Castledown

Intelligibility of L2 speech in ELF

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Abstract

This paper investigates the phonology of L2 speech and its impact on intelligibility in English as a Lingua Franca (ELF) contexts. Many studies have considered speaker-related characteristics, such as speech styles and pronunciation features, that influence the intelligibility of L2 speech for both non-native speakers (NNS) and native speakers (NS). However, only a handful of studies have considered what impact listener-related conditions, such as a shared first language (L1) background or L1 typology between NNSs, may have on the intelligibility of their speech. Therefore, an online survey was used to study the intelligibility of Mandarin-English, French-English, Japanese-English, and German-English from the perspective of 100 NNSs. It was hypothesized that a shared L1 or shared L1 typology between two NNSs will enhance the intelligibility of their speech. However, the findings did not support this supposition. For example, the Mandarin speakers did not find Mandarin-English to be more intelligible than Japanese-English or any of the other two accent types. Similarly, the results indicated that a shared L1 typology between two NNSs does not improve the intelligibility of their speech. The data did suggest however that a listeners' familiarity to one accent type may improve the intelligibility of a typologically related novel L2 accent. The limitations of the findings are discussed along with their implications for future research directions.

Keywords: intelligibility, L2 speech, shared L1, shared L1 typology, English as a Lingua Franca

Introduction

English is now the mostly widely used language around the globe and has established itself as the world's lingual franca. In fact, Strevens (1992) defined ELF perfectly when he noted that most of the English used in the world today "relates to [non-native speaker-NNS] populations requiring English… for dealing with other NNS populations, without the presence or intervention of native speakers [NS]" (as cited in Kachru, 1992b, p. 41). This shift has led scholars to reflect on traditional ideas about models of English language diaspora, the nature of ELF, the role of English as a language for communication vs identity, the identity of its users, attitudes towards varieties of English, and English language education. Central to many of these reflections is the concept of intelligibility, and what it means given

how English is being spoken in the world today.

In order to define *intelligibility*, one needs to appreciate that intelligibility is considered by many as the first level involved in the understanding of spoken text. Smith (1992) differentiated this understanding into three levels: intelligibility, comprehensibility, and interpretability. Bamgbose (1998) later explicated these levels by stating that the understanding of spoken text involves "recognizing an expression, knowing its meaning, and knowing what that meaning signifies in the sociocultural context" (p. 11). In light of the work by Kirkpatrick, Deterding, and Wong (2008), Munro and Derwing (1999), and Smith and Nelson (1985), *intelligibility* here refers to a listener's ability to accurately recognize and record individual words. *Comprehensibility* may be defined as the proposition that listeners have about the locutionary force of utterances. *Interpretability* is the proposition that a listener has about the illocutionary force behind an utterance. Thus, it may be argued that intelligibility concerns the phonology of speech, while comprehensibility is associated with lexiogrammar, and interpretability is the pragmatic force of an utterance.

Since NSs are no longer the dominant users of English, there has been a gradual shift in academic discourse in how researchers think about the intelligibility of different Englishes. Bamgbose (1998) was one of the first scholars to highlight a change in perspective was needed. He questioned the idea that only NSs can adjudicate the intelligibility of English spoken in outer circle countries. Likewise, Jenkins (2005) also expressed her concern about NS ideologies governing discussions about emerging Englishes and notions of standards in contexts such as ELF. While many studies such as Pease (2016) continue to investigate the intelligibility of L2 speech from the perspective of NSs, there are others that have taken a different approach. For example, a study by Matsuura, Rilling, Chiba, Kim and Rini (2017) asked not only NNSs to judge the intelligibility of Japanese- English, but also listeners from Indonesia, the Philippines, and South Korea. Wilang and Singhasiri (2017) also investigated the intelligibility of Cameroon-English and Vietnam-English from the perspective of L2 users from 21 non-English speaking countries. In sum, there is still a great deal to be learnt about the intelligibility of L2 speech in ELF.

The aim of this paper is to answer two questions about the intelligibility of L2 speech in ELF. Firstly, does sharing an L1 with one's interlocutor have an impact on the intelligibility of their speech? And secondly, will a shared phonological typology, such as Mora, Stress, Tone and Syllable, between two NNSs benefit intelligibility?

Factors Influencing Intelligibility

Shared L1

While many studies have demonstrated that speaker-related factors, such as pronunciation features, influence the intelligibility of L2 speech, one must not forget the role of the listener in the intelligibility of speech. One such role is the listener who shares the same L1 accent as the speaker (e.g. a Mandarin speaker having a conversation in English with another Mandarin speaker), and whether this enhances or hinders intelligibility. Smith and Bisazza (1982) and Munro, Derwing, and Morton (2006) both observed an improvement in understanding when the listener and speaker shared an L1. Bent and Bradlow (2003) described this advantage as the Interlanguage Speech Intelligibility Benefit (ISIB). When studying the ISIB, Hayes-Harb, Smith, Bent, and Bradlow (2008) found that native Mandarin speakers could accurately identify more Mandarin-English words than their NS counterparts. Harding (2012) also found that "Mandarin Chinese L1 listeners were clearly advantaged across several items on the test featuring a Mandarin Chinese L1 speaker" (p. 163). However, the findings of other studies have not been as conclusive. A study by Major, Fitzmaurice, Bunta, and Balasubramanian (2002) found

that native speakers of Chinese scored significantly lower when listening to speakers who shared their native language, while native speakers of Spanish scored significantly higher when listening to Spanish-accented speech. And a study by Kang, Thomson, and Moran (2018) found that neither Chinese nor Mexican speakers scored significantly higher when listening to speakers who shared their native language.

