DOI: http://dx.doi.org/10.5007/2175-8026.2023.e94529

THE ACQUISITION OF A NOVEL PHONETIC CATEGORY IN A FOREIGN LANGUAGE SETTING: INPUT VERSUS PHONOLOGICAL AWARENESS

Cesar Teló[1*]
[1]University of Calgary, Calgary, AB, Canada

Hanna Kivistö de Souza[2**]
[2]Universidade Federal de Santa Catarina, Florianópolis, SC, Brasil

Abstract

Input-related factors are fundamental for the acquisition of new second language (L2) phones (e.g., Flege et al., 1995). Nonetheless, evidence from instructional settings suggests that, in foreign language contexts, input alone may not be sufficient for the formation of new phonetic categories. In the present study, we investigated to what extent the acquisition of a novel L2 phone (/ð/) is associated with input-related variables and phonological awareness. First language (L1) Brazilian Portuguese speakers of English answered a language background, a phonological self-awareness questionnaire, and completed a paragraph reading task and a phonological awareness test. The recordings were submitted to acoustic analysis and accuracy assessment by Brazilian teachers of English. Linear mixed-effects models revealed that perceived accuracy was predicted by input quality and phonological self-awareness, suggesting that greater interaction with L1 speakers of the target language and heightened phonological self-awareness play an important role in the acquisition of the tested L2 phone.

Keywords: Pronunciation; interdental fricative; input; language awareness; phonological awareness.

[*] Master's student in Applied Linguistics at the University of Calgary, Alberta, Canada. He is broadly interested in second language speech, including how learners acquire and process individual sounds, how individual differences affect the learning process, how listeners react to second language speech, how speaking with a second language accent impacts speakers' lives, and how pronunciation can be taught and learned more critically and effectively. Email: cesar.telo@ucalgary.ca ORCID: https://orcid.org/0000-0002-0218-9498.

[**] Associate Professor at the Federal University of Santa Catarina (UFSC) in Brazil, where she teaches and advises at the undergraduate and graduate levels. Her main research interests are L2 speech acquisition and cognitive- and psycholinguistics applied to SLA. She is especially fascinated by the role of phonological (self) awareness in L2 speech acquisition and has conducted research mostly on explicit and implicit phonological awareness as well as phonological self-awareness. Email: hanna.kivistodesouza@gmail.com ORCID: https://orcid.org/0000-0002-8498-2691.

Esta obra tem licença *Creative Commons*
http://creativecommons.org/licenses/by/4.0

1. Introduction

The acquisition of novel phonetic categories and the factors influencing their development constitute a longstanding focus within the realm of second language (L2) speech learning research. Demographic and linguistic variables such as experience with the L2, L2 use, and age of onset of learning (AOL), together with psycholinguistic factors, such as phonological awareness, have been shown to predict L2 segmental acquisition, even though the interplay among them is still unclear (see Nagle, 2022 for a recent review).

The reorganization of phonetic systems and subsystems is argued to depend on both the quantity and the quality of the input received by the learner (Flege, 2021). This has prompted an array of investigations into the effects of AOL and length of residence (LOR), which are traditional gauges of input quantity (e.g., Flege et al., 1997; Ingvalson et al., 2011). However, considerably fewer studies have examined the impact of input quality on L2 speech learning, operationalized as the amount of linguistic input received from first language (L1) versus L2 speakers of the target language (TL) (Flege & Bohn, 2021). In foreign language (FL) contexts, learners are primarily exposed to the TL in instructional settings, where teachers are typically L2 speakers of the TL themselves (for example, English as Foreign Language in Asia, Europe, and South America). In these environments, input conditions are usually less-than-ideal as learners are exposed to the L2 for a limited amount of time and often do not have the opportunity to interact with L1 speakers of the TL, impacting both the quantity and the quality of the input received. Although the internet affords FL learners access to resources in the TL, the utilization of such materials outside the classroom relies on learners' initiative. Hence, the language classroom is arguably the primary milieu for systematic TL exposure and opportunities for language production.

