VOWEL QUALITY AND VOWEL LENGTH IN ENGLISH AS A LINGUA FRANCA IN SPAIN

MARÍA ÁNGELES JURADO-BRAVO
Universidad Complutense de Madrid
maajurad@ucm.es

Abstract

In today's globalised world, the use of English as a Lingua Franca (ELF) is a reality. Given the fact that pronunciation deviations from the native-speaker norm are one of the main causes of communication breakdown (Jenkins 2000), it feels necessary to investigate which aspects of pronunciation constitute a communication hindrance if produced in a non-native-like manner and which may allow some variation without loss of intelligibility. This paper aims at contributing to the existing literature related to vowel quality and intelligibility in ELF. Our hypothesis is that vowel length distinctions alone cannot ensure the intelligibility of English spoken by Spanish speakers, but that vowel quality does play a role in avoiding communication breakdown. A panel of listeners from different countries completed an intelligibility test in which they listened to several sentences and filled in a gap by choosing the word they thought had been uttered. Results show that vowel length seems to be a crucial vocalic feature in the avoidance of miscommunications, but that vowel quality is also necessary to maintain intelligibility, contrary to what the original Lingua Franca Core (LFC) originally suggested.

Keywords: English as a Lingua Franca, intelligibility, vowel length, vowel quality, Spanish context.

Resumen

En este mundo globalizado, el uso del inglés como lengua franca (ELF por sus siglas en inglés) es una realidad. Debido a que la variación de la pronunciación con respecto a la norma nativa constituye uno de los principales problemas de comunicación (Jenkins 2000), se hace necesario investigar qué aspectos fonéticos característicos de hablantes no nativos suponen un obstáculo comunicativo y cuáles podrían presentar variación sin que esto cause problemas de inteligibilidad. Este texto pretende contribuir a la literatura existente relacionada con la cualidad de las vocales y la inteligibilidad en ELF. Nuestra hipótesis es que la distinción entre vocales largas y cortas no es el único rasgo que asegura la inteligibilidad de los hablantes españoles de inglés, sino que la cualidad de la vocal también juega un papel importante a la hora de evitar malentendidos. Un grupo de oyentes de diferentes países completaron un test de inteligibilidad en el que escuchaban una serie de frases y las completaban escogiendo la palabra que creían haber escuchado. Los resultados muestran que una longitud apropiada de la vocal parece ser crucial para evitar problemas de comunicación, pero que la cualidad de la vocal no debería ser ignorada por completo, como sugería el *Lingua Franca Core* (LFC) originalmente.

Palabras clave: inglés como lengua franca, inteligibilidad, longitud de las vocales, cualidad de las vocales, contexto español.

1. Introduction and background

There is no doubt that English is nowadays spoken around the world by large groups of people, more than 80% of them being non-native speakers of the language (Crystal 2003). These numbers reflect the current use of English as an international *lingua franca* in an increasingly globalised world, where the majority of the interactions in English do not involve any native speaker of the language. Thus, English as a Lingua Franca (ELF) is defined as "any use of English among speakers of different first languages for whom English is the communicative medium of choice, and often the only option" (Seidlhofer 2011: 7).

Ever since Jenkins (2000) observed that pronunciation was a regular cause of misunderstandings and unintelligibility among non-native speakers of English, and proposed the Lingua Franca Core (LFC), recurrent research in the field has dealt with the relationship between phonology and intelligibility in ELF communication (e.g. Osimk 2009; Zoghbor 2011; Deterding 2012). The LFC summarises those

phonological aspects which hinder English international communication and result in unintelligibility if not articulated properly. It includes "most consonant sounds, appropriate consonant cluster simplification, vowel length distinctions and nuclear stress" (Jenkins 2000: 132).

One of the most controversial among the many elements of the LFC is the irrelevance attributed to accurate vowel quality (except for vowel /ɜ:/), while vowel length distinctions are given great importance for the maintenance of intelligibility. Jenkins (2000: 144) argues that the significant variability in the vocalic inventories of different dialects of English accounts for the decision to disregard accurate vowel quality in ELF since speakers are used to this variability and slight alterations will not contribute to unintelligibility. Nevertheless, some ELF detractors consider that this should not be a reason to ignore vowel quality in pronunciation instruction (Van den Doel 2010).

Recent investigations in several ELF contexts (Zoghbor 2011; O'Neal 2015; Deterding and Mohamad 2016) have analysed whether accurate vowel quality is indeed necessary for international intelligibility, or whether some approximation to any native variety of English is imperative. All of them conclude that shifts in vowel quality do not seem to be the main reason for misunderstandings among ELF speakers. In those instances in which vowel quality may have played a part in the communication breakdown, changes in other sounds within the word may have also contributed to the problem, thus it cannot be concluded that inexact vowel quality was the trigger of the misunderstanding. In fact, Zoghbor (2011), who analysed the effectiveness of the LFC in the intelligibility and comprehensibility of Arab students, goes further and suggests that vowel /ɜ:/ caused no intelligibility problems when her participants substituted it with diphthong /eɪ/.

The present paper aims at contributing to a better understanding of the relationship between vowel quality and intelligibility in ELF. Our hypothesis is that vowel length distinctions alone cannot ensure the intelligibility of Spanish speakers of English, but that vowel quality also plays a role in avoiding communication breakdown. We operationalise our hypothesis through the following research questions:

- It is well known that Spanish speakers tend to merge English vocalic sounds to conform to the Spanish vocalic inventory (Gómez-González and Sánchez-Roura 2016: 90). Could this be a problem for intelligibility?
- Is vowel quality an important factor for Spanish speakers of English who take part in international communication?
- Is vowel length the only characteristic regarding vowels relevant to intelligibility?

