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War feels less horrid in a foreign accent: exploring the impact of the foreign accent on emotionality

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Introduction: The processing of a foreign accent is known to increase cognitive load for the native listener, establish psychological distance with the foreign-accented speaker, and even influence decision-making. Similarly, research in the field of emotional processing indicates that a foreign accent may impact the native listener's emotionality. Taking these aspects into consideration, the current study aimed to confirm the hypothesis that a foreign accent, compared to a native accent, significantly affects the processing of affective-laden words.

Methods: In order to test this hypothesis, native Spanish speakers participated in an online experiment in which they rated on a Likert scale the valence and arousal of positive, neutral and negative words presented in native and foreign accents.

Results: Results confirm a foreign accent effect on emotional processing whereby positively valenced words are perceived as less positive and negatively valenced words as less negative when processed in a foreign accent compared to a native accent. Moreover, the arousal provoked by emotion words is lesser when words are processed in a foreign than a native accent.

Discussion: We propose possible, not mutually exclusive, explanations for the effect based on linguistic fluency, language attitudes and the linguistic context of language acquisition. Although further research is needed to confirm them, these explanations may be relevant for models of language comprehension and language learning. The observation of a reduction in emotionality resulting from a foreign accent is important for society as important decisions are made by representatives with diverse language and accent backgrounds. Our findings demonstrate that the choice of the language, which entails speaking in a native or a foreign accent, can be crucial when discussing topics such as the consequences of wars, pandemics, or natural disasters on human beings.

KEYWORDS

foreign accent, emotional word processing, emotion, affective valence and arousal, multilingualism

Introduction

When talking at the United Nations, politics who are non-native speakers of English may choose to deliver their speech in their native language that would be translated by interpreters into the audience's respective languages, or they may choose to speak in English, a foreign language. The choice will determine whether people perceive them as

native speakers, or foreign speakers based on their accent. The question is, would their message be interpreted similarly if the audience listens to it in their own language in a native or in a foreign accent? Recent empirical evidence suggests that the (foreign) accentedness of the speech may hamper the interpretation of the message. Literature has demonstrated that foreign-accented speech impacts the way native listeners process language at lexico-semantic, syntactic, or even pragmatic level (Goslin et al., 2012; Hanulíková et al., 2012; Romero-Rivas et al., 2015; Grey and van Hell, 2017; Caffarra et al., 2018; Foucart and Hartsuiker, 2021; Gosselin et al., 2021; Bazzi et al., 2022a; Puhacheuskaya and Järvikivi, 2022). The foreign accent also affects the way speakers are perceived by native speakers. For instance, foreign-accented speakers are usually perceived as less intelligent, less educated, or less competent than native speakers (Hosoda and Stone-Romero, 2010; Fairchild and Papafragou, 2018; Foucart et al., 2020; Lorenzoni et al., 2022) or judged as more guilty compared to native speakers for equal crimes (Romero-Rivas et al., 2022). The foreign accent has also been shown to affect natives' moral judgement, in that they are more likely to sacrifice one person to save five if a dilemma is presented to them in a foreign than in a native accent (Foucart and Brouwer, 2021). This effect has been called the Foreign Accent effect after the Foreign Language effect that has also demonstrated more utilitarian behaviors when a dilemma is faced in a foreign language compared with a native language (e.g., Costa et al., 2014). One of the potential factors that may induce people to act differently may be related to the reduction of emotionality triggered by the foreign language or foreign accent. Hence, the choice of the language, that entails speaking in a native or a foreign accent, can be crucial depending on the situation, especially in such contexts where listeners must process a message with a high emotional burden. Although a few studies have suggested a modulation of emotion processing by foreign accented speech (Hatzidaki et al., 2015; Bazzi et al., 2022b), the impact it may have on the valence and arousal elicited by emotion words has never been clearly demonstrated with explicit measures. In this study, we addressed this question by presenting Spanish L1-speakers with audio emotional vocabulary (in a native and a foreign accent) that they assessed both for their level of valence (pleasant or unpleasant quality of a stimulus) and arousal (high or low intensity of a stimulus).