These conflicting results are likely in part due to different methodological perspectives and the tools used to measure intelligibility. For example, intelligibility has been measured using repetition tasks (Wingstedt & Schulman, 1987, as cited in Floccia, Butler, Goslin, & Ellis, 2009, p. 380); mispronunciation detection (Shmid & Yeni-Komshian, 1999, as cited in Floccia *et al*., 2009, p. 380); sentence recognition tasks (Bent & Bradlow, 2003); word-image matching (Smith & Bisazza, 1982); and summary writing (Perlmutter, 1989, as cited in Munro *et al*., 2006, p. 113). Intelligibility has also been measured using traditional listening comprehension tests items, such as cloze, true and false, short answer and multiple-choice questions (Anderson-Hsieh & Koehler, 1988; Matsuura, 2007; Smith & Rafiqzad, 1979). However, it is unclear which level of understanding - Intelligibility, comprehensibility or interpretability - these tools actually measure. And while a cloze question comes close to this researcher's understanding of intelligibility, which involves the recognition and recording of individual words, gap-fill activities still have their shortcomings because they allow a participant to use top-down processes, or schema, to infer connections between the written and spoken text (Harmer, 2001; McKnight, 1993). Based on this analysis, it was concluded that an orthographic transcription task of intonation units using standard orthography is likely to be the most accurate measure of bottom-up processes, such as the recognition of speech sound patterns. This argument is grounded in the belief that understanding at the intelligibility level is derived from a linear, phonologically driven process identifying the smallest units of sound (McKnight, 1993). These small units of speech, also known as intonation units, can be "identified by such criteria as variable pauses, changes in pitch, or terminal contours… [and] represent the speaker's focus of consciousness at the time when it is uttered and is a stable memory unit" (Chafe, 1994, para. 4). To sum up, this study measured the intelligibility of L2 speech by assessing a listener's ability to recognize and record individual words spoken.

Shared typology

While some academics argue that the intelligibility of L2 speech is advantaged when an L2 speaker and L2 listener share an L1, others posit that intelligibility may be enhanced when L2 interlocutors share a language typology. Different methods have been used to classify the phonological typology of languages. For example, it is possible to classify a language by taking a single prosodic property, such as tone, and measuring its density in order to place the language on a unidimensional scale. Also, there is agreement that certain properties converge to characterize two prosodic prototypes, such as tone and stress. The stress system of English would place it at the stress end of the scale, while the tone system of Mandarin would put it at the other end. The problem with a linear dimension of language typology is the placement of intermediate languages, such as Somali, where these "pitch-accent" systems freely pick-and- choose properties from the tone and stress prototypes (Hyman, 2007, p. 214). A star topology offers a more suitable dimension, where languages are placed within a network of prosodic nodes (ibid, 2007, p. 214). To avoid the issue associated with intermediate languages, the languages sourced in the current study have a greater concentration of one prosodic property, such as Tone, Syllable, Mora, or Stress, than the other. Hence, these four phonological typologies were used to investigate the impact of shared typology on intelligibility in ELF.

One of the first studies to investigate the relationship between typologically related languages and intelligibility was by Major, Fitzmaurice, Bunta, and Balasubramanian (2002). They found that Mandarin listeners, whose L1 is more Syllable-timed rather than Stress-timed, found a novel, Syllable-

timed Spanish accent to be as comprehensible as a familiar American accent. Moreover, a study by Deterding and Kirkpatrick (2006) concluded that misunderstanding occurred less often in ELF when an individual's L1 shares more pronunciation features common to a particular region, or South East Asian Nations in their case. Lastly, Bradlow and Bent (2008) concluded that more research was needed to determine "whether exposure to one accent would generalize to a typologically-related novel accent" (p. 722). For example, could exposure to Spanish-accented English be generalized to French-accented English?

Therefore, the aim of this study is two-fold. Firstly, it hopes to shed further light on whether or not a shared L1 between NNSs has a positive impact on intelligibility. And secondly, this study investigated the impact of a shared L1 typology between L2 users on intelligibility, and whether or not exposure to one accent type can be generalized to a typologically-related novel accent.

Methods

Speech materials

All the speech materials were sourced from the Vienna-Oxford International Corpus of English (VOICE) and English as an Academic Lingua Franca (ELFA) corpora. Five selection criteria were used to select the speech samples. Firstly, speakers were selected according to the prosodic properties of their first language. More specifically, a speaker's accent was classified according to one of four language typologies, namely Tone, Syllable, Mora, or Stress. Two speakers of each accent variety were sourced. Table 1 shows the typology, language family, and accent of each speaker.

Table 1 *Speakers' first language backgrounds*

Speakers	Typology	Family	Accent
1 & 5	Tone	Sino-Tibetan	Mandarin-English
2 & 6	Syllable	Latin	French-English
3 & 7	Mora	Japonic	Japanese-English
4 & 8	Stress	Germanic	German-English

Gender was the second criterion used to select the speakers. It has been claimed that NNSs may have more difficulty understanding female voices owing to the higher pitch of female voices (Renoud, 2007, p. 41). However, other studies have found the opposite. For example, participants in a study by Kirkpatrick, Deterding, and Wong (2008) found the female speakers to be more intelligible than the male speakers. Thus, only female speakers were asked to produce the speech materials. The third criterion also relates to methodological considerations. Moreover, two speakers of each accent type were selected so that the responses were more likely to be based on the accent type rather than the idiosyncratic phonological features of an individual speaker. The fourth selection criterion was related to the proficiency of the speaker. All the speakers had graduated from and were employed by an English-speaking university. Finally, the speech samples were sourced from speakers ranging in age between 28-32 years old.

Listeners

Sample selection

Participation in the study was voluntary, with the online survey being conducted in one of the computer rooms at La Trobe University, Melbourne, Australia. All listeners identified themselves as L2 users and were asked to self-report any hearing impairments as part of the participant recruitment process. As the participants were current university students, all have to passed an English language entry requirement

with an advanced English score, such as an overall International English Language Testing System (IELTS) score of 6.5 with a minimum listening score of 6.5, or equivalent. In total, 100 students took the survey. The data for the shared L1 and shared typology was the independent variable.

Three demographics were collected about the listeners. The first was gender, with an even number of males and females participating in the study. The participants also ranged in age with 80% of them aged between 18-27 years. Lastly, the listeners' L1 backgrounds aligned with the Tone typology: Mandarin (38%), Vietnamese (18%), and Thai (10%); Syllable typology: Spanish (6%); and Stress typology: Arabic (16%), other (13%).