2. Method

2.1. Stimuli

The stimuli used in this study are 24 sentences taken from discrimination exercises (Bozman 1997) (Appendix 1). Each sentence invites the respondent to choose one of two words that are coupled together and are in fact minimal pairs in terms of vowel quantity, vowel quality or both (following RP). Meaning is not an issue here, it does not help, because the sentence makes sense regardless of which word is chosen. We decided to use this kind of sentences following Jenkins's (2002: 89-90) claim that ELF participants tend to rely on bottom-up processing. Consequently, these sentences provide an ideal ELF situation of this kind.

A native Spanish-speaking 27-year-old male actor (henceforth, the Speaker) was recorded reading these sentences aloud (Appendix 1), which were analysed and used as stimuli in an intelligibility test (see section 2.2). We consciously looked for a person with no knowledge of English phonetics —the actual situation of most Spaniards. He has been studying English for around 20 years but he does not speak the language on a daily basis and only uses it passively, listening to English music at home. He rarely speaks English with native speakers.

The 24 sentences were recorded using a Zoom h4n Handy Recorder and saved as individual files to be analysed in terms of both quality and length with the help of Praat (Boersma and Weenink 2016), and later used as stimuli in the intelligibility test. This analysis provided us with objective information about the pronunciation of English vowels by the Speaker. Three of the sentences were recorded as stimuli for the practice items of the intelligibility test and so they were not analysed.

To analyse vowel quality, we extracted the formant values at a point where they were steady in order to minimise the influence of surrounding sounds. These values were compared with each other in order to know whether the Speaker had pronounced the vowels differently. They were also contrasted with the formant values of English (Cruttenden 2014: 105) and Spanish (Quilis and Esgueva 1983: 244) vowels in order to know whether the Speaker tends to conform to Spanish vowel qualities or tries to produce native-like English vowels. For English, we used Cruttenden's (2014: 105) data. He reports the male-speaker formant frequencies for the 11 British English monophthongs in connected speech. For the Spanish formant values, we used the data reported in Quilis and Esgueva (1983: 244), cited in Hualde (2014: 121-123). These formant values correspond to vowels in contact with labial consonants produced by male speakers.

For the measurement of vowel duration, we looked at the beginning and ending of periodic waves in the waveform as well as the beginning and ending of steady formants in the spectrogram. The vowel length obtained was contrasted with the average native vowel durations provided in Cruttenden (2014: 101).

2.2. The intelligibility test

A two-part intelligibility test was designed by the researcher. The first section of the test gathered information about the respondent, including age, gender, occupation, native language and questions related to their use of English (see Appendix 2 for the entire list of items). These personal data allowed us to organise and analyse the responses according to different criteria which may have affected the results.

The second part of the questionnaire consisted of a total of 33 items, each of them including one of the sentences recorded beforehand (see section 2.1). For each of the items, three possible answers were offered to the respondents, namely the members of the minimal pair and an 'other' option with a blank space to write down a different word from the ones offered. Respondents listened to each of the sentences and chose the word they thought the Speaker had uttered. Three practice items (not included in the analyses) were added at the beginning of the test so as to check the listeners had understood the task. After the practice items, the researcher stopped the recording to clarify any doubts the listeners may have had. Each item was played twice, with an interval of one second between both listenings and a period of 11 seconds between the different sentences.

This tool enabled us to study whether vowel length distinctions alone are responsible for a better understanding of the words or whether accurate or inaccurate vowel quality also plays an important role in communication.

The questionnaire was administered to 125 people, all of them either university students of the BA in English Studies or teachers of the same BA. Thus, they are all expected to be proficient in the language. Four responses had to be discarded because they were either incomplete (more than 3 items were left blank) or the responses to the questions were evidently chosen at random. Thus, a total of 121 responses (91 women, 30 men) were considered for this study. The respondents come from Spain (64), China (22), UK (4), Germany (4), Netherlands (2), Ecuador (2), France (2), Poland (2), Malaysia (2), Norway (2), Colombia (1), South Korea (1), Saudi Arabia (1), Romania (1), Russia (1), Portugal (1), Peru (1), Pakistan (1), Italy (1), Hungary (1), Finland (1), Belgium (1), Argentina (1), Ukraine (1) and the USA (1); their age range from 18 to 55 (mean 22.69, sd 6.639).

Most of these participants also speak one or several foreign languages, mainly English and French in the case of Spanish speakers, and English and Spanish in the case of non-native speakers of Spanish. They use English in their daily lives, mostly at university, and they tend to communicate with both native and non-native speakers of English or mostly with non-native speakers (see Figure 1). Furthermore, 82.6% claimed to have some knowledge of phonetics and phonology while 15.7%

stated otherwise and 1.7% did not respond to this question. The respondents' familiarity and contact with English foreign-accented speech may have affected the results of the test since they seem to be used to communicating in English with people of different language backgrounds.

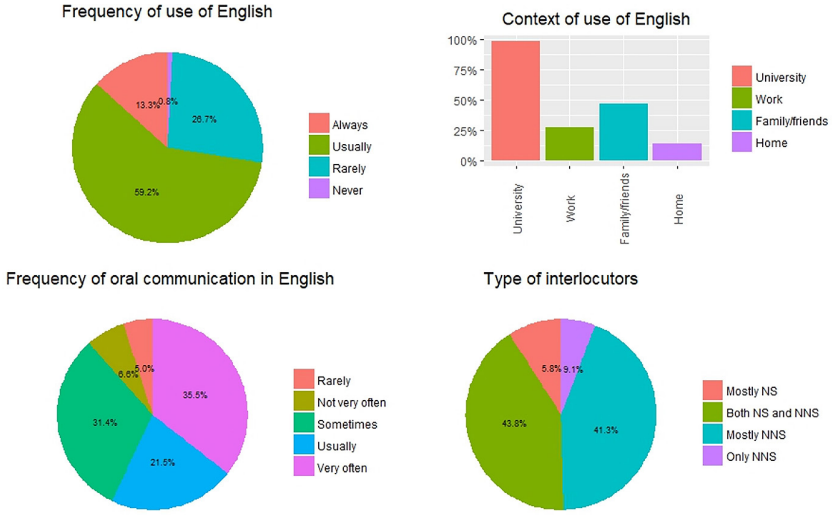

Figure 1. Distribution of the respondents according to different criteria: frequency of use of English in their daily lives (top left), context(s) in which they use English (top right), frequency of oral communication in English (bottom left) and people with whom they communicate in English (bottom right).