Hatzidaki et al. (2015) investigated the influence of a speaker's accent on the processing of affective words. In their study, they presented native Spanish speakers with neutral, positive, and negative words spoken in both native and foreign accents. The participants undertook a semantic categorization task while their brain activity was monitored using the event-related brain potential (ERP) technique. Interestingly, the behavioral findings indicated no discernible differences in terms of reaction time between the two accent conditions; i.e., participants were slower to respond to emotion words than to neutral words independently of the accent of the speaker. The ERP data revealed that the emotion words elicited a more pronounced late positive complex [an ERP component associated with processing emotional language, see Kotz and Paulmann (2011) for a review] compared to neutral words in both accent conditions. This pattern was true for both positive and negative words in the native accent. Nevertheless, in the

foreign accent condition, this effect was present only for negative-valenced words, whereas positive words were processed similarly to neutral words. In other words, listeners' word processing differed in the native and foreign accent only for positive words. The authors claimed that negative valence words generally elicit a higher arousal, and therefore they are more resistant to the impact of the foreign accent. To further explain their results, they hypothesized that during the processing of emotional vocabulary, listeners carry out extra-linguistic processing related to episodic memory of when the emotion words were learned. That is, if a word was encoded in a native accent, this word and its associated features such as its valence and arousal will be more easily retrieved if heard in a native accent than in a foreign accent. Moreover, the foreign accent might be perceived as noise by native speakers (Adank et al., 2012), and findings suggested that the emotional load of the speech was lowered in noisy environments (Morgan, 2021; Neumann and Vu, 2021).

A modulation of emotionality by accent was reported as well by Bazzi et al. (2022b). The main focus of their study was the impact of the speaker's accent (native vs. foreign) on the likelihood to respect social norms and the judgement for not respecting them. However, the authors also analyzed whether the accent modulated the emotionality elicited by the norms. More specifically, participants were asked to evaluate the level of *anger*, *disgust*, *sadness*, *preoccupation*, and *fear* after listening to a set of social norms. In Experiment 1, participants were presented with norms imposed by the government to fight the Covid pandemic (e.g., "You should keep a safe distance"). The norms were uttered in a Spanish accent (native) and Indonesian accent (foreign). The Indonesian accent was selected because it was perceived as unfamiliar by native speakers and therefore, did not trigger stereotypes associated to a specific nationality. In Experiment 2, participants were presented with everyday social norms (e.g., "Do not litter on the streets"), with a cultural link, learned in a natural context and taught by peers. In this experiment, in addition to the Spanish and Indonesian accents, a second foreign accent, Moroccan, was included because it is usually related in Spain to negative stereotypes (Nikleva and Rico-Martín, 2017). The results revealed that in both experiments, accent did not impact the likelihood to respect a norm nor the judgement for not respecting it. However, these two aspects were significantly modulated by the emotion triggered by everyday norms (Experiment 2), and this emotion varied depending on the accent of the speaker. Specifically, when the level of emotionality of a norm increased, not respecting it was perceived as more wrong in the three accent conditions, even though the effect was significantly larger in the unfamiliar foreign accent (Indonesian). The same was true regarding the likelihood to respect the norms but only when they were produced in the native accent and the unfamiliar foreign accent, not when produced by the Moroccan speaker. Their results showed that emotions felt by the participants were not only modulated by the accent but also by the origin of the speaker. Indeed, the negative accent (Moroccan) provoked a less intense emotional response compared to the native accent, suggesting that language attitudes may generate an emotional distance. The conclusion of this study was that accent does not directly impact participants' decisions, but it affects the decision-making process. Importantly for our purpose,

the authors suggested that emotionality and language attitudes related to the speaker may be the underlying factors of such effect.