Data collection

Instruments and procedures

An on-line survey software called Qualtrics Web Application was used to collect the intelligibility data set. The participants were emailed the plain language statement and consent form prior to the day of the survey. After answering any questions about the Plain Language Statement and Consent Form the students were asked to click on a hyperlink added to the email. In doing so, the student gave their consent to participate in the study. The Qualtrics on-line survey was designed into two sections. The first section was items relating to the bio data, such as participant's, age, first language background, and gender. Section two was designed to collect the intelligibility data. This study adopted a psycholinguistic approach where the intelligibility of L2 speech was measured by assessing a listener's ability to recognize and record individual words spoken (Bent & Bradlow, 2003; Brodkey, 1972; Burda, Hageman, Scherz, & Edwards, 2003; Derwing & Munro, 1998; Kent, 1992). Therefore, section two consisted of data entry boxes for the participants to transcribe the words recognized in five intonation units from each of the eight speakers. The intonation units consisted of 30 words in total per speaker. Given below are the procedures used to collect the data.

To investigate intelligibility, five excerpts from each speaker were played once using QuickTime software and projected over two speakers in a Computer Assisted Language Laboratory (CALL) classroom. Participants were instructed to listen to each excerpt and record every word they recognized into the survey. For example, the first excerpt from Speaker One was played and then the students were then given time to type every word they recognized into the survey in the column labeled Speaker 1A. This procedure was repeated for all eight speakers. Each excerpt was played only once.

Results

The data was analyzed using Excel and SPSS software packages. Though parametric measures have been used to compute intelligibility scores, this data is in fact a type of ordinal data (Andrich, 1978; Hustad, Schueler, Schultz, & DuHadway, 2012). Therefore, non-parametric tests were considered the most appropriate analytical tool despite their reduced power.

It was hypothesized that the intelligibility of L2 speech may be affected by a number of factors, such as a shared L1 or shared typology between interlocutors. Therefore, the intelligibility data set was analysed according to shared L1s between the listener groups and the speaker's accent type. Because the data was also examined for possible influences of a shared typology on the intelligibility of L2 speech, the listener groups were categorized as being a Tone language, a Syllable language, or a Stress language. This was done to correspond to the typologies of the Mandarin-English, French-English, Japanese-English, and German-English accent types, respectively. Given below are the overall intelligibility scores of the 100 L2 listeners for each accent type.
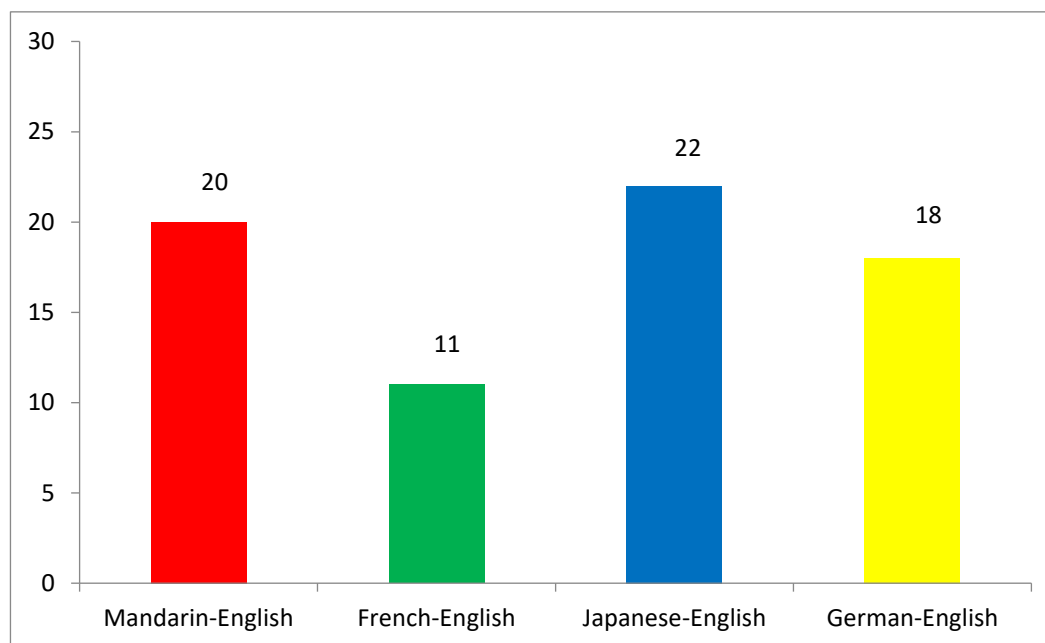
Figure 1 *Median intelligibility scores of 100 L2 listeners for Mandarin-English, French-English, Japanese-English, and German-English accents.*

Figure 1 shows the median intelligibility scores of 100 L2 listeners from eight linguistic backgrounds. Overall, the majority of the accent types have similar intelligibility scores. Three of the accent varieties, including the Mandarin-English, Japanese-English, and the German-English accents were moderately intelligible. The Japanese-English speakers were the most intelligible, with an average intelligibility score of 22 out of a possible 58 words accurately recognised and recorded in the survey. Similarly, Mandarin- English was more intelligible than the German-English. Lastly, the L2 listeners could only recognise eleven out of a possible 58 words spoken by the French-English speakers. This was the lowest score for any of the four accent varieties. Because of the similar median scores between the Mandarin and Japanese speakers, as well as German-English and Mandarin-English, a Spearman's *rho* and their *p*-values were calculated for all possible combinations of accents. In general, there was no significant relationships between the majority of the accent pairs. However, the results of the Spearman's *rho* did indicate a strong correlation of .640 between the Mandarin and Japanese speakers with a p-value at the .00 significance level. Moreover, there was a weak correlation between the Mandarin-English and German-English accents with a .05 significance level. The remaining speaker pairs showed a weak correlation between their intelligibility scores and none were of any significance.

