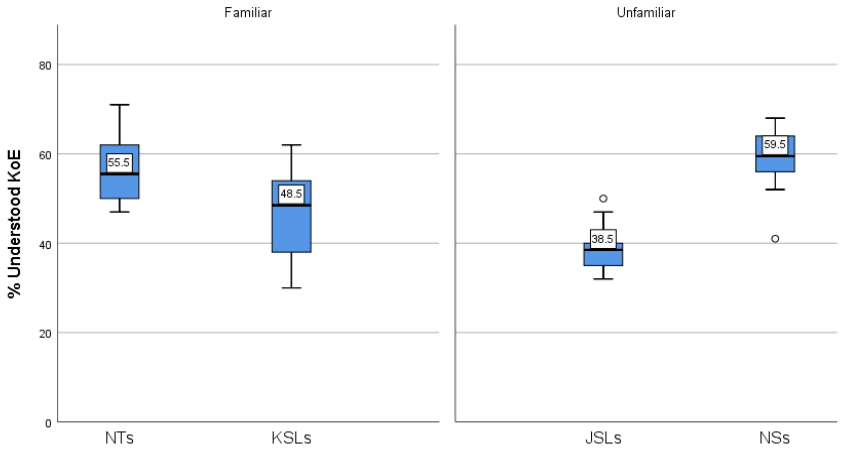
4.1. KoE Intelligibility Across Countries: Listener Group Performance

4.1.1. Overall comparisons by listener groups

Overall results of the KoE listening test are presented in Figure 1, which gives the average rate by the four listener groups. Results indicate that KoE was most intelligible to native English-speaking college students (NSs) (*M* = 59.1, *SD* = 5.695), followed by native English-speaking professors living in Korea (NTs) (*M* = 56.4, *SD* = 8.262), and Korean college students (KSLs) (*M* = 46.9, *SD* = 8.497). KoE was found to be least intelligible to Japanese speaking learners of English (JSLs) (*M* = 39.0, *SD* = 5.754).

FIGURE 1

Mean Correct Rates in KoE Listening Test by Listeners' Groups



Mean rates of less than 60% for all listener groups are of particular importance because, in several previous studies, the cut-off threshold of intelligible speech is 60%. Kirkpatrick and Saunders (2005) conducted a small-scale study of the intelligibility of Singaporean English among local and international students at an Australian university. The great

majority of listeners reached the criterion of 60% of correct answers in the listening test, indicating that Singaporean English was highly intelligible. Smith and Nelson (2006) examined the intelligibility of five pairs of speakers with different L1. The more than 60% correct answer rates were considered in the study to indicate intelligibility, and the numbers of listeners who found an accent intelligible were compared among the three groups. Given that the mean rates for KoE went under 60%, it appears that all listener groups experienced some difficulties identifying English sounds in the KoE accent. This lends support to the notorious perception of KoE speech as 'strange,' 'harsh,' and 'quarrel-like' for respondents with various language backgrounds (Jenkins, 2007).

When KoE intelligibility scores were compared between two groups with different familiarity with KoE (higher vs. lower), statistical differences were found using an independent t-test [$t(78) = -2.156$, $p = 0.034$]. The average intelligibility scores achieved by familiar listener groups were 55.5% for NTs and 48.5% for KSLs. Meanwhile, mean intelligibility estimates of less familiar groups were 59.5% for NSs and 38.5% for JSLs. Interestingly, the findings showed that the less familiar groups ($N = 40$), JSLs and NSs, performed statistically significantly better (54.1 ± 10.462 mean rate) than the more familiar groups ($N = 40$, 49.3 ± 9.310), NTs and KSLs. These results suggest that degree of familiarity with the KoE accent is less likely to affect the intelligibility level. Even though the overall intelligibility level of KoE falls short of the intelligible speech criteria (> 60%), exposure to KoE was also found to be of little importance in improving the level of intelligibility. Listener familiarity with an accent has been regarded as a facilitating factor in general; however, the current data resulted in outcomes antithetical to that argument. The intelligibility benefits of accent familiarity, as supported in many studies — Gass and Varonis (1984), Matsuura (2007), Newbold (2017), Smith (1992), Smith and Nelson (2006), along with some others claiming a shared-L1 advantage in several studies (Bent & Bradlow, 2003; Harding, 2012; Wang & van Heuven, 2015; Xie & Fowler, 2013) — was not observed to be a deciding factor in this study. Rather surprisingly, being familiar with KoE did not ensure KoE intelligibility (Chung & Bong, 2017; Fuse et al., 2018).