The effect of the foreign accent on emotionality has also been indirectly demonstrated in the study by [Foucart and Brouwer \(2021\)](#). They presented Spanish (Experiment 1) and Dutch (Experiment 2) native speakers with the Footbridge dilemma in which one must decide whether to sacrifice one person to save five others ([Foot, 1978](#); [Thomson, 2012](#)). The moral dilemmas were spoken either in native or foreign accents. They reported an increase in utilitarian decisions in the foreign condition compared with the native condition. As mentioned above, this Foreign Accent effect resembles the Foreign Language effect (e.g., [Costa et al., 2014](#)). One of the factors that have been considered to drive these effects is the reduction of emotional response to the dilemma provoked by the foreign linguistic context (i.e., accent or language).

Overall, the findings of these studies imply that the foreign accent modulates emotionality. However, until now, an explicit reduction of emotional response to affective-laden stimuli has not been clearly demonstrated. First, both [Foucart and Brouwer \(2021\)](#) and [Bazzi et al. \(2022b\)](#) used materials considered to have an emotional impact on the listener (i.e., norms and moral dilemmas) but that did not consistently feature emotionally charged words. For example, the sentence “Do not litter in the street” lacks explicit positive or negative emotion words, and the emotion it triggers is implicit. It seems that to understand the impact of the foreign accent on implicit emotionality at sentence or larger context, the impact it may have on emotion words must first be determined. Although, [Bazzi et al.](#) explicitly asked their participants to evaluate the level of specific emotions (e.g., “anger”) generated by a norm on a Likert scale, they did not assess the response to affect-laden words (e.g., “party”). [Hatzidaki et al. \(2015\)](#) did use emotion words, but their participants performed a semantic categorization task in which they indicated whether each word was either concrete (i.e., they could touch) or abstract (i.e., they could not touch). The authors opted for this task to obtain an implicit measure of word processing with behavioral and neural data (ERP). Interestingly, the results of these two measures did not align with regards the impact of accent on emotion word processing. Therefore, the aim of the present study is to take a step further and address the question of the impact of the foreign accent on emotion word processing using (1) affective-laden single words and (2) explicit measures on both valence and arousal.

The present study

Methods

Participants

Forty-one native Spanish users took part in the experiment (29 females, mean age = 28.44 ± 8.92 years, see [Supplementary material](#) for detailed power analysis). Seventeen were from central or south America, but all had been living in Madrid for over a year and were therefore familiar with the peninsular Spanish accent. Participants were tested in a classroom or were recruited via the Prolific pool (www.prolific.co) and received the pro-rata of 10 euros/hour for their participation. The study was approved by the Research Ethical Committee of

Nebrija University (approval code: UNNE-2020-004) and it was carried out following the principles of the Declaration of Helsinki. Before taking part in the experiment, the participants read and accepted the consent form. None of the participants reported a hearing disorder.

Materials

We selected a subset of 192 words from the Spanish version of the Affective Norms for English Words ([Redondo et al., 2007](#)). In their study, a total of Spanish 1,034 words were evaluated on the dimensions of valence, arousal, and frequency using a 1 to 9 scale. First, we classified the words according to their valence and we divided all the vocabulary into three groups based on their scores. Negative-valenced words ranged from 1.00 to 3.20, neutral-valenced words from 3.21 to 6.10 and positive-valenced words from 6.11 to 9.00. Additionally, we classified the words into two categories based on their level of arousal; low arousal words had scores between 2.00 and 5.50 (the database does not contain words with a score below 2 for arousal), and high arousal words had scores between 5.51 and 9.00. The level of arousal between low and high arousal words was significantly different [$F_{(1,31)} = 123.86, p < 0.001, \eta^2 = 0.746$]. Words consisted of nouns, verbs or adjectives, but we excluded words from the same semantic concept (e.g., if the word “dead” was included, then the words “die” and “death” would be discarded). Frequency and number of letters were balanced across the three valence conditions [$F_{(2,62)} = 2.714, p = 0.074, \eta^2 = 0.032$; $F_{(2,62)} = 2.338, p = 0.105, \eta^2 = 0.022$, respectively] and the two arousal conditions [$F_{(1,31)} = 3.418, p = 0.074, \eta^2 = 0.017$; $F_{(1,31)} = 0.714, p = 0.405, \eta^2 = 0.004$, respectively]. This selection resulted in the 6 following conditions: positive valence high arousal (positive-high), positive valence low arousal (positive-low), neutral valence high arousal (neutral-high), neutral valence low arousal (neutral-low), negative valence high arousal (negative-high), and negative valence low arousal (negative-low). The full list of materials is available at https://osf.io/r8hck/?view_only=c07896d7a6214acead46b5d3880d75b8.