In an attempt to bolster L2 speech acquisition, explicit pronunciation instruction and phonetic training have emerged as strategies to counterbalance the constrained input quantity and quality in FL contexts. The notion of enhancing learners' phonological awareness—that is, learners' awareness about the phonological system of the L2—aligns with Schmidt's (1990) concepts and the assertion that attention is necessary for acquisition to take place (Schmidt, 2001). Meta-analytic evidence supports the idea that directing learners' attention toward phonetic forms and explicitly focusing on L2 pronunciation are indeed beneficial for pronunciation learning (Lee et al., 2015; Saito, 2021), and studies examining the role of phonological awareness suggest that it predicts and is positively related to L2 pronunciation accuracy and comprehensibility (e.g., Kivistö de Souza, 2017; Venkatagiri & Levis, 2007).

This study aims to investigate the acquisition of a novel L2 phonetic category, specifically the English voiced interdental fricative (/ð/), in an FL setting. Our goal is to ascertain to what extent accurate production of this phone is predicted by (1) input-related variables (*quantity*, as measured by

L2 experience and use, and *quality*, quantified by interaction with L1 English speakers) and (2) psycholinguistic variables (*phonological awareness* and *phonological self-awareness*). The selection of /ð/ as the target sound is supported by considerations of its distribution, frequency, and functional load (see below). Accuracy was determined through acoustic analysis as well as assessments by L1 Brazilian Portuguese teachers of English.

2. Background literature

2.1 Input quantity and quality in L2 speech acquisition

The question of what causes an L2 accent has dominated the interests of L2 speech researchers. Findings suggest that L2 pronunciation tends to be more targetlike when contact with the L2 commences in early childhood (e.g., Piske et al., 2001). Similarly, several studies have demonstrated that participants with longer experience with the language, frequently operationalized as LOR, have more accurate L2 pronunciation (e.g., Aoyama & Flege, 2011; Flege et al., 1997). This substantiates the widely accepted notion that both the age of exposure and accumulated experience with the L2 serve as pivotal predictors of L2 phonological development. However, AOL and LOR are confounded with other input-related variables, as younger learners encounter different quantity and quality of input than older learners. Furthermore, immigrating to an L2-speaking country does not necessarily equate to extensive L2 usage (Moyer, 2008). This is testified by research indicating that individuals with longer LOR and ample L2 use opportunities do not always present targetlike pronunciation (Ingvalson et al., 2011). These intricacies, pondered over the past seven decades, usually concerning English learners, have prompted questions regarding the relevance of input quantity alone for L2 speech learning (Flege, 2019; Flege & Bohn, 2021; Flege & Wayland, 2019). This, in turn, has led to the postulation that differences in input quantity *and* quality—rather than AOL or LOR—underlie L2 speech learning (Flege, 2018, 2019).

According to the revised Speech Learning Model (SLM-r; Flege & Bohn, 2021)[1], L2 segments that are initially processed akin to L1 sounds will eventually be discerned from L1 phonetic categories by means of accumulated phonetic information, culminating in the formation of novel L2 phonetic categories. As such, this process hinges on both quantitative and qualitative aspects of the input (Flege, 2021). Input quantity refers to the amount of input that the L2 learner has been or is exposed to, measured in previous research as self-reports of the amount of time spent in L2-speaking countries (e.g., Flege & Liu, 2001), as the amount of time spent studying the L2 in instructional settings (e.g., Moyer, 2004), and as the amount of time used to interact in the L1 versus the L2 over a given period of time (e.g., Flege & MacKay, 2004). Input quality, historically overlooked in L2 speech research (Flege & Bohn, 2021),

has been operationalized as self-reported time spent interacting with L1 versus L2 speakers of the TL (e.g. Moyer, 2004).

Learners in FL contexts, where exposure to the L2 beyond the classroom is limited, may encounter disadvantages in terms of input-related factors. Although previous research indicates that learners' pronunciation is not linked to a teacher's status as an L1 or L2 speaker of the TL (Levis et al., 2016), it is common for learners in FL contexts to rely on (accented L2) teacher and peers as their primary source of input and interaction. In terms of quantity, input is also limited and, differently from naturalistic settings, not continuous (Muñoz, 2008). Asymmetries between naturalistic and instructed settings are also found in relation to AOL and length of exposure, as the onset of L2 learning and the duration of formal instruction are often regulated by educational systems (Muñoz, 2008). Consequently, being exposed to high-quality, authentic, and variable input in FL instructed settings is often unrealistic.