Shared L1

It has been suggested that a shared L1 between interlocutors, also known as the ISIB, had an influence on the intelligibility of L2 speech (Hayes-Harb, Smith, Bent, & Bradlow, 2008). More specifically, sharing a L1 background with an interlocutor could make speech more intelligible. The Mandarin listeners were the only participants to share an L1 with one of the accent types. Figure 2 has the intelligibility score given by the Mandarin listeners for each accent type.
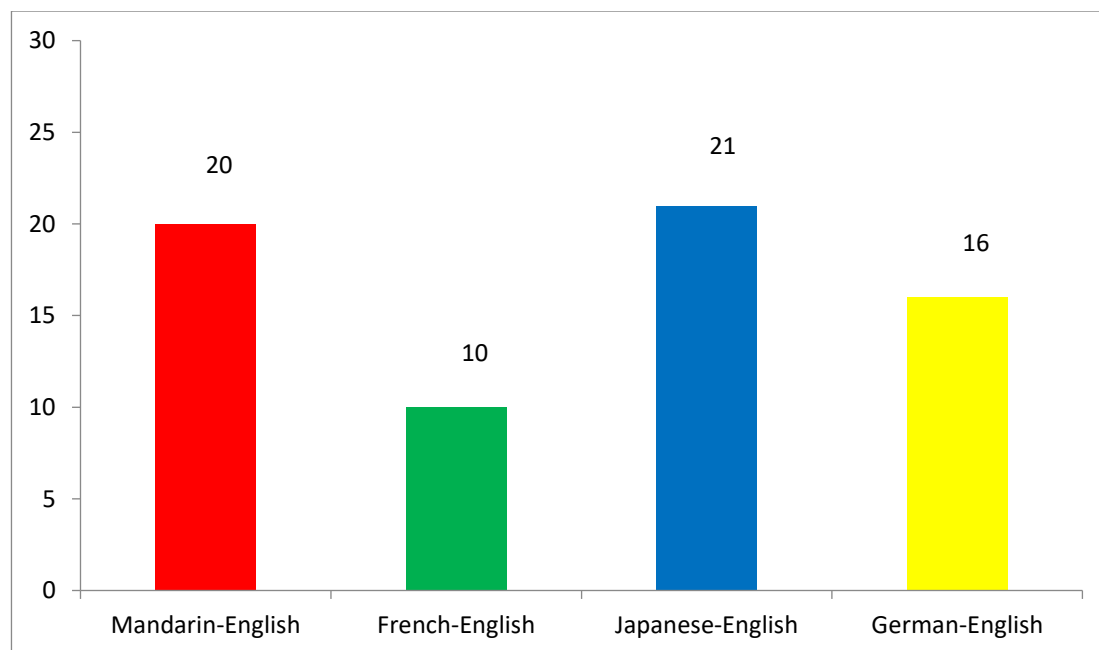
Figure 2 *Median intelligibility scores of Mandarin listeners for Mandarin-English, French-English, Japanese-English, and German-English accents.*

Figure 2 shows the median intelligibility scores of the Mandarin listeners for each accent variety. Overall, it can be seen that Japanese-English, with a median intelligibility score of 21, were the most intelligible speakers according to the Mandarin listeners. Similarly, the Mandarin-English accent was highly intelligible when compared to the European accent varieties. French-English and German-English were the least intelligible for the Mandarin listeners, at 10 and 16, respectively. Moreover, there was more of a disparity between the intelligibility scores of the European varieties than the Asian varieties. As the scores for the Mandarin and Japanese speakers were similar, a set of Spearman's *rho* was calculated. The analysis revealed a significant correlation coefficient value of .749 at the .000 level for the Mandarin-English and Japanese-English accents.

Shared L1 typology

Lehiste (1977) noted that little is known about the possible advantage afforded to L2 listeners whose L1s are typologically similar. Over a decade later, Bradlow and Bent (2008) took this question one step further by asking if the intelligibility benefits of sharing language typology could be "generalize[d] to a typologically-related novel accent" (p. 722). The following sections investigate the possible impact of a shared typology on the intelligibility of L2 speech. Listeners were grouped as being either a Tone language, a Syllable language, a Mora language, or a Stress language according to their L1 background. The first typology to be discussed is the Tone languages.

Tone languages

The Thai and Vietnamese languages have been classified as having a Tone typology (Burnham & Francis, 1997; Le, Tran, Castelli, Besacier, & Serignat, 2004). Consequently, the Thai intelligibility scores were chosen, collated, and compared to see if these Tone language listeners found Mandarin-English to be more intelligible than the other accents. Figure 3 details the median intelligibility scores for the four accent types according to the Thai listeners.
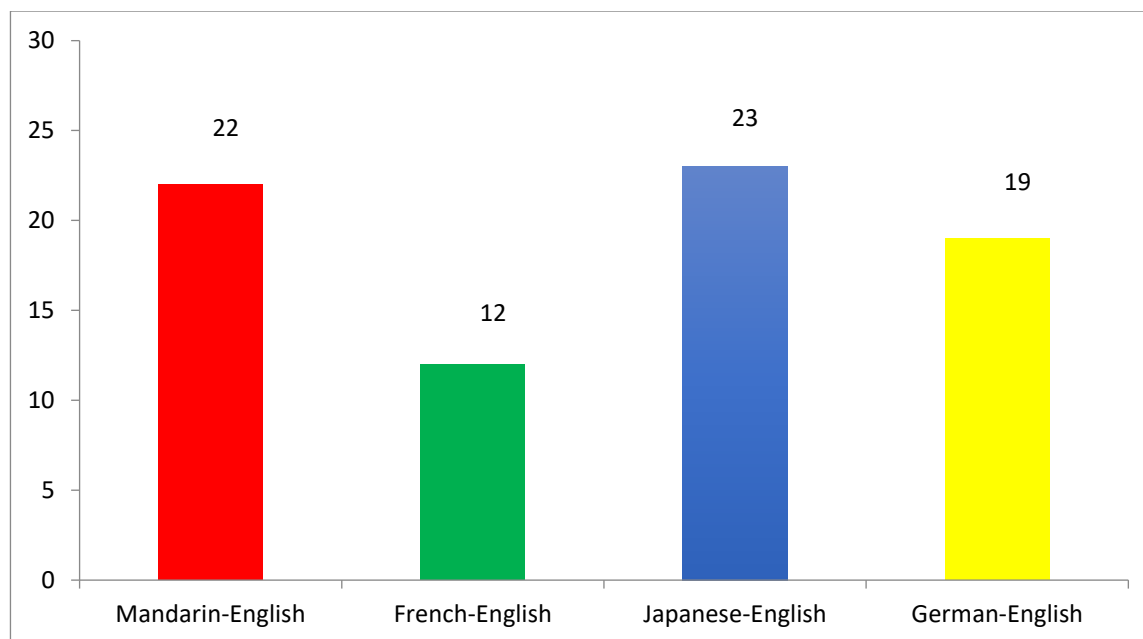
Figure 3 *Median intelligibility scores of Thai listeners for Mandarin-English, French-English, Japanese-English, and German-English accents.*