Audio stimuli

The stimuli were generated in native and foreign accents by the Microsoft Azure AI Speech Service (<https://azure.microsoft.com/en-us/products/ai-services/ai-speech/>; henceforth “Azure”). Azure uses advanced voice synthesis technologies, allowing for the real-time conversion of text to speech. It is particularly adept at producing voices that closely resemble real-life speech, complete with proper intonation and nuances in expression. Furthermore, using Speech Synthesis Markup Language (SSML), Azure can modify various aspects of speech, including tone, mood, and even specific characteristics of the voice. The use or the listening of synthetic voices is no longer something unusual, as nowadays, 4.2 million digital voice assistants like Apple’s Siri and Amazon’s Alexa ([Schreiblmayr and Mara, 2022](#)) are already being employed in our daily lives. Therefore, the use of voices generated through Artificial Intelligence, with their increasingly life-like quality and versatility, is becoming more common in different contexts, such as in the language teaching field.

Both native and foreign accent conditions had four different speakers. For the native condition, the stimuli were generated in a standard Spanish accent from Spain. In the foreign condition, the stimuli were generated in Spanish by artificial voices from Italian, British, Finnish, and Romanian speakers.¹ To avoid potential gender biases (due to acoustic differences, for example) the gender of the voices was balanced (two males, two females in each accent condition). Similarly, in the foreign condition, we used several distinct nationalities since recent findings have showed that social categorization or stereotypes related to the origin of foreign speakers may have a different impact on native speakers (Foucart and Brouwer, 2021; Bazzi et al., 2022a). Although the effect of gender and stereotypes on emotion processing is an interesting question, these factors were not analyzed here because the aim of this study was first to demonstrate whether accent affects emotion processing.

The Italian and British accents were chosen because they are easily identifiable by Spanish speakers (58.53% of the participants correctly identified the Italian accent, 87.80% correctly identified the British accent). Likewise, two more difficult to identify accents were included, namely the Finnish and Romanian accents (none of the participants were able to identify these two accents). Gender and nationality factors were controlled to avoid experimental biases.

Design and procedure

The experiment followed a within-subjects design. The vocabulary was fully randomized so that each participant listened to 192 words, 96 in each accent condition (foreign accent vs. native accent). Of the 96 words in each condition, there were 32 of each valence condition (positive, neutral, negative) and 48 of each arousal condition (high and low). To ensure that the experiment was fully counterbalanced across participants and that each word was heard in each of the condition, i.e., accent (native and foreign), speakers (four native and four foreign speakers), and gender, eight experimental lists were created, and participants were randomly assigned to one of these lists at the beginning of the experiment. Hence, across these eight lists, each of the 192 words was heard in all the conditions and produced by all the speakers.

After giving their consent and filling out a demographic questionnaire, participants were informed that they would listen to a set of words. A practice trial was carried out before the experiment *per se* with a different set of words. In each trial, participants listened to each word (they could play the word twice if needed). After listening to the word, three questions appeared on the screen, each accompanied by a Likert scale from 1 to 9 to assess (1) valence [“How did you feel when listening to the word?” with the options “negative” (1) and “positive” (9)], (2) arousal [“What did you feel when listening to the word?”, with the options “low

intensity” (1) and “high intensity” (9)], and (3) comprehensibility [“How difficult was it to understand the word?” with the options “Not at all” (1) and “I did not understand the word” (9)]. Note that, when assessing valence, the extremes reflected the highest emotionality in a reversed manner. In other words, the closer to 9, the more positive, and vice-versa, the closer to 1, the more negative. According to our hypothesis (reduced emotion in foreign-accented speech), we expected a lower rating (i.e., closer to 1) for negative words in the native condition than in the foreign condition, and a higher rating (i.e., closer to 9) for positive words in the native condition than in the foreign condition. After finishing the main task, participants completed a second questionnaire in which they were asked to indicate their knowledge of foreign languages and to identify the accents (nationality) of the speakers they had heard during the experiment.