3. Results

As described in detail in section 2.1., we analysed vowels in terms of both length and quality with the aim of studying the actual production of English vowels by the Speaker, and their perception by other speakers of English. The results presented in this section are divided accordingly.

3.1. Vowel length

Figure 2 shows the mean vowel length as produced by the Speaker and by native speakers of English (Cruttenden 2014: 101). The chart presents different phonetic contexts in which English vowels may occur.

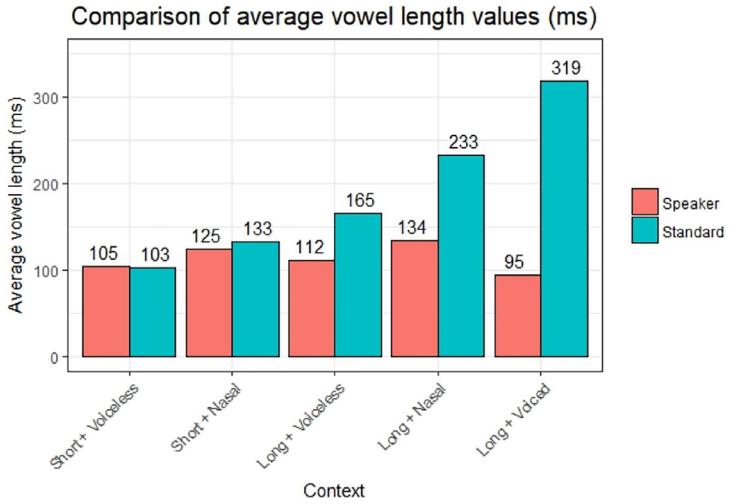

Figure 2. Comparison of vowel lengths (in ms) between a native speaker of English (Cruttenden 2014: 101) and the Speaker. 'Short' and 'long' refer to the vowel length, taking RP as the standard. 'Nasal', 'voiceless' and 'voiced' refer to the kind of consonant which follows the vowel.

The chart clearly shows that the Speaker's vowels have a similar length in all contexts, which indicates that he does not distinguish between long and short vowels. This is not surprising since Spanish vowels are only distinctive in quality and the Speaker stated he had not studied English phonetics and phonology. Moreover, all vowels produced by the Speaker are shorter than the native vocalic length, except for the context 'Short+Voiceless', in which the Speaker's vowels are slightly longer (103 ms vs 105 ms). According to the LFC (Jenkins 2000), the Speaker's 'short vowels' should not cause any intelligibility problems because the average length in the two 'short vowel' contexts is similar to that of the native speaker. Nevertheless, the difference in vowel duration between the Speaker and the standard is specially marked in the three 'long vowel' environments, suggesting that unintelligibility is likely to occur.

Because of the similar vowel length across phonetic contexts and the large deviation from the standard in long monophthongs, we used Praat to manipulate and lengthen those vowels which in RP are long. This allowed us to investigate whether listeners rely on this feature of length (consciously or otherwise) to identify words regardless of vowel quality. Table 1 shows the manipulated sentences and both the original and the manipulated duration of the vowels (in ms).

Sentence	Original vowel length (ms)	Modified vowel length (ms)
Is that a **sheep** over there?	109	182
What did you buy that **cord** for?	74	168
It is not supposed to be **hard**, actually.	101	165
Why don't you just **calm** down?	134	232
Fred used to **hawk** stolen goods, I think.	115	168
What did you buy that **card** for?	82	162
It is not supposed to be **heard**, actually.	117	279
What could we do to **burn** Johnson?	97	227
Luke, I don't know what on earth you're talking about!	112	162

Table 1. Sentences in which the vowel duration has been manipulated. Values are expressed in ms.

The data gathered from the intelligibility test (Table 2) shows that in general, participants were better at identifying the word in its modified version. A McNemar test was performed for each of the words (original vs modified), concluding that the improvement was statistically significant in 4 out of the 7 words in which the judges performed better in the modified version of the word. These results suggest that accurate vowel length helps in the identification of words. However, since this improvement is not significant in all items, it is expected that other factors have also played a role.

Word	Frequency (original)	Percentage (original)	Frequency (modified)	Percentage (modified)	Improvement[1]
Sheep	85	70.25 %	107	88.43 %	25.88 % **
Calm	102	84.30 %	107	88.43 %	4.90 %
Hard	117	96.69 %	106	87.60 %	-9.40 % *
Card	86	71.07 %	104	85.95 %	20.93 % *
Hawk	44	36.36 %	49	40.50 %	11.36 %
Cord	98	80.99 %	107	88.43 %	9.18 %
Luke	36	29.75 %	64	52.89 %	77.78 % *
Burn	106	87.60 %	114	94.21 %	7.55 % *
Heard	110	90.91 %	109	90.08 %	-0.91 %

Table 2. Correct identification of the words containing long vowels in both the original and modified versions. The data are presented in both absolute frequency and percentage. Information about the improvement between both versions of the words is also provided in the last column.