Figure 3 illustrates the median intelligibility scores of Thai listeners for each accent variety. The Thai listeners found the Asian accent varieties to be the most intelligible, with the Japanese-English speakers scoring the highest at 23, followed closely by the Mandarin-English speakers with a score of 22. The German-English accent was slightly less intelligible than the Mandarin-English accent, and the Thai listeners found French-English to be half as intelligible as Japanese-English. However, with such similar median scores, it is still unclear as to whether the Thai listeners found the Tone language to be more intelligible than the Mora language. Therefore, a set of Spearman's *rho* was calculated. The r*ho* and *p*-values for the Thai listeners showed a strongest correlation between the Mandarin-English and Japanese-English accents with a *rho* value of .689 and a *p*-value of .001. The remainder of the accent pairs produced moderate to very weak correlations, none of which were significant.

The other Tone language to be investigated was the Vietnamese group. Figure 4 showed the Vietnamese listeners' intelligibility scores for the Mandarin-English, French-English, Japanese-English, and German-English speakers.

Figure 4 gives the median intelligibility scores of Vietnamese listeners for each accent variety. In general, the Vietnamese listeners found the Asian accents to be the most intelligible. The Japanese-English accent scored the highest of any of the four accent varieties with a median score of 19. Mandarin-English also scored highly according to the Vietnamese listeners with a median score of eighteen. Despite the Asian accent varieties having similar median scores, there was a disparity between the European varieties. For example, German-English received a median of sixteen, while the French-English scores were much lower with a median intelligibility score of just ten.

Similar to the patterns seen in Figure 3, further analysis was required, so a set of Spearman's *rho* was run to determine the association between the Mandarin-English and Japanese-English accents. The *rho* and *p*-values for the Vietnamese listeners showed a significant correlation between the Mandarin and Japanese speakers, with values of .843 and .000, respectively.
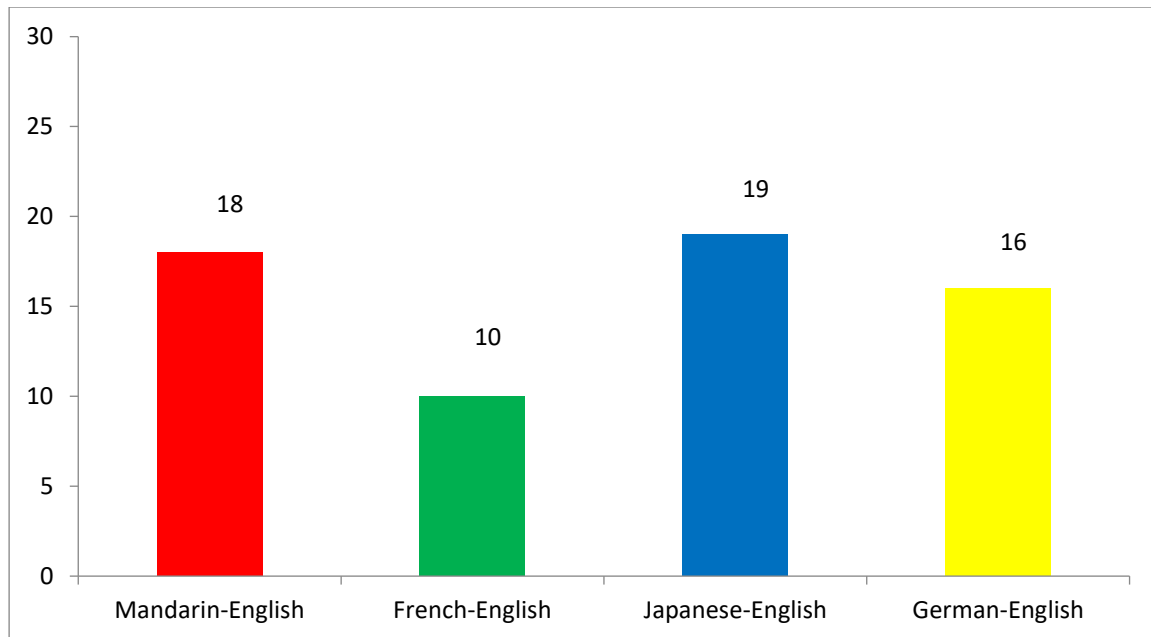
Figure 4 *Median intelligibility scores of Vietnamese listeners for Mandarin-English, French-English, Japanese-English, and German-English accents.*