Data analysis

The data and analysis scripts are available at https://osf.io/r8hck/?view_only=c07896d7a6214acead46b5d3880d75b8. We analyzed the data using the `clmm` function (Christensen, 2023) from the ordinal package in R (version 4.3.1; R Core Team, 2023). Two ordinal mixed effects analyses were conducted. The aim of the first analysis was to assess whether the valence ratings were influenced by accent and type of valence of the words. We conducted an analysis on the dependent ordinal variable valence rating (Likert scale from 1 to 9) with accent (native and foreign) in interaction with type of valence (positive, negative, and neutral). The native level of accent was contrast-coded at $-0.1/2$ and the foreign level at $1/2$. Helmert-coding was used for type for valence. The first contrast compared neutral ($-2/3$) vs. negative ($1/3$) and positive ($1/3$), whereas the second contrast compared negative ($-1/2$) vs. positive ($1/2$) (neutral was set to 0). The most parsimonious random effects structure was assessed by comparing the goodness of fit for two models using the lowest Akaike Information Criterion. The best model included participants and items (i.e., vocabulary) and a random slope for accent by participants.

The aim of the second analysis was to assess whether the arousal ratings were affected by accent and type of arousal. We conducted an analysis on the ordinal dependent variable arousal rating (scale from 1 to 9) with accent in interaction with type of arousal (high and low). Low arousal was contrast-coded at $-0.1/2$ and high arousal at $1/2$. Accent was contrast-coded as in the first analysis and the same random effects structure was used.

Results

Before conducting the two main analyses, we removed from the final data all the words for which participants had indicated “I did not understand the word,” resulting in 7.22% of the stimuli removed from the analyses. A paired *t*-test showed that the vocabulary uttered in foreign accents ($M = 2.64$; $SD = 2.08$) was assessed significantly more difficult to comprehend than the native accent [$M = 1.32$; $SD = 0.93$; $t_{(38)} = 31.7$, $p < 0.001$, $d = 0.57$].

¹ The exact voices from the Microsoft Azure AI Speech Service were in the native condition: es-ES-ArnauNeural (male), es-ES-ElviraNeural (female), es-ES-LiaNeural (female), es-ES-TeoNeural (male) and in the foreign condition: ro-RO-AlinaNeural (female), it-IT-GianniNeural (male), en-GB-EthanNeural (male), fi-FI-NooraNeural (female).

TABLE 1 Means, SDs and medians for the valence ratings (1-negative to 9-positive) split by accent (native vs. foreign) and type of valence (negative, neutral, positive).

Type of valence	Accent					
	Native			Foreign		
	M	SD	Mdn	M	SD	Mdn
Negative	2.65	1.84	2	2.88	1.95	2
Neutral	5.28	1.97	5	5.06	1.91	5
Positive	7.16	1.89	8	6.67	1.98	7

TABLE 2 Estimates, standard error, z-values, and p-values of the model on the valence ratings.

	Estimate	SE	z-value	p-value
Accent	-0.14	0.11	-1.31	0.19
Type of valence _{CONTRAST1}	-0.41	0.12	-3.43	<0.001
Type of valence _{CONTRAST2}	4.51	0.15	30.89	<0.001
Accent by type of valence _{CONTRAST1}	-0.02	0.09	-0.19	0.85
Accent by type of valence _{CONTRAST2}	-1.02	0.11	-9.12	<0.001

Contrast1, neutral vs. negative and positive words; Contrast2, negative vs. positive words.

5.44, $SD = 2.42$) than the foreign accent condition ($M = 5.13$, $SD = 2.34$). In addition, a main effect of type of arousal was found, showing that the arousal rating was higher for the high arousal words ($M = 5.63$, $SD = 2.49$) than the low arousal words ($M = 4.95$, $SD = 2.23$).