2.2 Phonological Awareness

The last decade has witnessed a surge in research on pronunciation instruction, phonetic training, and explicit feedback. These strategies share the notion of drawing learners' attention to the phonetic form by making it more salient than it would be in regular L2 input. This approach aims to facilitate the acquisition of novel phonetic and phonological features. Allocating learners' attention to the L2 phonetic form through consciousness-raising activities has demonstrated efficacy in fostering L2 phonological development (Thomson & Derwing, 2015), which is in line with the noticing framework (Schmidt, 1995) and usage-based accounts of L2 acquisition, which posit that attention is necessary for input to become intake.

The ability to notice an L2 phonetic form is believed to stem from phonological awareness, which is usually understood as knowledge of the TL phonological system at different levels of analysis, including segments, suprasegments, and phonotactics. Phonological awareness is argued to be stored mainly as procedural knowledge, even though individuals who have received pronunciation and/or phonetics and phonology instruction will also possess declarative knowledge about the L2 phonological system (Kivistö de Souza, 2021). Awareness of the L2 phonological system appears to be beneficial for L2 speech learning, and numerous studies have stablished a positive link between heightened phonological awareness and more accurate, more comprehensible, and less accented L2 pronunciation (Kennedy & Trofimovich, 2010; Kivistö de Souza, 2017; Venkatagiri & Levis, 2007).

The concept of phonological awareness extends to encompass language users' cognizance of their own language use, which is referred to as phonological self-awareness. Phonological self-awareness becomes evident in language users' ability to notice that their output does not match the target, to self-correct, and to reflect on their pronunciation abilities, strengths, and weaknesses. Prior

research has shown that learners who possess elevated levels of phonological self-awareness are also the ones whose segmental (e.g., Saito, 2019) and suprasegmental (e.g., O'Brien, 2019) pronunciation is the most accurate.

3. The Current Study

The present study examines the role of input and phonological awareness on the acquisition of a new phonetic category. By concurrently examining these factors within the domain of L2 phonetic acquisition, the study offers a multifaceted and nuanced perspective on the intricate mechanisms underlying the acquisition of novel phonetic categories. This approach acknowledges that successful phonetic acquisition might be influenced by both external linguistic exposure and internal cognitive processes, thereby allowing a disentanglement of their relative contributions.

The target of investigation is the English voiced interdental fricative (/ð/), chosen due to the difficulty it poses for L1 Brazilian Portuguese (BP) speakers of English (Lucarevschi, 2018; Schadech & Silveira, 2013). Such difficulty is related to the fact that /ð/ does not exist in speakers' L1 phonological inventory. Among L1 BP speakers, substituting /ð/ with the BP [d] or [d̪] is the most predominant pattern of replacement in production, rarely followed by [v] or [z] (Reis, 2006). Therefore, when attempting to produce /ð/, most L1 BP speakers of English change its manner of articulation from fricative to a stop-like sound, at least initially. Other factors, including frequency, salience, and functional load may contribute to the challenges associated with perceiving and producing /ð/. The English voiced interdental fricative appears in few contexts in English, most often in word-initial position of function words, such as "the" and "this" (Denes, 1963; Shi et al., 1998). Function words are not as salient as content words in natural discourse, on condition that they are short, not highlighted by intonation, not produced in isolation or accompanied by stressed vowels (Shi et al., 1998), making function words difficult to be perceived from the input (Ellis, 2018). /ð/ is further described as having a low functional load, signifying its limited role in distinguishing minimal pairs (Brown, 1988; Munro & Derwing, 2006). The /ð–d/ opposition produces few minimal pairs in English (Brown, 1988). Therefore, both English as a Foreign Language (EFL) teachers and learners may overlook /ð/ (see, e.g., Munro & Derwing, 2006; Sewell, 2017; Suzukida & Saito, 2021) assuming that contextualized deviations from the target form have minimal impact on meaning.

In this study, we employed two complementary measures of pronunciation accuracy: acoustic analysis and listener assessments. While acoustic analysis provides an objective evaluation of whether the target phone is produced accurately bypassing subjective judgments, listener assessments provide a more fine-grained perspective on the pronunciation of /ð/ as perceived by actual listeners. In keeping with the study's goal to examine the acquisition of /ð/ in a FL setting, L2 English-speaking teachers were recruited as listeners.

Our decision to recruit L1 BP-speaking listeners, all with training in applied linguistics and experience as language teachers, is to illustrate the population of typical external assessors in FL contexts, where English learners typically interact with other English learners from the same L1 background and where teachers are often L2 speakers of the TL themselves.