To be fair, various listener factors affecting intelligibility have been supported by prior studies. L1 phonological influences (e.g., Best & Tyler, 2007; Flege, 1995; Major & Faudress, 1996), length and quality of L2 exposure (Flege & Liu, 2001), or even listeners' social group (Lippi-Green, 1997) may have contributed to struggles for listeners to perceive or produce English sounds. The finding that native English listeners (NSs and NTs) performed better in testing KoE intelligibility suggest that listeners tend to use information that corresponds to the rules of their L1 phonology. Nonnative listeners might therefore find difficult to process the different phonological features to identify. This finding supports the case that listener English proficiency has a strong influence in determining KoE intelligibility (Lim et al., 2016).

4.1.2. Comparison of phonological factors by listener groups

Mean intelligibility rates of the nine intelligibility factors categorized ranged from 36.5% to 76.7%. Across all factors, the highest mean rate score was 76.7% for Factor 9 [F9], Re-syllabification (*SD* = .116). Although the sources of re-syllabification, such as omission of morphological endings and inappropriate syllable assimilation, are common errors among nonnative speakers (Klein et al., 2004; Lee, 2001; Rimikis, Smiljanic, & Calandruccio, 2013), the findings implied that this factor did not necessarily hinder intelligibility of KoE. Other factors, however, appeared to diminish the intelligibility of KoE, as the correct average rates were less than the threshold of intelligibility criteria of 60% (Kirkpatrick & Saunders, 2005; Smith & Nelson, 2006). Two intelligibility factors related to consonant voicing, the voiceless consonant factor [F1] [-voice] and its counterpart, [F2] [+voice], showed mean rates of 57.1% (SD = .116) and 51.6% (SD = .124), respectively. Factor 7 vowel length, was a close third with a mean rate of 51.3% (*SD* = .131). The mean rates for the next three KoE intelligibility factors were found to be within 43.0-48.9%. They were: [F3] Lateral /l/, [F6] Back vowels, [F5] Front, central vowels, and [F4] Rhotic /r/ factors. The mean rate for [F8] Stress factor exhibited the lowest performance out of the nine factors, indicating that word-stress triggered severe difficulties in recognizing KoE speech.

As mentioned in the literature review, similarities and differences between L1 and L2 were noted by multiple researchers, suggesting that L1 influence manifests in L2 perception and production. In general, although the difference was not significant, a weak L1 effect appeared. The L1-congruent features of KoE, having equivalent or approximant Korean sounds, received slightly higher mean scores than did incongruent stimuli. Words containing [F1] voiceless consonants were more intelligible than [F2] voiced stimuli, and [F3] lateral /l/ words were better recognized than words with [F4] rhotic /r/ sounds. [F6] Back vowels received lower mean rates than [F5] front and central vowels, as supported by Lee (2001) arguing that the conflations of the back vowels /ɔ, ʊ/ with pure /o/ are typical problems KSLs would experience. This finding is aligned with the idea of somewhat negative L1 influences in L2 production found in a body of research (Chang, 2007; Choi et al., 2016; Kang, 2008; Kim, 2015; Kim, 2010; Lee & Cho, 2020; Shin, 2015). The mean rates of nine intelligibility factors were calculated and compared by four listener groups, as shown in Table 3 below.

TABLE 3

KoE Intelligibility Scores for Each Key Phonological Factor by Listener Groups

	More Familiar		Less Familiar					
	NTs (A)	KSLs (B)	NSs (C)	JSLs (D)	Total			*Bonferroni*
Factor	*M* ± *SD*	*M* ± *SD*	*M* ± *SD*	*M* ± *SD*	*M* ± *SD*	χ^2	*p*	Post-Hoc
F1	61.33±.098	51.11±.110	63.33±.084	52.00±.133	57.1±.116	21.285	.000	B<C
F2	55.33±.151	53.56±.117	53.78±.093	35.33±.077	51.6±.124	18.567	.000	D < A=B=C
F3	55.71±.207	41.43±.156	60.48±.171	30.00±.142	48.9±.198	25.432	.000	B=D<C
F4	40.00±.188	45.24±.119	46.19±.166	30.00±.196	43.0±.163	6.103	.107	-
F5	48.67±.100	36.00±.162	54.89±.118	34.67±.098	44.5±.159	26.276	.000	B=D<C
F6	51.25±.161	38.75±.100	54.58±.096	35.00±.165	45.8±.141	28.970	.000	B=D<C
F7	54.29±.096	47.86±.114	59.05±.108	35.00±.086	51.3±.131	29.346	.000	B=D<C
F8	48.33±.166	28.89±.214	44.44±.141	23.33±.086	36.5±.191	22.134	.000	B=D<A=C
F9	81.43±.151	70.48±.154	86.67±.112	62.86±.193	76.7±.168	22.096	.000	B=D<C