It is worth noticing that the minimal pair 'hard/heard' was slightly less accurately identified in the modified version. The results from the McNemar test suggest that only in the case of 'hard' was this difference statistically significant ($p = 0.004$). In both items, participants had to choose 'hard', 'heard' or 'other'. A thorough analysis of the participants' responses for the item 'hard' shows that in the modified version of the word some listeners opted for the 'other' option, specifying words such as 'her' or the non-existing word 'har'. We believe that these responses are a consequence of the Speaker's pronunciation of the final consonant sounds in this word. He pronounced the rhotic variant of the word and omitted the last consonant sound /d/. Thus, the lack of the final consonant cluster in the word might have affected the results, especially in the selection of 'har' as the correct option, which, according to RP rules, would also be pronounced with vowel /ɑ:/. Similar responses were found for the item 'heard', which the Speaker pronounced in the same way as 'hard' regarding the pronunciation of the final consonant sounds. Even though in this case the difference between the original and modified versions of the word is not significant ($p = 0.81$), we also noticed that some respondents had selected the 'other' option and specified words such as 'her', 'hair' or 'here'. However, the analysis of final consonant clusters is beyond the scope of this study and so we will not discuss it in detail.

3.2. Vowel quality

In this section, we present the results obtained from an analysis of vowel quality. When referring to a word containing a long vowel, only its version in isolation is taken into consideration (unless otherwise indicated) thus making possible a comparison of vowel qualities among vowels of similar lengths.

Figure 3 shows the placement of the vowels within the vowel space as produced by the Speaker. The standard Spanish (Quilis and Esgueva 1983: 244) and British English (Cruttenden 2014: 105) vowels are highlighted as a reference point for comparison (see section 2.1. for a description of the standard values). Because of the greater number of RP monophthongs (twelve) as compared to five in Spanish, Spanish speakers of English tend to merge several English vowels and assimilate them to the Spanish categories (Gómez-González and Sánchez-Roura 2016), both in production and perception. For this reason, the quality of some English vowels tends to suffer great deviation from the native-speaker norm.

For the analysis of vowel quality, the eleven English pure vowels which have been studied were grouped in five categories, corresponding to the most common merging processes by Spanish speakers, following the grouping proposed by Gómez-González and Sánchez-Roura (2016: 90).

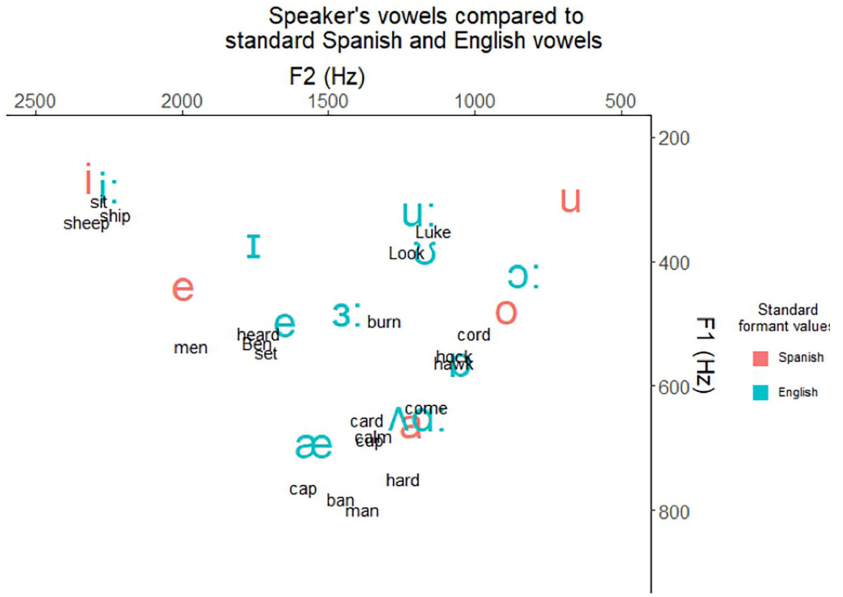

Figure 3. Placement of the vowels as pronounced by the Speaker. Spanish and English standard vowels appear for reference purposes. Formant data taken from Quilis and Esgueva (1983: 244) for Spanish and Cruttenden (2014: 105) for English.

3.2.1. *Category 1. /i:/ and /ɪ/*

Sentences 1, 2, and 11 include words containing either /i:/ (*sheep*) or /ɪ/ (*sit* and *ship*). The similar formant values in the three vowels analysed in this group (see Figure 3) seem to confirm the idea that the Speaker does not distinguish between these two English phonemes and tends to assimilate them to Spanish /i/.

Despite this similarity in the articulation of the vowels, the minimal pair 'sheep/ship' did not present major problems to the listeners. More than 70% of the participants correctly identified each of the words (see Appendix 3 for exact percentages of all words). This rate of correct identifications could be explained by the different vowel length in the words 'ship' (74 ms) and 'sheep' (109 ms). In spite of both vowels being shorter than the standard, listeners might have perceived the difference.

The results obtained in the 'sit' sentence are worth mentioning. Despite the fact that the Speaker articulated the vowel in this word close to Spanish /i/ and

English /i:/, thus very distant from the expected vowel in 'set' (Figure 3 shows the distance between /i:/ and /e/), not all respondents identified this word correctly. We think this may be the result of the Speaker producing a sound similar to /ʃ/ for the first consonant sound (/s/), which explains why 14.41% of the judges understood a word which contains the same vocalic sound as 'sit' but starting with a different consonant sound. Had the Speaker correctly pronounced the initial consonant sound, the percentage of correct identifications might have risen to 96.61%. These results suggest that the accurate production of consonant sounds is important in order to be intelligible, in agreement with the LFC (Jenkins 2000). However, this is beyond the scope of the present research, so we will not discuss it in any more detail.

3.2.2. *Category 2. /e/ and /ɜ:/*

Sentences 9, 12 and 13 include words containing vowel /e/ (*Ben*, *set* and *men*). Figure 3 presents the Speaker's vowel closer to English /e/ than to the Spanish vowel, thus there should not be any problems in understanding words containing this sound, as confirmed in the percentage of correct identifications of these words (95.04% for 'Ben', 79.34% for 'men' and 98.5% for 'set').