Most importantly, a significant interaction was found between accent and type of arousal. Unpacking this interaction by subsetting the data revealed a higher arousal rating for low arousal words in the native accent ($M = 5.08$, $SD = 2.30$) than in the foreign accent ($M = 4.80$, $SD = 2.13$; *estimate* = -0.26; *SE* = 0.12, *z-value* = -2.19, $p = 0.03$). A higher arousal rating was also found for high arousal words in the native accent ($M = 5.79$, $SD = 2.49$) than in the foreign accent ($M = 5.45$, $SD = 2.48$; *estimate* = -0.39; *SE* = 0.13, *z-value* = -3.00, $p = 0.003$).

Valence ratings

Table 1 shows the means, SDs and medians of the valence ratings for the emotional words in the two accent conditions split by type of valence. The outcomes of the most parsimonious model are illustrated in Table 2. Significant results were found for type of valence for both contrasts, suggesting that (1) neutral words were rated more positively ($M = 5.18$, $SD = 1.95$) than negative ($M = 2.76$, $SD = 1.89$) and positive words ($M = 6.93$, $SD = 1.95$) together, and, (2) negative words were rated more negatively than positive words.

Most importantly, the findings demonstrated a significant interaction effect between accent and type of valence for the second contrast. Unpacking this interaction by subsetting the data revealed a lower valence rating for negative words in the native accent ($M = 2.65$, $SD = 1.84$) than in the foreign accent ($M = 2.88$, $SD = 1.95$; *estimate* = 0.47; *SE* = 0.12, *z-value* = 3.84, $p < 0.001$). In addition, a higher valence rating was found for positive words in the native accent ($M = 7.16$, $SD = 1.89$) than in the foreign accent ($M = 6.67$, $SD = 1.98$; *estimate* = -0.70; *SE* = 0.17, *z-value* = -4.16, $p < 0.001$).

Arousal ratings

Table 3 shows the means, SDs and the medians of the arousal ratings for the emotional words in the two accents split by type of arousal. Table 4 reveals the outcomes of the most parsimonious model. The results revealed a main effect of accent, indicating that the arousal rating was higher in the native accent condition ($M =$

Discussion

The purpose of the study was to investigate whether the foreign accent affects the level of emotionality processed by native speakers. To do so, we explicitly asked Spanish native participants to assess the level of arousal and valence of positive, neutral, and negative emotion-laden words uttered in native and foreign accents. The findings showed that positive words felt more positive and negative words felt more negative when processed in a native accent compared to a foreign accent. Also, the results indicated that words (independently of their valence) elicited overall higher arousal when processed in a native accent than when processed in a foreign accent. Our results extend and confirm previous findings that suggested an impact of the foreign accent on emotionality (Hatzidaki et al., 2015; Bazzi et al., 2022a). This reduction of the emotional response when stimuli are produced in a foreign accent can be attributed to several factors, which are not mutually exclusive, mainly, linguistic fluency, language attitudes, and the linguistic context of language acquisition, as developed in the following sections.

The foreign accent deviates from the native accent because of a variation in the pronunciation of phonemes, stress, etc. (Cristia et al., 2012), which renders speech less fluent. Hence, similarly to noise (Adank et al., 2012), the foreign accent increases cognitive load and reduces the fluency with which speech is processed (Oppenheimer, 2008). The noise generated by the foreign accent and the difficulty in processing somebody's speech has been shown to affect the way the speaker is perceived (Lev-Ari and Keysar, 2012; Dragojevic and Giles, 2016; Hanzliková and Skarnitzl, 2017; Boduch-Grabka and Lev-Ari, 2021). For instance, previous research

TABLE 3 Means, SDs and medians for the arousal ratings (1–low to 9–high) split by accent (native vs. foreign) and type of arousal (low vs. high).