Note. NTs (*N* = 10), KSLs (*N* = 30), NSs (*N* = 30), JSLs (*N* = 10), Total (*N* = 80); *df* = 3; *p* values were corrected using the Bonferroni-method.

To scrutinize which listener groups varied significantly from one another, the KoE intelligibility scores for each of the nine factors from the four listener groups were compared. Native English speaking professors in Korea, *NTs*, whose familiarity is presumably higher, generally achieved mean scores across nine factors higher than those of the two nonnative listener groups, JSLs and KSLs. However, the findings indicated that the mean rate differences were generally not strong enough to be statistically significant from those of the other listener groups. It turned out that, for seven factors out of nine, KoE was neither more nor less likely to be understood better by native English speaking professors teaching in Korea. However, there were cases in which their scores were the highest among all groups. The mean rates of understood voiced consonants and stress features, classified in [F2] [+voice] and [F8] Stress, were significantly higher than the other two groups of nonnative listeners. Yet, the differences with native English college students, *NSs*, were not remarkable. It indicated that NTs and NSs both found these two factors similarly intelligible. Still, considering that their scores were the highest for those two factors, it is plausible to consider that the intelligibility of voiced consonants and stressed words in KoE accent is likely to be reinforced by accent familiarity.

Even for KSLs, the group of listeners who share the same L1 as the audio speakers, effects of familiarity with KoE were rather minimal as opposed to ISIB (Bent & Bradlow, 2003) or a shared-L1 advantage (Harding, 2012). However, the findings showed that KSLs relatively better-recognized words containing voiced consonants in particular ([F2] [+voice] factor). The percentage of words with voiced consonants correctly understood by KSLs was significantly higher than that for JSLs, but the mean rates were not as high as those for native ears. Furthermore, KSLs managed to understand re-syllabified words ([F9] Re-syllabification) at a mean rate of 70.48% (> 60%). Nonetheless, the correct average rates were clearly lower than those of NSs. For the remaining eight factors, the findings

seem to dispense with theories that involve benefits of intelligibility for those who share the first language.

The findings from one of the lower familiarity groups were of interest. NSs, the group of native English speaking college students, outperformed other listener groups. Their higher performance was evident in six factors amongst nine (accounting for 66.7%): [F1] [-voice]; [F3] Lateral /l/; [F5] Front, central vowels; [F6] Back vowels; [F7] Vowel length; and [F9] Re-syllabification. Of the six, three factors [F1, F3, and F9] also indicated intelligible, as the correct average rates were over 60% (intelligibility threshold). The other three factors [F5, F6, and F7] were below the intelligibility criteria; however, there was often a statistical difference of 15% or more with two other groups from the expanding circle countries (JSLs and KSLs). Apparently, NSs better recognized the English words in KoE than did the two nonnative speaking groups, JSLs and KSLs. On the other hand, NSs also experienced as much difficulty recognizing KoE as other listener groups: regarding [F4] Rhotic /r/ factor, the second-worst factor of all, correct average rates of NSs were not significantly different from those of the three other listener groups. This factor shows the notorious feature of KoE that it has low intelligibility irrespective of listener nationality. The findings also provide evidence that Koreans find difficulty producing the English /r/ phoneme (Chung, 2011; Kim, 2015; Shin, 2015), possibly because it does not exist in the Korean inventory.