Syllable languages

The Spanish language has been classified as having a Syllable typology (Visceglia, Tseng, Kondo, Meng, & Sagisaka, 2009). For this reason, the students whose L1s were Spanish became the listeners for the Syllable group. Figure 5 shows the intelligibility scores of the Spanish listeners for each of the accent types.
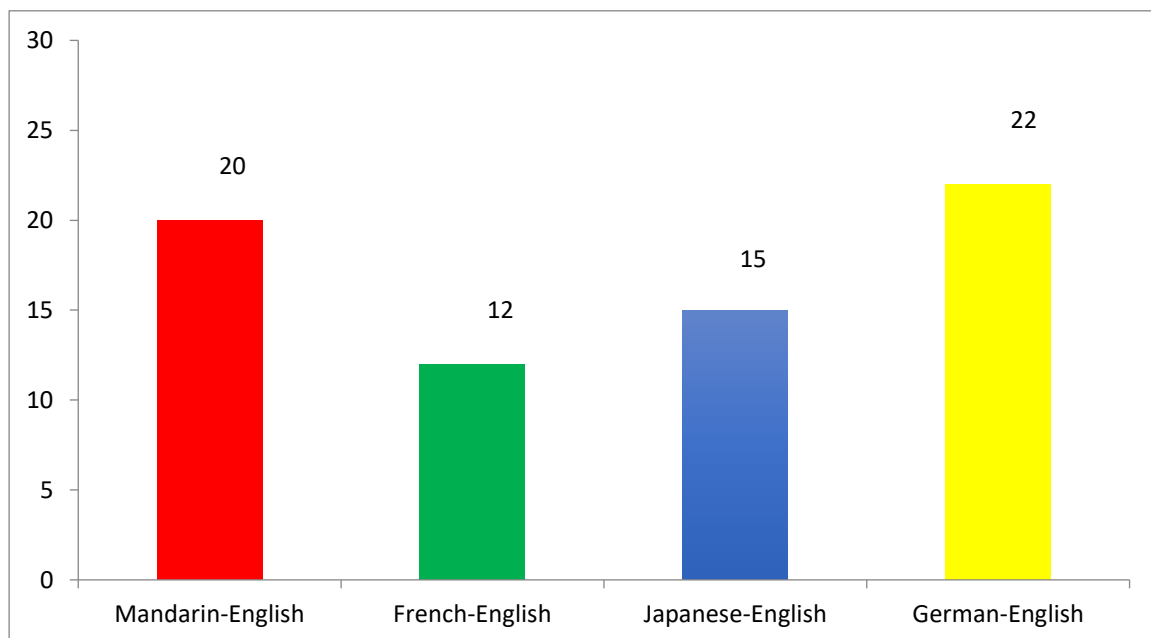

Figure 5 *Median intelligibility scores of Spanish listeners for Mandarin-English, French-English, Japanese-English, and German-English accents.*

In contrast to all other listener groups, it appeared that the Spanish listeners found the Mandarin-English and the German-English accents to be similarly intelligible. Moreover, the Spanish listeners

found French-English and Japanese- English to be the least intelligible. Finally, there was a significant difference between the most intelligible and least intelligible accent types. For instance, the Mandarin-English accent received a score of 20, while the Spanish listeners could only recognise 12 out of a possible 58 words spoken by the French-English speakers.

Unlike the other listener groups, the Spanish listeners did not find either of the Asian varieties as the most intelligible. Instead, one of the European varieties- German-English, was the most intelligible. Further analysis was needed to investigate a possible relationship between the two most intelligible accent varieties and the two least intelligible varieties. Similar to the other listener groups, the Spearman's correlation for the Spanish listeners also indicated a strong relationship (rs = .618, p < .05) between the Mandarin and Japanese speakers. However, there was only a weak correlation between the Japanese and French speakers.

Stress languages

Arabic languages have been classified as having a Stress typology (Stockmal, Muljani, & Bond, 1996). Therefore, the students whose L1 was Arabic became the listeners for the Stress group. Figure 6 shows the intelligibility scores of the Arabic listeners for each of the accent types.
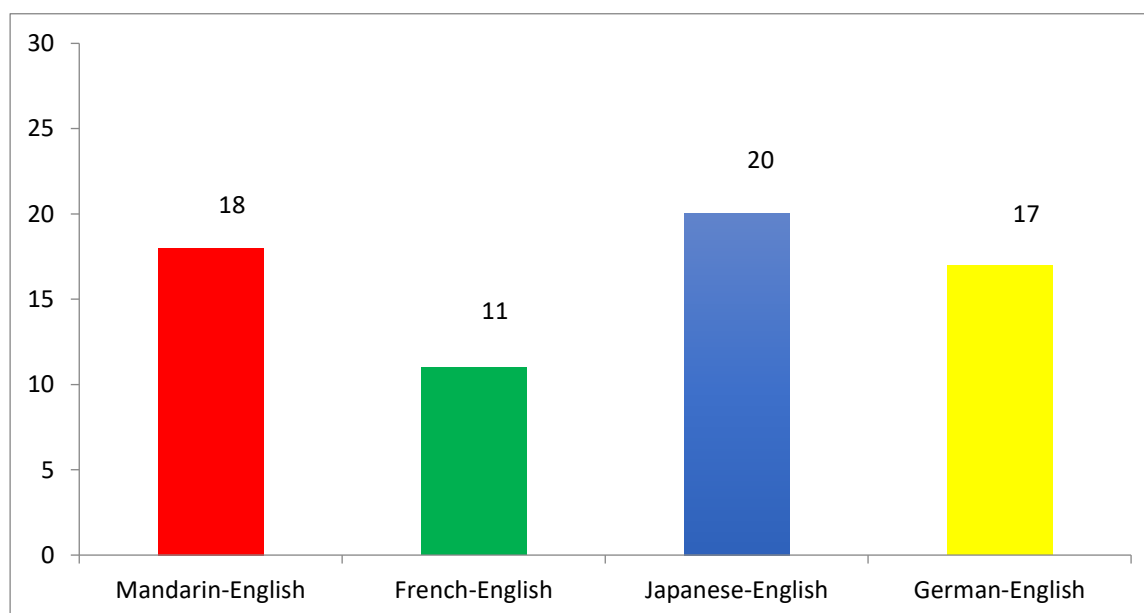

Figure 6 *Median intelligibility scores of Arabic listeners for Mandarin-English, French-English, Japanese-English, and German-English accents.*

It can be seen in Figure 6 that the Arabic listeners considered the Japanese-English accent to be the most intelligible, followed closely by the Mandarin-English accent. The third most intelligible accent was the German-English accent with a median of 17 recognizable words. The French-English accent had the lowest intelligibility score, with just a median of 11 words recognised out of a possible 58 words. Thus, the Asian speakers, and not the speakers with a Stress typology, were the most intelligible according to the Arabic listeners.

A set of Spearman's *rho* was run to investigate a possible relationship between the median scores for the Mandarin, Japanese and German accents. The results indicated that, while there was only a weak association (rs = .321, p < .073) between Mandarin- English and German-English, the results for the Arabic listeners continued to demonstrate a strong correlation (rs = .759, p < .00) between the intelligibility scores for the Mandarin-English and Japanese-English accents.