Type of arousal	Accent					
	Native			Foreign		
	M	SD	Mdn	M	SD	Mdn
Low	5.08	2.30	5	4.80	2.13	5
High	5.79	2.49	6	5.45	2.48	5

TABLE 4 Estimates, standard error, z-values, and p-values of the model on the arousal ratings.

	Estimate	SE	z-value	p-value
Accent	−0.31	0.10	−3.00	0.003
Type of arousal	0.65	0.08	7.83	<0.001
Accent by type of arousal	−0.18	0.09	−2.02	0.04

has suggested a strong link between the disfluency generated by the accent and the fact that foreign speakers are perceived as less trustful and less likable than native speakers (Lev-Ari and Keysar, 2012; Dragojevic and Giles, 2016; Hanzlíková and Skarnitzl, 2017; Boduch-Grabka and Lev-Ari, 2021) and that they obtain less purchase intends in the marketing field (Mai and Hoffmann, 2011). Thus, in a similar manner, the reduction of emotionality may be explained by processing disfluency. We conducted further analyses to test this potential explanation. Recall that, after listening to each stimulus, our participants indicated the difficulty they had to understand the word. The results revealed that the foreign-accented stimuli were assessed as more difficult to understand than the native-accented stimuli. Two separate *post-hoc* analyses were performed to examine whether comprehensibility interacted with accent on valence ratings and on arousal ratings. Accent was contrast-coded and the same random effects structure as in the main analyses was used. Comprehensibility was centered in both models. The results for the valence ratings revealed no significant interaction between accent and comprehensibility (*estimate* = 0.05; *SE* = 0.04, *z*-value = 1.31, *p* = 0.19). However, the results for the arousal ratings did show a significant interaction (*estimate* = 0.07; *SE* = 0.04, *z*-value = 1.96, *p* = 0.0495). Note that some models consider valence and arousal as two independent dimensions of emotion and it is not uncommon to observe differences between the two, like here (for a review, see, Citron, 2012). Plotting these data (see, Supplementary Figures S1, S2) showed that for both accent conditions the higher arousal words elicited, the easier it was to comprehend them. This effect seems to be stronger in the native than the foreign accent condition. Previous studies have shown that the perceived comprehensibility of the foreign speaker modulates participants' answers (e.g., Lev-Ari and Keysar, 2012; Foucart and Brouwer, 2021). Note that the effect of comprehensibility is not consistently found, even across experiments that follow the same paradigm (Romero-Rivas and Costa, 2022). More research is needed to better understand which factors among comprehensibility, intelligibility, accent strength or

even the speaker's idiosyncratic features drive the disfluency which consequently affects processing.

The disfluency generated by the foreign accent goes beyond linguistic processing and also adopts a social aspect since, as previously mentioned, it triggers a negative bias toward the speaker (Fuentes et al., 2012; Dragojevic and Giles, 2016). Moreover, this negative bias generated by processing difficulty can be reinforced by the stereotypes associated with the origin of the speaker revealed by the accent (Mai and Hoffmann, 2011). Indeed, a word as simple as “hello” produced with an accent is a hint for native listeners to classify foreign speakers as out-group members (Purnell et al., 1999). The fact that a speaker does not belong to the same social/linguistic group generates psychological distance, which may alter how the information coming from this speaker is processed and may lead to a more abstract perception of the reality (Lieberman and Trope, 2008). In this line, in Bazzi et al. (2022a) study reported in the Introduction, the origin of the speaker affected the emotionality elicited when processing social norms. Indeed, recall that the foreign accent associated with a negative stereotype (Moroccan) provoked a less intense emotional response compared to the native accent and unfamiliar foreign accent (Indonesian). The aim of the present study was to establish for the first time the impact of the foreign accent on emotionality using explicit measures, not identifying the factors underlying this effect. For this reason, we used foreign-accented voices of four different nationalities in the foreign condition to avoid associating the speakers with the stereotype of one specific country. The Italian and the British accents were correctly identified by the participants at around 59% and 88%, respectively, whereas the Finnish and Romanian accents were not successfully recognized. Note that the accents that were identified are usually positively perceived in Spain (Nikleva and Rico-Martin, 2017) and therefore, most likely did not trigger negative stereotypes. Now that the impact of the foreign accent has been explicitly demonstrated, future research should investigate the role of language attitudes and the psychological distance generated by social categorization play in it by contrasting accents strongly associated with positive and negative stereotypes.