The JSLs, another group with low familiarity toward KoE, were somewhat tolerant of [F9] re-syllabled stimuli in KoE (M = 62.86, SD = .193), but were likely to be confused with understanding other KoE factors (< 60%). [F1] [-voice], voiceless consonants, was found to be the next highest intelligible factor for JSLs, followed by [F2] [+voice], voiced consonants. Vowel length difference, back vowels, and fronted vowels followed. Both liquid sounds, /r-l/, and stress were rated as the three most problematic factors for JSLs in understanding KoE. The mean rate difference from KSLs was not statistically significant; however, just from the numbers, JSLs seemed to face a relatively more difficult struggle, showing lower average correct rates.

Further comparison of KoE intelligibility factors by listener groups suggests that L1 inventory was not considered as a mere manifestation. Apart from L1 influence, language proficiency generally appeared to modulate KoE intelligibility. To the ears of native English speakers, who performed significantly well on the intelligibility test, KoE was found to be more intelligible than it was for nonnatives in all nine factors. No doubt this tendency was affected by the English proficiency of the listeners. While NSs were fluent speakers, capable of recognizing and comprehending different English varieties, both JSLs and KSLs were foreign language learners of English, less proficient groups than NSs. Besides this, undoubtedly not as profound a difference as English proficiency; the influence of familiarity with KoE may still be worthy of attention. Both groups that had

more exposure to KoE, the NTs and KSLs, reached higher average correct rates when they listened to target words involving voiced consonants. This finding suggests that familiarity with KoE can facilitate at least identifying [F2] [+voice] features in KoE, unlike other intelligibility features.

4.2. Factors Affecting KoE Intelligibility

In seeking further contributing factors that determine the intelligibility level of KoE, stepwise multiple regression analysis was applied to the nine intelligibility predictors. Beforehand, it was necessary to avoid multicollinearity amid the nine factors. For this, the relationship between the nine intelligibility factors was examined by generating a correlation matrix, shown in Table 4. The findings show that the nine factors were correlated with statistically significant differences ($p < 0.05$). At the same time, moderate correlation coefficient value estimates ranged from 0.239 to 0.556, which would reduce multicollinearity problems.

TABLE 4

Pearson-*r* Correlation Matrix for Nine Intelligibility Factors

Factors	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	-								
F2	.242*	-							
F3	.403**	.256*	-						
F4	.283*	.408**	.413**	-					
F5	.556**	.301**	.487**	.308**	-				
F6	.389**	.406**	.386**	.388**	.435**	-			
F7	.440**	.375**	.509**	.301**	.517**	.361**	-		
F8	.402**	.404**	.459**	.278*	.554**	.481**	.471**	-	
F9	.468**	.239*	.411**	.374**	.488**	.484**	.385**	.396**	-

*$p < .05$, **$p < 0.01$

Consequently, stepwise linear regression was executed for the nine intelligibility factors to examine the best set of predictors of KoE intelligibility. All nine factors included forming the model in a statistically significant finding, which would influence measurements of intelligibility in KoE speech. Furthermore, the Durbin-Watson test showed that there is no autocorrelation ($p = .000$), indicating that residues are independent. The following explain 99.7% of the level of KoE intelligibility, in order as follows: (1) [F5] Front, central vowels, (2) [F7] Vowel length, (3) [F6] Back vowels, (4) [F2] [+voice], (5) [F3] Lateral /l/, (6) [F1] [-voice], (7) Re-syllabification, (8) [F8] Stress, and (9) [F4] Rhotic /r/ (see Table 5).

TABLE 5

Multiple Regression Analysis of KoE Intelligibility

Independent Variables Entered	Unstandardized Coefficient Variables		Standardized Coefficients			
	B	SE	*β*	*t*	*p*	R^2 Change
(constant)	1.219	0.591		2.063	0.043	
[F5] Front, central vowels	15.967	0.791	0.251	20.187	0.000	0.636
[F7] Vowel length	14.397	0.883	0.186	16.298	0.000	0.137
[F6] Back vowels	8.785	0.811	0.122	10.827	0.000	0.087
[F2] [+voice]	15.216	0.864	0.186	17.620	0.000	0.039
[F3] Lateral /l/	8.370	0.583	0.163	14.367	0.000	0.038
[F1] [-voice]	15.439	0.974	0.177	15.850	0.000	0.028
[F9] Re-Syllabification	8.096	0.676	0.134	11.984	0.000	0.015
[F8] Stress	6.558	0.619	0.124	10.590	0.000	0.007
[F4] Rhotic /r/	6.003	0.654	0.097	9.173	0.000	0.006