Nevertheless, even though the percentage of correct identifications is very high, the low score of the word 'men' as compared to the other two words in the group was striking. A chi-square test suggests that Spanish native speakers (SpNS) performed better in this item (90.14%) than non-native speakers of Spanish (SpNNS) (64%) ($p < 0.001$).

Sentences 19 and 20 include words containing vowel /ɜ:/ (*burn* and *heard*). Figure 3 shows that, while the vowel in 'burn' is pronounced in a near-native-like way, the vowel in 'heard' is closer to English /e/. Curiously enough, both words were identified by a similar percentage of the listeners (91.7% for 'heard' and 89.3% for 'burn'). It is also worth noticing that among the listeners who could not identify 'heard', five of them said they had understood 'her' or 'hair'. We believe this is the result of both a deviation in the vowel quality and the Speaker's pronunciation of the final consonant sounds: he pronounced the rhotic variant of the word but omitted the final /d/. On the other hand, three respondents thought the Speaker had uttered 'Bern' (/bɜ:ʳn/) instead of 'burn' (/bɜ:ʳn/).

3.2.3. *Category 3. /æ/, /ʌ/ and /ɑ:/*

Sentences 3, 4, 5, 8, 14, 15, 16 and 18 include words containing either /æ/ (*man*, *cap* and *ban*), /ʌ/ (*cup* and *come*) or /ɑ:/ (*hard*, *calm* and *card*). Figure 3 reveals that the Speaker pronounced many of these words similarly even though they are distinct phonemes in RP. This is particularly noticeable in the position of 'calm'

(containing RP /ɑ:/) and 'cup' (containing RP /ʌ/), which overlap, confirming that the Speaker does not distinguish between these English vowels and tends to assimilate them to Spanish sound /a/ because they are more open than the native English vowels. Also, the Speaker confuses the articulation of /ʌ/ with that of /ɑ:/ (more clearly seen in Figure 4). While the vowel in 'hard', 'calm' and 'card' should be articulated at the back of the oral cavity, it is more fronted than the one in 'come', which is pronounced very close to RP /ɑ:/.

Contrary to our expectations, there is a clear distance between the vowel in 'man', 'cap' and 'ban' and the rest of the vowels in this category. The Speaker articulates this vowel closer to English /æ/ than to Spanish /a/. This may be because /æ/ is farther away from the other two English sounds in the vowel space and the Speaker finds it easier to distinguish them in terms of articulation.

Several results are worth mentioning in this group. First, we realized that 'cap' had been identified by less than 70% of the listeners. A chi-square test was performed

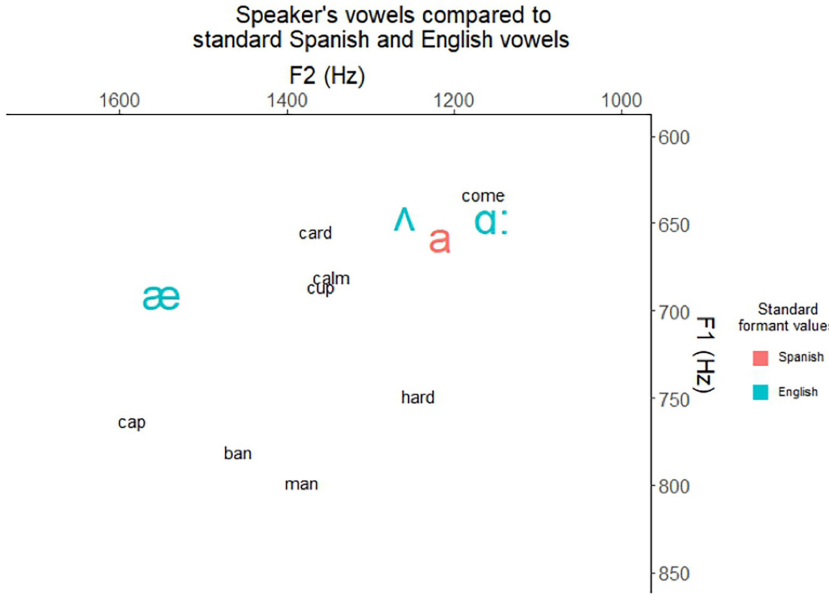

Figure 4. Enlarged image of the placement of vowels /æ/, /ʌ/ and /ɑ:/ as pronounced by the Speaker. Spanish and English standard vowels appear for reference purposes. Formant data taken from Quilis and Esgueva (1983: 244) for Spanish and Cruttenden (2014) for English.

to analyse whether any particular characteristic of the respondents had influenced the results. On average, SpNNS performed better (82%) than SpNS (57.75%) ($p = 0.005$). Figure 4 shows that the quality of the Speaker's vowels is different, thus there should not be any problems in differentiating the words. Nevertheless, because Spanish speakers tend to merge these sounds both in articulation and perception (Gómez-González and Sánchez-Roura 2016: 90), this might have been the reason for the rather poor rate of identifications by SpNS.

Second, the pair 'come/calm' is worth analyzing because the Speaker articulated the vowels in these words in an unexpected manner. As explained above, 'come' presents formant values closer to RP /ɑ:/, while the vowel in 'calm' is more front and open, that is, close to English /ʌ/ or Spanish /a/. While this change does not seem to have been a problem in the identification of 'calm' (84.3% of correct identifications) it may have been so in the identification of 'come' (72.73%), especially since 26.45% of the listeners thought the Speaker had said 'calm'.

A chi-square test suggests that SpNS performed better in 'come' (80.28%) than SpNNS (62%) ($p = 0.003$). Two non-mutually exclusive reasons may explain these results. First, SpNNS might have been influenced by the deviant pronunciation of the vowel thus choosing the incorrect word. Second, SpNS might have relied on the absence of /l/ rather than on vowel quality to identify 'come'. Even though in RP English the <l> is silent in 'calm', many Spanish speakers, including the Speaker in this study, tend to pronounce it, which may have influenced the results.