Another factor that may account for the effect the foreign accent has on emotionality is related to language acquisition and the context in which a word is learnt. During language processing, listeners do not only consider the linguistic features of a word but also the non-linguistic attributes linked to it. This is particularly relevant for emotion words (Harris et al., 2006; Pavlenko, 2012). The features of a word, including its emotional content, are more easily accessible when the word is processed in the same language as that in which it was initially encoded. This account was previously proposed by Hatzidaki et al. (2015) to explain the

modulation of processing of positive words by the foreign accent, but the impact of the language of encoding on word processing and especially on emotion has commonly been reported in the bilingual literature. For instance, bilingual speakers tend to store and recall memories in the language in which they were initially encoded, hence, their memories are linked to the language context and this link can persist over the years (Schrauf and Rubin, 2000). Furthermore, words tend to elicit a stronger emotional response when expressed in one's native language compared to a foreign language (Schrauf, 2000; Harris et al., 2006; Pavlenko, 2006, 2012). As literature has showed, taboo words, reprimands, love statements or even advertisements are usually perceived as less emotional when processed in a foreign language compared to a native language (Dewaele, 2004, 2010, 2012; Harris, 2004; Harris et al., 2006; Pavlenko, 2006, 2012; Caldwell-Harris and Ayçiçeği-Dinn, 2009). In the present study, participants listened to emotional vocabulary produced in a foreign accent context that did not align with the characteristics of the native accent context in which it was encoded. Typically, emotional vocabulary is taught by in-group members of one's linguistic society (Conrad et al., 2011). As previously proposed by Hatzidaki et al. (2015), we theorize that processing foreign-accented emotional vocabulary does not match with the vocabulary stored in participants' memory, which potentially renders the access to the stored emotional vocabulary more difficult. This, in turn, may affect perceived level of valence and arousal of the words. Future research should test this hypothesis.

This study has certain limitations. While we regularly encounter synthesized voices in our daily interactions with digital assistants like, for example, Alexa (Amazon) and Siri (Apple Inc.), the synthesized voices used in our study may have somehow affected speech processing compared to real voices. Despite the fact that none of our participants reported noticing that the voices were artificially generated, a recent study reports that audiobook stories narrated by human voices overall are judged as more enjoyable compared with synthesized voices (Rodero and Lucas, 2023). Moreover, participants showed more engagement, paid more attention, remembered more details and created more mental images when listening to human voices. Importantly for our purpose, they also manifested more positive emotional response. Note, however, that if there were an effect of synthesized voices in our study, it would have equally affected the voices in the native and in foreign condition, but this should be further tested in future research.

Conclusions

Recognizing the effect of a foreign accent on the emotional load of speech is crucial in today's globalized world, and it was the primary objective of our research. This study provided first evidence with explicit measure of the influence of the foreign accent on the valence and arousal of emotion words. The findings reveal that, compared to a native accent, the foreign accent causes native speakers to perceive negatively valenced words as less negative and positively valenced words as less positive, and both with less arousal. The potential factors underlying this effect are linguistic fluency, language attitudes and the

linguistic context of language acquisition. Hence, the choice of the language, that entails speaking in a native or a foreign accent, can be fundamental when discussing topics such as the consequences of wars, pandemics, or natural disasters on human beings.

Data availability statement

The data and analysis scripts are available at https://osf.io/r8hck/?view_only=c07896d7a6214acead46b5d3880d75b8.

Ethics statement

The studies involving humans were approved by Nebrija University Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

LB: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. SB: Formal analysis, Writing – review & editing. ZK: Conceptualization, Investigation, Methodology, Writing – review & editing. RV: Formal analysis, Methodology, Writing – review & editing. AF: Conceptualization, Funding acquisition, Investigation, Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/flang.2024.1357828/full#supplementary-material>

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