R^2 = .997 (Adjusted R^2 = .995), Durbin-Watson 2.002 F = 84.145, df = 1, 70, p = .000

Note. B values are regression coefficients; SE, standard error of B; and *β*, Beta

Above all, the most important predictor in determining KoE intelligibility was found to be front and central vowel sounds. The findings indicated that 63.6% of the variation in KoE intelligibility was explained by [F5] Front, central vowels, showing that those who better recognize fronted vowels of KoE tend to find KoE more intelligible in general. Vowels are easily heard, while consonants help to determine and to distinguish speech sounds. This is partly because of the acoustic prominence of consonants having energy distributed in a higher frequency range of speech as compared with vowels (Sataloff, 1966). However, this finding that intelligible vowels, more fronted vowels in particular, would facilitate overall KoE intelligibility. It suggests that it is equally important to pay attention to the front, central vowels, which KSLs are predisposed to produce with tensed vowels in front and central areas because of the absence of lax vowels in Korean (Kim, 2010; Lee & Cho, 2020; Shin, 2015).

The other KoE intelligibility factors positively, statistically, and significantly predicted KoE intelligibility, but did not have values as high as the fronted vowel factor (<14%). These were followed by other vowel features of [F7] Vowel length and [F6] Back vowels, which showed 13.7% and 8.7% variation, respectively. These top three factors with the highest explanatory value, however, indicate that the aspects that make KoE most intelligible are more likely to involve vowel-associated sounds. The findings leave us skeptical about LFC's general applicability in that vowel quality and quantity are less detrimental than consonant features (Jenkins, 2000). It appears that, to maintain the intelligibility of KoE, more attention should be paid to English vowel sounds and length.

5. CONCLUSION

In the current study, the effects of both listener and speaker variables on KoE intelligibility have been examined. On the basis of the findings described above, we can conclude that KoE intelligibility is not very high, and that KoE accent familiarity, while it influences intelligibility to some extent, is by no means the critical variable. Overall, the KoE intelligibility scores of the four listener groups indicated that those with less (lower) familiarity recognized KoE significantly better than those with higher familiarity. The findings do suggest that the intelligibility of KoE may be influenced by the listener's English competency than those of accent familiarity. Even between the lower familiarity groups—Japanese-speaking learners of English and native English college students—there was inconsistent performance. The mean rates in the KoE intelligibility test indicated either best or worst. For the higher familiarity group, it was solely the voiced consonant feature of KoE that could be beneficial for the higher familiarity groups (Korean college students and native English professors living in Korea for more than a decade) since they found it more intelligible than did the other groups. The findings cast doubt on the claims of listener familiarity benefits that ISIB (Bent & Bradlow, 2003) or the Shared-L1 advantage (Harding, 2012) are supposed to confer, while supporting the claim by Lim et al. (2016) that English proficiency of listener appears a decisive factor in KoE intelligibility.

Further, the comparison between nine intelligibility factors from the KSLs' speech yielded an interesting finding. The vowel quality, front and central vowels in particular, was found to be the strongest deciding factor and to have the highest explanatory power in determining KoE intelligibility. In other words, the intelligibility of KoE is clearly affected by the quality of KSLs' front and central vowel sounds. The more intelligible the front and central vowel sounds are, the more likely it is that other KoE speech sounds will be intelligible. Given that a comparison was made between the mean values of the nine factors for all listener groups, the front and central vowels in KoE appear to be the primary factor influencing intelligibility in ELF situations in which people of various language backgrounds are involved.

Unlike the research that tends to focus on singling out the feature(s) of nonnative speakers that are divergent from native-like pronunciation, the results above suggest what should be given a key priority in order for enhancing KoE intelligibility, and what roles listener's familiarity with KoE plays on its intelligibility. Further research of this kind and methodological improvements such as expanding ELF participants encompassing a variety of English proficiency levels (e.g., KSLs with lower or higher levels of English) and a variety of first languages (e.g., Chinese) will allow not only to identify impeding features of KoE intelligibility that hamper ELF communication (world Englishes communication), but also to categorize the properties of KoE. This knowledge will certainly be

implementable in English language education in Korea, and helpful in building up an understanding of what actually is required, specific to KSLs, at a certain level in intelligibility improvement, thereby allowing better accommodation to ELF contexts.

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Applicable levels: Tertiary

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