Finally in this group, the word 'card' (/kɑːʳd/) presents some interesting results. In spite of the large distance between the vowel quality of the two words contrasted in this item ('card' and 'cord') (Figure 3), 28.93% of the listeners were unable to identify the word which had been uttered. A thorough analysis of the participants' responses showed that 25.62% selected the 'other' option and specified they had understood 'car' (/kɑːʳ/). Similar to other words analysed in this study which finish in <rd>, the Speaker pronounced the /r/ but not the final consonant (/d/). This may mean that the problem in the correct identification of this word does not lie in the articulation of the vowel (both 'card' and 'car' contain the same RP vowel) but in the simplification of the final consonant cluster, as happened with the words 'hard' and 'heard' (see section 3.1. in this paper).

3.2.4. *Category 4. /ɒ/ and /ɔ:/*

Sentences 6, 7 and 17 present words containing either /ɒ/ (*hock*) or /ɔ:/ (*cord* and *hawk*). Figure 3 shows that the Speaker's vowel quality for both words is very similar, thus we may say that he does not distinguish between the two English sounds but merges them. In fact, the Speaker pronounces the minimal pair 'hock/

hawk' only slightly differently, which caused problems in the identification of the words in the intelligibility test (Figure 5).

Most listeners selected 'hock' as the word uttered by the Speaker in the three sentences within this group, even though only in one of them had the Speaker actually pronounced this word. In the sentence 'hawk (modified)' more respondents selected the correct option (40.5%), thus vowel length seems to have contributed to the better rate of identifications (see section 3.1.). Yet the majority of the respondents (50.41%) opted for 'hock', probably influenced by the quality of the vowel, very similar to English /ɒ/.

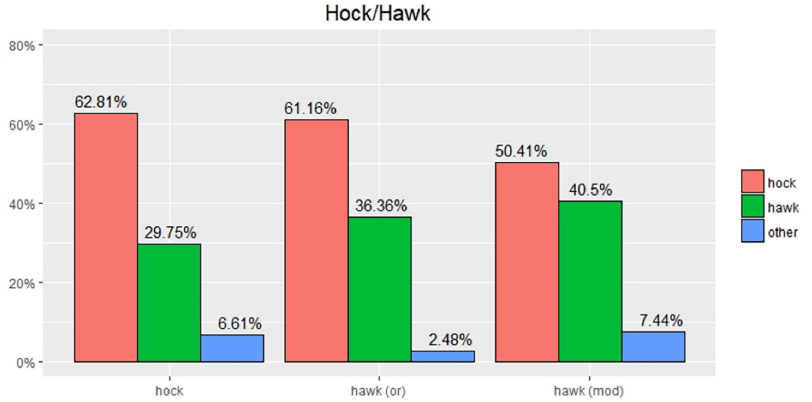

Figure 5. Distribution of the words understood by the listeners in the sentences containing the words 'hock' and 'hawk'.

3.2.5. *Category 5. /ʊ/ and /u:/*

Sentences 10 and 21 include words containing /ʊ/ (*look*) and /u:/ (*Luke*) respectively. Figure 3 reveals that the words are pronounced quite similarly. A closer look at the actual production of these vowels shows that 'look' is pronounced very close to the corresponding English vowel while 'Luke' is pronounced between /ʊ/ and /u:/. The results from the intelligibility test show some degree of confusion on the part of the listeners (Figure 6). In the sentence 'Luke (original)', only 29.75% of the respondents correctly identified the word, whereas the modified version largely improved the rate of correct responses (52.89% of right identifications). However, the number of participants who selected one of these two options is very similar, thus the confusion is maintained, probably because of the similar vowel quality produced by the Speaker.

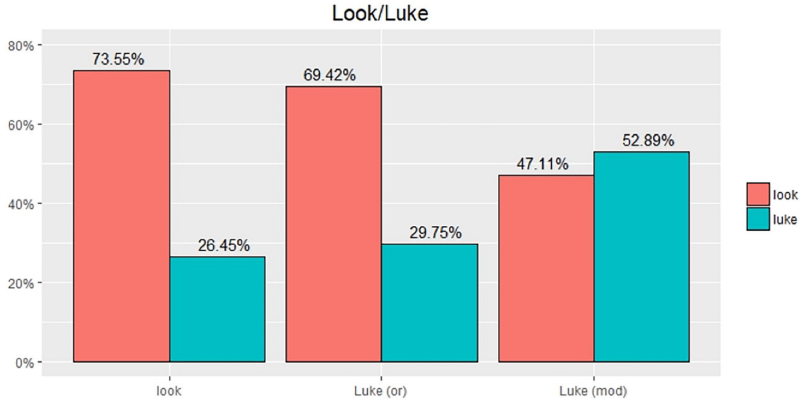

Figure 6. Distribution of the words understood by the listeners in the sentences containing the words 'look' and 'Luke'.

4. Discussion

With regard to vowel length, the results show that accurate vowel length increases the Speaker's intelligibility (Table 2), suggesting that this feature is actually a key element in ELF communication, which thus confirms the LFC in this respect. Nonetheless, this improvement was not significant in all cases and for few of the words, the lengthening of the vowel resulted in a lower degree of intelligibility. This, together with the low rate of correct responses for a few items (e.g. 'hawk' and 'Luke'), indicates that vowel length alone may not be enough to ensure intelligibility.

In the case of 'hock/hawk', we might attribute the confusion in the identification of the words to the fact that some American accents do not distinguish between RP /ɒ/ and /ɔ:/ and their users produce /a:/ instead (Celce-Murcia et al. 2010: 451). Some listeners may be more used to listening to American accents and therefore have difficulties in distinguishing between the two RP sounds analysed in this paper. Another possible reason for the poor percentage of right responses is the low word frequency of these words (55 for 'hock' and 12 for 'hawk' as a verb, according to the British National Corpus).