The following research question guided the study: What is the relationship between accuracy in the production of /ð/ and speakers' background in terms of input quantity, input quality, phonological awareness, and phonological self-awareness? Considering the segment's low functional load (Brown, 1988) and the characteristics of input in FL instructional settings (Muñoz, 2008), we hypothesized that increased language experience and use would not be related to accuracy in the production of /ð/. Conversely, we expected input quality to predict targetlike productions of /ð/ (Flege & Bohn, 2021). Similarly, we expected participants with heightened awareness about the phonological system and enhanced phonological self-awareness to show more accurate productions of /ð/, owing to their increased noticing abilities (O'Brien, 2019; Saito, 2019).

4. Method

4.1 Speakers

Speakers were 18 students, encompassing graduate (N = 6) and undergraduate (N = 12) students. All speakers either held a Bachelor's degree in English Language and Literature or were majoring in the field, with the exception of one individual whose major was in Translation Studies. The sample exclusively comprised females, with ages ranging from 19 to 31 years (M = 25.06, SD = 3.15). Speakers grew up in monolingual BP households.

4.2 Materials and procedures

4.2.1 Speech elicitation task

Speakers were recorded individually reading a text adapted from Norris and French (2008). The passage presented the target sound /ð/ in word-initial position of four function words ("that," "there," "the," "they"), each presented twice. The complete text, the target words, and their respective contexts are provided in Appendix A. In total, there were 36 productions of each target word (two from each participant), adding up to 144 items.

4.2.2 Measures of input quantity and quality

Following previous research (e.g., Piske et al., 2001), the quantity and quality of the input speakers receive were estimated through a questionnaire. Speakers first elaborated on their experience with English instruction across various contexts (compulsory education, university, language schools). The resulting variable *L2 experience* was computed, signifying the number of

years of formal English education. Another set of questions addressed L2 use, prompting speakers to estimate the percentage of time they spent engaging in oral communication in English over the past five days, five weeks, five months, and five years. The derived variable, *L2 use*, represented the averaged English use percentage across the stated time spans. Our decision to estimate L2 use by averaging different time spans is supported both theoretically (Flege, 2021) and experimentally (e.g., Piske et al., 2001).

The quality of input received by the speakers was estimated based on the answers they provided to a language use questionnaire. The *input quality* score was calculated based on the frequency of interaction that speakers reported having with L1 English speakers in formal and informal environments as well as based on the number of classes attended with L1 English instructors. No distinction was made between interaction with L1 English speakers in formal versus informal environments, based on the assumption that all input received from L1 English speakers is free of L2 accent and, therefore, high-quality from a phonological standpoint.

4.2.3 Measures of phonological awareness

Speakers' phonological awareness was assessed through two instruments used in previous research (Kivistö de Souza, 2015, 2017). The first instrument measured speakers' awareness about English segmental phonology. In this task, speakers listened to English phones pronounced by L1 and L2 speakers of English and judged whether the productions were accurate. The stimuli consisted of English phonological features shown by previous research to be problematic for Brazilian learners, namely: Vowels (/i–ɪ, u–ʊ, ɑ, æ, ʌ, ɝ/), consonants (/θ, ð, ɹ, h, ŋ/), nasalization, final devoicing, VOT, and orthographic transfer (<ch>, <j–>, <–ge>, <–l(l)>). The stimuli consisted of 98 randomized trials: 65 spoken by L1 BP speakers, each with a pronunciation deviation, and 33 spoken by L1 English speakers. The task was administered using DmDx (Forster & Forster, 2012). The derived measure was mistake identification accuracy, which is the percentage of times the speaker accurately identified a deviating segment.

Another instrument targeted speakers' phonological self-awareness, which was operationalized as awareness about their own phonological knowledge and abilities (see Appendix B). Speakers indicated on 5-point scales how well they perceived L2 and regional accents, deviations in the segmental and suprasegmental levels, and how targetlike they consider their own pronunciation. A phonological self-awareness score was derived from the questionnaire, where higher scores indicate higher phonological self-awareness. This instrument was previously validated in Kivistö de Souza (2015), with an internal consistency of .75.

Speakers were tested individually in a quiet university classroom in Brazil. After giving written consent to participate in the study, they filled out the language background questionnaire, which was followed by the speech

elicitation task, the phonological awareness test, the vocabulary size tests, and the phonological self-awareness questionnaire.