In summary, the results for the Stress typology were similar to the other language typologies. The Arabic listeners found the Japanese and Mandarin-English accents to be the most intelligible followed by the German-English accent and then the French-English accent. These findings were the same as the Tone group, which included the Thai and Vietnamese listeners. However, the Syllable listeners did not follow this trend. The Spanish listeners thought the German-English accent was the most intelligible. Therefore, the results do not seem to support the notion that a shared typology between NNSs may have a positive impact on the intelligibility of their speech.

Between-group correlations

The next analysis was to assess the level of agreement between the different listener groups and their intelligibility scores. The aim of this analysis was to investigate a possible relationship between the listeners of the same typology rather than a relationship between speakers and listeners of the same typology. Therefore, Spearman's *rho* were calculated for Tonal listener groups. Overall, all the listener group pairs had very weak associations between their intelligibility scores: Mandarin and Thai listeners ($rs = .095$, $p < .403$); Mandarin and Vietnamese listeners ($rs = -.050$, $p < .562$); and Thai and Vietnamese listeners ($rs = -.063$, $p < .578$). These results indicate that there was considerable disagreement between the Tonal listener groups about the intelligibility of the Mandarin-English, French-English, Japanese-English, and German-English accent types. In sum, listener groups belonging to the same typology do not have similar experiences with the intelligibility of L2 speech.

Discussion

While an NNS's perception of L2 speech is likely to differ from that of a NS the bulk of research has investigated the perception of L2 speech only from an NL's perspective. To address this shortcoming, this paper investigated the intelligibility of foreign-accented speech from an NNS's perspective. More specifically, this study investigated the possibility that a shared L1 or a shared typology between ELF users may influence the intelligibility of their speech.

Shared L1

One factor thought to influence intelligibility in ELF contexts is a shared L1 background between interlocutors. At a glance, the findings supported the notion of a shared L1 advantage because the Mandarin listeners found the Mandarin-English accent to be the most intelligible. However, the results for a shared L1 were very similar to those of all the listeners. That is, the data in Figure 2 mirrors the intelligibility scores for all listeners seen in Figure 1. Therefore, the Mandarin listeners may not have found Mandarin-English to be the most intelligible because of a shared L1. Rather, the majority of the listeners, including the Mandarin listeners, found Mandarin-English to be the most intelligible, followed closely by the Japanese-English accent. These findings are inconsistent with past research. For example, Harding (2008) found that sharing an L1 with one's interlocutor is an advantage. In sum, the findings of this study suggest that sharing a first language does not have a positive impact on the intelligibility for L2 users.

Another aspect of speech perception that may impact the intelligibility of L2 speech is a shared typology between L2 users. It was expected that a shared typology between interlocutors in ELF may increase intelligibility.

Shared typology

Overall, the results indicated that a shared typology between L2 users does not influence the intelligibility of their speech. For instance, there was no shared typology advantage for the Syllable and Stress languages. The Spanish listeners did not find French-English to be any more intelligible than the other accent types. Moreover, the Arabic listeners did not find the German-English accent more intelligible than the other accent varieties. However, the results were not so clear-cut for the Tone languages. At first glance, it seemed than the Thai listeners found the Mandarin-English accent to be one of the most intelligible accent varieties, the other being the Japanese-English accent. This also seemed to be the case for the Vietnamese listeners, who found the Mandarin-English accent to be the second most intelligible accent. However, the trend seen in the intelligibility scores for the Thai listeners and Vietnamese listeners (Figures 3 and 4, respectively) is identical to the trend seen in Figure 1- All listeners. These findings differ from previous studies that suggested that a speaker and listener who have typologically similar L1s may experience fewer instances of misunderstanding at the intelligibility level (Bradlow & Bent, 2008; Major *et al*., 2002).

An analysis of the data indicates that the relationship between shared L1 typology is not between a listener and speaker. Rather, the advantage of a shared typology is more dependent on the similarities between speakers. The results for the Spanish listeners were quite unexpected and suggest that the connection between language typology and intelligibility is speaker dependent. According to the data, the Spanish listeners found the German-English accent to be the most intelligible, yet this is counter-intuitive. It is unlikely that Latin American students would have had much exposure to German-English. One possible explanation for this is that the Spanish listeners had stronger listening skills and were more familiar with the speech sounds of English than the other listener groups, so they were able to transfer their adaptation to one variety of English to a typologically similar one. More specifically, the Spanish listeners were able to generalize their familiarity to the speech sounds of a divergent English, such as Australian-English to a typologically similar convergent English, such as the German-English accent. This conclusion is supported by the work of Pallier, Sebastian Galles, Dupoux, Christophe, and Mehler (1998), who argued that familiarity with one language variety might positively affect the intelligibility of a closely-related novel variety. In the present study, the Spanish listeners' ability to transfer their adaptation to divergent English to a novel convergent variety could be attributed to the prosodic similarities between the two varieties. Unfortunately, it was beyond the scope of this study to test the intelligibility of other typologically similar convergent varieties of English, such as Arabic-English.

The results also showed that the Mandarin-English and Japanese-English accents were more intelligible than the European accent types, and their intelligibility scores were strongly correlated. The reason for this distinction was not be immediately clear. At a glance, it is probable that the listeners recruited by the present study had had more exposure to Asian varieties of L2 than European ones. For example, a significant proportion of the international students in Melbourne are from mainland China. In addition, Mandarin-English speakers made up approximately 40% of the survey participants in the current study. Consequently, the participants may have found the Asian L2 varieties to be more intelligible than the European ones. This result is surprising given very few Japanese students study at the university where the data was collected. Nonetheless, the listeners found the novel Japanese-English accent to be just as intelligible as the Mandarin-English accent. Perhaps regional features shared by the two accents are responsible for this finding. More specifically, there may be other typological features apart from prosodic properties common to regional languages, which with exposure, enhance the intelligibility of a novel L2 accent from that region.