Nevertheless, while the confusion in the group 'hock/hawk' may be justified by either the influence of American accents or the infrequent occurrence of the words, the misidentification of 'look/Luke' suggests that vowel quality may play an

important role in the intelligibility of speakers, at least in the distinction between /ʊ/ and /u:/.

The results concerning vowel quality present some contradictory results depending on the sounds which are analysed and contrasted. On the one hand, even though /i:/ and /ɪ/ are pronounced in a very similar way, more than 70% of the listeners were able to correctly identify the words. This suggests that Jenkins is right in claiming that vowel quality is not necessary to intelligibility but vowel length is. Likewise, the words containing /ʌ/ and /ɑ:/ were correctly identified by more than 70% of the participants. However, these results should be taken with caution because in those words presenting /ɑ:/, the Speaker introduced one consonant sound ([r] in 'hard' and 'card', and [l] in 'calm') after the vowel, influenced by rhotic accents and/or spelling. The production of these consonant sounds, which according to RP rules should be silent in these words, may have helped the judges to discern the correct word and therefore increase the rate of correct identifications.

Remarkable are the results obtained regarding /æ/. The percentage of identifications changes depending on the word with which it was contrasted. Even though the position on the front-back axis of the vowel in 'cap' was distant from the vowel in the other two words (Figure 4), it received the lowest rate of identification in category 3 (66.7%). We believe that the reason lies in the fact that 'cap' was contrasted with 'cup', which falls within the Spanish /a/ category, while 'ban' was contrasted to 'Ben' and 'burn', and 'man' to 'men', which belong to different Spanish perceptual categories and therefore are easier to pinpoint. This implies that the quality of vowels /æ/ and /ʌ/ should be regarded as important.

The results for /ɜ:/ are worth mentioning since the LFC establishes that vowel /ɜ:/ should be articulated accurately in terms of vowel quality. The results obtained in the present study show that 'heard' (pronounced with a vowel similar to English /ɐ/) was better identified than 'burn' (in which the vowel was native-like) in the original version of the words. However, the modified versions reveal that 'burn' received a higher percentage of correct identification than 'heard'. This means that the combination of both vowel quality and length should be accounted for in the production of this vowel, thereby confirming the LFC.

Finally, we accidentally found out that the simplification of final consonant clusters in three of the words ('hard', 'heard' and 'card') may have influenced the results of the intelligibility test. In 'hard' (mod) (/hɑːʳd/), two of the listeners who did not identify the word claimed to have heard the non-existent word 'har' which, according to the rules of RP pronunciation, would also be pronounced with vowel

/ɑː/. Similarly, some respondents said that the word uttered by the Speaker in both versions of 'heard' was 'her', which, in its strong form, only differs from 'heard' in the production of the final cluster.

Parallel results were found in relation to 'card' (/kɑːʳd/), which was identified by 71.07% of the listeners in its original form and by 85.95% in the modified version. In both cases, a large group of participants said they had understood 'car' (/kɑːʳ/) (25.62% in the original version and 12.4% in the modified one), suggesting that they were misled by the simplification of the final cluster. Therefore, we may consider that these respondents identified the vowels uttered but were confused by the simplification of the final consonant clusters. Consequently, we might conclude that the simplification of final clusters hinders intelligibility (contradicting the LFC). Nevertheless, the intelligibility of consonant clusters is beyond the scope of this study, thus we will not discuss this any further.

Worth mentioning is the fact that we found a significant difference in the overall performance of the respondents regarding their native language. An independent T-test suggests that, overall, SpNS performed better in identifying the words (M = 23.80, sd = 2.49) than SpNNS (M = 22.40, sd = 3.47) (p = 0.02). We attribute this difference to the shared native language between the Speaker and the SpNS listeners. This may simply mean that SpNS are more familiarised with the Speaker's accent and the possible merging processes. On the other hand, SpNNS may not be so used to this foreign accent, thus they are not sure how to interpret words pronounced with a clear influence of Spanish phonology.

5. Conclusions

The data examined in this study have considered both vowel quantity and quality, which have been analysed using quantitative as well as qualitative methodology. Regarding vowel length, the quantitative analysis has revealed that the Spanish Speaker does not distinguish between English long and short vowels, all of them being short when compared to standard English vowel length. This fact has proved to be an obstacle for intelligibility. The results from the intelligibility test suggest that vowel length affects intelligibility. Longer vowels generally enhanced the rates of correctly identified words, regardless of vowel quality. This confirms Jenkins's idea that vowel length is crucial to intelligibility.

The quantitative data have also shown that the Speaker has difficulties discerning the different RP English vowel qualities, resulting in merging processes to conform

to other categories, generally closer to Spanish vowels, as discussed in existing literature (Gómez-González and Sánchez-Roura 2016).

However, the results from the intelligibility test suggest that vowel length is not the only element which helps identify a word because none of the modified versions of the words included in this study achieved 95 % correct identification, which means that other factors are also to be taken into consideration.

The study of the correct identification of words based on vowel quality suggests that Jenkins was not completely right about disregarding vowel quality altogether. Even though the sounds /i:/ and /ɪ/ did not present major problems, the group 'look/Luke' caused many misidentifications due to the similar quality of the vowels. Similarly, the group 'hock/hawk' was also a source of intelligibility problems. However, this may be due to the influence of American English accents which do not distinguish /ɒ/ and /ɔ:/ or to the low frequency of use of these words. Furthermore, words including vowel /æ/ received a high rate of correct identification probably because its place of articulation was closer to the native phoneme and further from that of other vowels.