4.2.4 Accuracy assessment

Two approaches were used to ascertain the production accuracy of /ð/: Acoustic analysis and listener-based assessment. As previous research indicates that Brazilian EFL learners' most frequent substitution for /ð/ is [d] rather than another fricative ([v, z]; Reis, 2006), a fricative/stop categorization for the stimuli was adopted for the acoustic analysis. The stimuli were visually inspected using Praat (Boersma & Weenink, 2018) by the first author to determine the presence or absence of a burst upon the release of the target sound. Accordingly, waveforms that had weak noises throughout the entire segment were classified as a canonical /ð/, while waveforms that presented a silent voiced period followed by an acoustic burst were labeled as /d/.[2] Figures 1 and 2 below exemplify productions that were deemed target-like and non-target-like, respectively. Doubtful cases were analyzed by the second author and submitted to auditory analysis, in which complete agreement was obtained between the researchers. Production accuracy of /ð/ as per acoustic analysis was calculated as the mean accuracy in percentage.

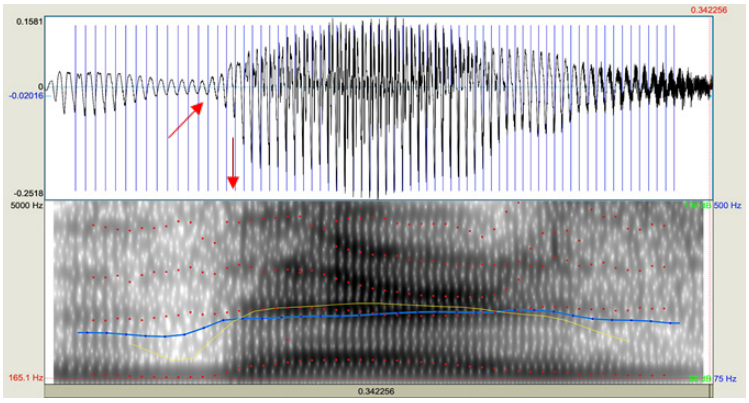

Figure 1. Speaker's canonical production of /ð/ in "there." The red arrows indicate the absence of acoustic burst in the transition from the consonant (onset) to the vowel in both the waveform and the spectrogram.

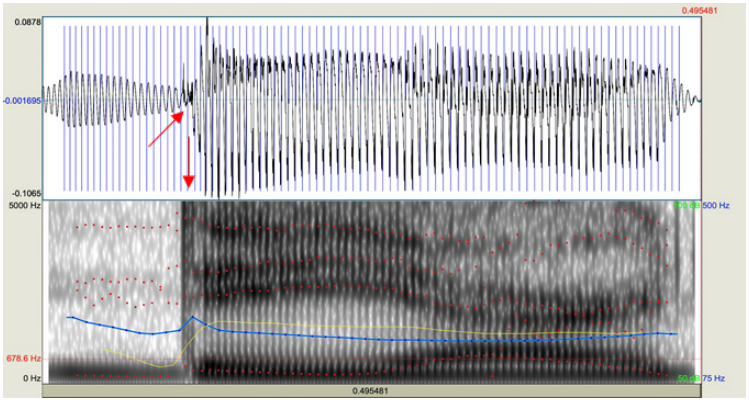

Figure 2. Speaker's stop-like production of /ð/ in "they." The red arrows indicate the presence of acoustic burst in the transition from the consonant (onset) to the vowel in both the waveform and the spectrogram.

Following our goal to examine how typical EFL assessors judge the accuracy of /ð/, speakers' productions were submitted to listener-based assessment. Listeners (four males and two females; M_{age} = 27.66) were English language teachers at a university outreach program and graduate students in English Language and Literature. They were recruited through word of mouth. The productions were presented in a randomized order to the listeners who rated them for accuracy using a 7-point scale (1 = *very inaccurate*, 7 = *very accurate*) on Praat. Listeners were given the opportunity to familiarize themselves with the task through three practice trials. They were allowed to replay each stimulus twice before assigning it a score.

Finally, to control for possible effects of proficiency on speaking performance, speakers' English proficiency was estimated via two receptive vocabulary size tests. This measure was adopted upon the expectation that an individual's vocabulary size increases as language proficiency increase (e.g., Milton, 2010; Uchihara & Clenton, 2020). X_lex and Y_lex were used to test speakers' knowledge about the 10,000 most frequent English words (Meara, 2005; Meara & Miralpeix, 2006). The measure derived from the vocabulary tests is the sum of the X_lex and Y_lex scores corrected for guessing. Speakers' mean vocabulary size score was 6,997.22, indicating a C1 proficiency level (Milton, 2010).