Proponents of ELF theory have argued that ELF is not a singular entity with one standardized form but

constitutes a number of varieties and these varieties may be specific to particular regions of the world. For example, Seidlhofer, Breiteneder, and Pitzl (2006) argued for the emergence of a European ELF. In addition, a study conducted in South East Asia by Deterding and Kirkpatrick (2006) found that ELF users experience fewer misunderstandings when their L1 shared more pronunciation features with the other languages in the region. The present study concluded that a shared L1 or shared typology between L2 users do not improve the intelligibility of L2 speech. However, the data did indicate that listeners from six different L1 backgrounds found a previously known Asian English, Mandarin-English, to be just as intelligible as a novel Asian English, which was Japanese-English in this case. It is argued that ELF users will experience fewer intelligibility issues if they are exposed to the segmental features common to the L1s of a particular region.

Another reason why the Japanese-English and Mandarin-English accents were more intelligible than the other L2 varieties may be due to the speech rate of the speech samples. The speech rate of the Mandarin-English and Japanese-English speakers did not fall within the optimal range of 210- 290 syllables per minute (spm). The Japanese-English speakers had an average speech rate of 176 spm, and the Mandarin-English speakers had an average speech rate of 184 spm. These speech rates were much lower than the French-English and German-English speakers, who averaged 250 spm and 244, respectively. Therefore, it is most likely that slower speech rates have a positive influence on the intelligibility of different accents in ELF contexts.

An analysis of the speech samples also suggested that speakers with the fastest speech rates, such as the French-English and German-English speakers, were the least intelligible for the L2 listeners. This finding supports the conclusions drawn by Kashiwagi and Snyder (2010), who found that variations in L2 speech rates were responsible for the intelligibility problems experienced by L2 listeners. However, these results are not supported by the findings of other studies. For example, the results presented here suggest that speech rates between 170-180 spm may enhance the intelligibility of L2 speech, but Derwing and Munro (2001) found that NNSs prefer both native speech and non-native speech at 270 spm. Hence, it is still unclear as to whether or not there is an optimal range of speech rate for NNSs.

Conclusions

Summary

This study has investigated the impact of a shared L1 and shared typology between interlocutors on the intelligibility of L2 speech in ELF. The results indicated that a shared L1 between ELF users did not have a positive impact on the intelligibility of their speech. There were also some interesting findings regarding the impact of a shared typology on the intelligibility of ELF. It was concluded that a shared typology between interlocutors did not enhance the intelligibility of L2 speech. However, the Spanish listeners' adaptation to the speech sounds of divergent English, such as Australian English, may have been transferred to a typologically similar convergent English, such as German-English. Therefore, the effect of a shared typology seems to be speaker-speaker dependent rather than speaker-listener dependent. In addition, languages of a particular demographic tend to share phonological features, and exposure to these commonalities may enhance the intelligibility of known L2 varieties as well as novel L2 accents from the same region. Lastly, speech rate has a pronounced impact on the intelligibility of L2 speech in ELF. However, it is unclear if there is an optimal range of speech rate for ELF users.

Limitations and future directions

Due to the limited scope of this study, only the influence of a shared L1 and shared L1 typology were

considered when investigating the intelligibility of L2 speech in ELF. There is still much to be learnt about the impact of other listener-related factors on the intelligibility of L2 speech. For example, it has been claimed that NNSs rely more heavily on their systemic knowledge of content word stress and segmental features than NSs because they have a "higher dependency on phonological form … [and are] less able to integrate inferences from some kind of higher contextual knowledge or from a shared background with their interlocutors" (Pickering, 2006, p. 223). However, it is likely that L2 users are highly dependent on their schematic knowledge when trying to deal with misunderstandings caused by segmental features. Field (2004) also argued that L2 listeners construct a schema to guide their processing of incomplete [systemic] information and rely more heavily on this schema than the incoming speech-stream.

The type of exposure one has to the different varieties of English also warrants further attention. L2 users may be exposed to a variety of convergent and divergent Englishes, but one cannot assume they would have had extensive exposure to their own variety of L2. This argument gathers strength when one considers that little emphasis is placed familiarizing students with Vietnamese-English in Vietnamese EFL classrooms, for example. In addition, it may be assumed that L2 users have had extensive exposure to their own accent via their interlanguage. This argument is based on the premise that the phonological characteristics of one's interlanguage are identical to the phonology of their speech. However, the extent to which L1 phonology influences an NNS's abstract representation of English, or interlanguage, is not likely to be the same as its impact on the articulation of English sounds. Therefore, an L2 user may have a heavy accent, but this does necessarily equate to a heavily accented inner voice.

Finally, little is known about the relationship between interlanguage, language proficiency, and intelligibility. For example, NNSs with low listening proficiency may have an interlanguage weighted heavily with L1 phonology. As a result, these listeners may find strongly accented speakers with the same L1 background to be more intelligible. This proposition is supported by Hayes-Harb, Smith, Bent, and Bradlow (2008), who argued that an ISIB benefit might have more of an effect on listeners with low phonological proficiency in English.

This study was also limited because it only considered listener-related factors when investigating the intelligibility of L2 speech in ELF. However, the findings showed that two speaker-related factors are likely to have a significant impact on the intelligibility of L2 speech from a NNSs' perspective. Firstly, the results suggested that speech rate has an impact on intelligibility in ELF. This finding agrees with the conclusions drawn by previous research, where the suprasegmental features of L2 speech caused intelligibility issues for NSs (Anderson-Hsieh & Koehler, 1988; Tajima, Port, & Dalby 1997). However, it is believed that the segmental features of foreign accented speech may also cause more intelligibility issues for NNSs than NSs. Perhaps this is because L2 listeners rely more heavily on different signals in speech to locate word boundaries in a stream of continuous speech (see Carroll, 2004; Cutler, 2001).

There are also few studies investigating the impact of other speaker-related factors, such as different speech styles, on the intelligibility of L2 speech. The work of Smiljanić and Bradlow (2011) is one of only a handful of studies investigating the impact of clear speech and conversational speech, for example, on the intelligibility of L2 speech from either an NS or NNS's perspective. Moreover, a study by Holmes (2015) compared the impact of background noise compared with background talkers on the intelligibility of speech. The impact of background noise, such as voices, raises the question as to whether or not a Lombard speech style will enhance intelligibility in ELF. In summary, there is still much to be learnt about the impacts of both listener and speaker-related factors on the intelligibility of L2 speech in ELF.

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