In addition, we discovered contradictory results with respect to the accurate production of vowel /ɜ:/, since 'heard (original)' (whose vowel was not accurately pronounced) was better identified than the word 'burn (original)' (whose vowel was near-native-like). However, the opposite results were found in the modified versions of the words, which suggests that a combination of both vowel length and accurate quality is necessary for this sound to be intelligible, in accordance with the LFC.

We are aware of the limitations of this study since only a few examples of each English vowel were considered, thus only tentative conclusions could be drawn. Further research is needed which analyses each phoneme in detail in order to draw more definite conclusions on the role played by vowel length and quality in international intelligibility on the part of Spanish speakers. Moreover, we consider that more research is needed on the actual relevance of final consonant clusters given the results obtained in this study.

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Notes

[1] The column "Improvement" of the correct number of identifications between the original and modified versions of the words has been calculated with the percentage of change formula ((Frequency (modified) / Frequency(original))-1).

* $p < 0.05$

** $p < 0.001$

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Appendix 1 - Stimuli

Practice items (not included in the analyses)

1. Where did you find this **jam**?
2. I know a **person** who lives in that village.
3. No, I **want** drink.

Items included in the analyses

1. Is that a **sheep** over there?
2. Why do you always have to **sit** on my brother?
3. Have you seen the **man** anywhere?
4. Which is your **cup**, John?
5. Why don't you just **come** down?
6. Fred used to **hock** stolen goods, I think.
7. What did you buy that **cord** for?
8. It is not supposed to be **hard**, actually.
9. What could we do to **Ben** Johnson?
10. **Look**, I don't know what on earth you're talking about!
11. Is that a **ship** over there?
12. Why do you always have to **set** on my brother?
13. Have you seen the **men** anywhere?
14. Which is your **cap**, John?
15. What could we do to **ban** Johnson?
16. Why don't you just **calm** down?
17. Fred used to **hawk** stolen goods, I think.
18. What did you buy that **card** for?
19. It is not supposed to be **heard**, actually.
20. What could we do to **burn** Johnson?
21. **Luke**, I don't know what on earth you're talking about!

Appendix 2 - Intelligibility test

Part 1 - Background information

1. Age: _____
2. Gender: ☐Masculine ☐Feminine
3. Occupation: _____
4. Do you have any knowledge of phonetics or phonology? ☐Yes ☐No
5. Place of birth (Country): _____
6. Native language: _____
7. Do you speak any other languages apart from your native language? _____ Please, specify which language(s)
8. How often do you use English in your daily life?
   - ☐ I use English all the time
   - ☐ I usually use English but I also speak other languages on a daily basis
   - ☐ I rarely use English
   - ☐ I never use English

9. In which contexts do you use English? (choose all that apply)
   ☐ At work
   ☐ At school/university
   ☐ At home
   ☐ With family/friends
   ☐ Other (please, specify) _____

10. How often do you speak English?
   ☐ Very often
   ☐ Usually
   ☐ Sometimes
   ☐ Not very often
   ☐ Rarely
   ☐ Never

11. You speak English with…
   ☐ Native speakers of English only
   ☐ Mostly native speakers of English
   ☐ Mostly non-native speakers of English
   ☐ Non-native speakers of English only
   ☐ Both native and non-native speakers of English alike

Part 2 - Intelligibility test (sample items)

1. What did you buy that _____ for?
   ☐ Cord ☐ Card ☐ Other: _____

2. _____, I don't know what on earth you're talking about!
   ☐ Look ☐ Luke ☐ Other: _____

3. Is that a _____ over there?
   ☐ Sheep ☐ Ship ☐ Other: _____

4. Have you seen the _____ anywhere?
   ☐ Man ☐ Men ☐ Other: _____

5. Fred used to _____ stolen goods, I think.
   ☐ Hock ☐ Hawk ☐ Other: _____

6. It is not supposed to be _____, actually.
   ☐ Hard ☐ Heard ☐ Other: _____

7. Why don't you just _____ down?
   ☐ Come ☐ Calm ☐ Other: _____

8. Which is your _____, John?
   ☐ Cup ☐ Cap ☐ Other: _____

9. Why do you always have to _____ on my brother?
   ☐ Sit ☐ Set ☐ Other: _____

10. What could we do to _____ Johnson?
   ☐ Ben ☐ Ban ☐ Burn ☐ Other: _____

Appendix 3 - Rates of correct identifications of each of the words

Word	Sound	Frequency (correct)	Percentage (correct)
Sheep (original)	/iː/	85	70.25%
Sheep (modified)	/iː/	107	88.43%
Ship	/ɪ/	87	71.90%
Sit	/ɪ/	97	80.17%
Set	/e/	119	98.35%
Ben	/e/	115	95.04%
Men	/e/	96	79.34%
Man	/æ/	119	98.35%
Ban	/æ/	101	83.47%
Cap	/æ/	82	67.77%
Cup	/ʌ/	90	74.38%
Come	/ʌ/	88	72.73%
Calm (original)	/ɑː/	102	84.30%
Calm (modified)	/ɑː/	107	88.43%
Hard (original)	/ɑː/	117	96.69%
Hard (modified)	/ɑː/	106	87.60%
Card (original)	/ɑː/	86	71.07%
Card (modified)	/ɑː/	104	85.95%
Hock	/ɒ/	76	62.81%
Hawk (original)	/ɔː/	44	36.36%
Hawk (modified)	/ɔː/	49	40.50%
Cord (original)	/ɔː/	98	80.99%
Cord (modified)	/ɔː/	107	88.43%
Look	/ʊ/	89	73.55%
Luke (original)	/uː/	36	29.75%
Luke (modified)	/uː/	64	52.89%
Burn (original)	/ɜː/	106	87.60%
Burn (modified)	/ɜː/	114	94.21%
Heard (original)	/ɜː/	110	90.91%
Heard (modified)	/ɜː/	109	90.08%

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