4.3 Data analysis

To investigate to what extent speakers' input and phonological awareness profiles predict the acquisition of /ð/, we modeled listeners' ratings (which were deemed sufficiently consistent; Cronbach's alpha = .82) and the results of the acoustic analysis using the lme4 package (version 1.1.33; Bates et al., 2015) in R (version 4.3.0; R Core Team, 2023). Both models included L2 experience, L2 use, input quality, phonological awareness, and phonological self-awareness as fixed-effect predictors, with random intercepts for speaker (18) and item (8). Listeners' ratings were modeled with a linear mixed-effects model fit by restricted maximum likelihood using Gaussian distribution. Accuracy as per acoustic analysis was modeled with a generalized linear mixed-effects model fit by maximum likelihood using binomial distribution. To assess the statistical significance of each parameter, we examined the p-values calculated by the lmerTest package (version 3.1.3; Kuznetsova et al., 2017). Marginal and conditional R^2 were obtained with the MuMIn package (version 1.47.5; Bartón, 2023). To check the assumptions of the linear mixed-effects model, we examined variance inflation factors to screen for collinearity and plotted model residuals (histograms, Q-Q plots) to assess normality. Collinearity among variables was not found to be a concern (VIF < 1.85), and the residuals of the model resembled normal distribution. The correlation matrix for the continuous variables included in the models is available in Appendix C.

5. Results

The accuracy of /ð/ depended on the accuracy measure at issue. Accuracy as determined by acoustic analysis was low, with 91% of the speakers' productions realized as a stop (N = 131). In percentage, the accuracy average for the entire speaker group (obtained after calculating an average for each speaker) was 9.02% (SD = 11.97, min = 0, max = 37.5). Notably, out of the 18 speakers, ten had a mean accuracy of zero, meaning that they did not produce the target sound as a fricative in any instance. Conversely, the mean accuracy rating assigned by the listeners was 4.02 (SD = 0.44, min = 3.37, max = 4.95), suggesting that even though listeners did not consider the productions targetlike, their mean rating fell closer to the mid-point of the scale (3.5) rather than to the lower end. Speakers' background variables are descriptively summarized in Table 1.

Table 1: *Summary of participants' characteristics*

Variable	Mean	95% CI	Min	Max	*SD*
L2 experience (years)	18.89	[17.26, 20.52]	14	29	3.27
L2 use (% of time)	35.41	[26.23, 44.59]	15	85	18.45
Input quality	18.11	[11.21, 25.01]	5	59	13.97
Phonological awareness (%)	39.48	[33.76, 45.20]	15.38	61.54	11.50
Phonological self-awareness	33.83	[31.30, 36.36	25	42	5.09
Vocabulary size	6997.22	[6445.28, 7549.17]	4250	8800	1109.91

Note. Mean, 95% confidence interval for the mean, min, max, and standard deviation of participants' background variables. Input quality is a score that expresses the amount of interaction with L1 English speakers. Phonological self-awareness is expressed in points (min = 11, max = 55). Vocabulary size is expressed in points (min = 0, max = 10,000).

As presented in Table 2, none of the outcome variables significantly predicted accuracy as determined by acoustic analysis. It is worth noting that this model displayed a limited explanatory capacity, evident from the considerable σ^2 and the low R^2 values. These observations indicate that the model is not able to explain a considerable portion of the variability in the data, which, in itself, exhibited very low variability (see above). On the other hand, as summarized in Table 3, input quality and phonological self-awareness predicted listeners' assessments, where speakers who engaged more with L1 English speakers and those who possessed heightened levels of phonological self-awareness received higher accuracy ratings overall. While measures of input quantity (L2 experience, L2 use) and phonological awareness did not emerge as significant predictors of listeners' assessment, the variables entered in the model as fixed effects explained, together, around 22% of the variance

in listeners' ratings. The entire model, including both fixed and random effects, accounted for around 41% of the variance, signifying a noteworthy amount of speaker- and item-specific variance.

Table 2: *Summary of generalized linear mixed-effects model for acoustic accuracy*

Fixed effects	**Estimate**	***SE***	**95% CI**	***z***	***p***
Intercept	–3.90	2.78	[–9.35, 1.55]	–1.40	.161
L2 experience	–0.05	0.15	[–0.34, 0.25]	–0.30	.763
L2 use	0.02	0.03	[–0.03, 0.07]	0.68	.495
Input quality	0.03	0.02	[–0.01, 0.08]	1.42	.155
Phonological awareness	0.01	0.03	[–0.14, 0.17]	0.16	.702
Phonological self-awareness	0.01	0.04	[–0.06, 0.09]	0.07	.876
Random effects					
σ^2	3.29				
τ_{00} Speaker	0.18				
τ_{00} Item	0.00				
Observations	144				
Marginal R^2 / Conditional R^2	0.10 / 0.14				

Table 3: *Summary of linear mixed-effects model for listeners' assessment*

Fixed effects	**Estimate**	***SE***	**95% CI**	***t***	***p***
Intercept	2.31	0.60	[1.12, 3.50]	3.81	< .001
L2 experience	–0.02	0.03	[–0.08, 0.05]	–0.48	.631
L2 use	0.00	0.01	[–0.01, 0.02]	0.88	.378
Input quality	0.01	0.01	[0.00, 0.03]	2.29	.023
Phonological awareness	0.01	0.01	[–0.01, 0.02]	1.05	.293
Phonological self-awareness	0.04	0.02	[0.01, 0.07]	2.31	.022
Random effects					
σ^2	0.32				
τ_{00} Speaker	0.06				
τ_{00} Item	0.05				
Observations	144				
Marginal R^2 / Conditional R^2	0.22 / 0.41				

6. Discussion

The present study sought to examine the extent to which input-related and phonological awareness-related variables predict the acquisition of a novel phonetic category in an FL setting. Specifically, we analyzed productions of the English /ð/ by L1 Brazilian Portuguese speakers of English. These productions were submitted to acoustic analysis and accuracy assessment by Brazilian

EFL teachers. Collectively, results showed that the production of /ð/ was (1) predominantly non-targetlike, (2) greatly influenced by speakers' L1, and (3) significantly more accurate for speakers who engaged more with L1 English speakers (signifying higher quality of input) and for those with elevated levels of phonological self-awareness (operationalized as speakers' awareness about their phonological knowledge and abilities).

In total, 91% of speakers' productions were deemed inaccurate (stop-like), with a mean speaker accuracy of about 9% as measured by acoustic analysis, and 4 on a 7-point scale when assessed by Brazilian EFL teachers. In other words, the L1 BP speakers who participated in the study had not acquired the target phone, despite their advanced proficiency level and having studied English for almost 19 years on average. While listeners exhibited a preference for the mid-range of the rating scale, the low acoustic analysis scores are unlikely to be solely attributed to task effects. In comparison to Reis (2006), who reported an accuracy rate of 2% for /ð/ productions, the mean accuracy as determined by acoustic analysis was slightly higher in the present study. Notably, Reis's study shared a similar speaker demographic and elicitation task; nonetheless, her work utilized auditory analysis conducted by an L1 and an L2 English speaker.

A possible explanation for the low accuracy in the production of /ð/ is related to the specific target words used in the study. Function words such as the ones tested are likely to be automatized in early stages of learning (Flege et al., 1996), and later attempts to change the pronunciation of these words might be particularly challenging, especially if considering their low discursive salience (Shi et al., 1998). Alternatively, the gradual progression of segmental development in later stages of L2 learning (Saito et al., 2019) elicited from a story telling task before and after the treatment, was analysed via a set of linguistic measures. In line with the componential view of L2 oral proficiency and development, our results hinted L2 learners' experience and proficiency levels as a mediating factor for determining the link between interaction and its impact on different dimensions of L2 speech learning. While the longitudinal interaction equally improved the participants' grammatical complexity and articulation rate—a fundamental component for defining L2 oral proficiency —the development of less experienced/proficient learners was observed across a wide range of lexicogrammar and fluency features (lexical appropriateness/ richness, grammatical accuracy, pause ratio introduces the prospect that participants' /ð/ phonological category is still under development (as suggested by participants with somewhat higher pronunciation accuracy) or is yet not developed (as indicated by those who did not produce /ð/ targetlike in any of the analyzed items).

In line with our predictions, experience with the L2—quantified by years of English exposure in formal education—and L2 use—expressed as the averaged percentage of English use over varying time spans—did not emerge as significant predictors pronunciation accuracy across the models. Although this meets our

expectations, it is noteworthy that speakers' long history of classroom-based English learning certainly provided ample opportunities for them to receive both explicit pronunciation feedback and form-focused instruction. Yet, the possibility remains that learners were never explicitly taught how to produce /ð/ on account that it has a low functional load (Munro & Derwing, 2006) and that communicative and critical teaching approaches often leave pronunciation out of the language curriculum (Pennington, 2021). Testing a similar population, Reis (2006) also found L2 experience and accuracy in the pronunciation of /ð/ to be uncorrelated. Input frequency has been claimed to favor L2 (speech) learning (Wulff & Ellis, 2018), but this does not seem to be the case in relation to the acquisition of /ð/ since the target words used in this study ("that," "the," "there," "they") are among the most frequent words in English (Leech et al., 2001). Our finding thus suggests that contact with the L2 and L2 use alone, in FL instructional settings, may not be enough for the formation of this new L2 phonetic category.

The only input-related variable associated with accurate production of /ð/ (as per listeners' assessment) was input quality, which was represented by a score indicating the amount of input received from L1 versus L2 English speakers. This finding indicates that speakers who had been exposed to more high-quality phonetic input—that is, input provided by L1 English speakers—were perceived to produce /ð/ mode accurately. From a theoretical standpoint, this finding is supported by the SLM-r (Flege & Bohn, 2021), which posits that phonetic systems and subsystems undergo restructuring contingent on the variations inherent in phonetic input, encompassing the dimension of input quality. Earlier studies also lend weight to this observation (e.g., Flege & MacKay, 2004; Moyer, 2011), further corroborating the positive association between input quality and pronunciation proficiency.

As suggested by our results, it is likely that input alone is not sufficient to trigger or catalyze the reorganization of phonetic systems and subsystems for language learners in FL settings, on condition that input is usually constrained to the L2 classroom and provided by fellow L2 speakers (Muñoz, 2008). These input issues, together with /ð/'s limited contexts of occurrence, early inaccurate categorization, and small number of minimal pairs leading to potential misunderstandings, seem to make the target sound particularly susceptible to slipping beneath learners' attentional radar. Yet, the pivotal role of heightened noticing abilities and an elevated awareness about one's own pronunciation and L2 phonology may partially explain why some speakers succeed in producing challenging segments accurately (Kivistö de Souza, 2015). In our study, speakers' phonological self-awareness significantly predicted listeners' assessments, where speakers with greater awareness about their own L2 pronunciation were reliably judged as pronouncing /ð/ more accurately. This finding is in line with previous research documenting the positive association between learners' phonological self-awareness and their L2 pronunciation (e.g., Kennedy & Trofimovich, 2010; Kivistö de Souza, 2015; Saito, 2019;

O'Brien, 2019). Nevertheless, this relationship only emerged in the model that predicted listeners' assessment. A possible explanation for the lack of association between phonological self-awareness and production accuracy as per acoustic analysis is task-driven: Differently from the procedure adopted for the acoustic analysis, which involved a fricative/stop categorization, it is likely that listeners used other criteria when rating the samples as they were asked to assess the productions based on how they thought the target sound should be pronounced. Our intention in presenting listeners with a 7-point rating scale rather than with a binary choice was to obtain a more nuanced perspective on how listeners perceive the accuracy of /ð/. A gradient accuracy scale was also deemed more appropriate given that listeners themselves were L2 speakers of English, such that their own L2 phonetic category for /ð/ may not be fully formed yet. However, it is noteworthy that, despite being encouraged to use the entire rating scale, listeners showed a preference for the values in the mid-range of the scale, possibly mirroring some degree of uncertainty about their decisions (Douven, 2018).

Contrary to our hypothesis, participants' phonological awareness was not related to their accuracy in producing /ð/. Phonological awareness was measured through a test that tapped into participants' awareness of English segments. The test presented most L2 consonants, vowels, and allophones that are commonly challenging for Brazilian EFL learners, but only 3 out of 98 trials tested /ð/. In other words, although speakers obtained a phonological awareness score of about 40% on average, their awareness of /ð/ may be particularly lower due to the aforementioned particularities of this phone. Thus, it seems that no direct association can be established between the production accuracy of a single sound—especially one with low functional load and restricted contexts of occurrence—and the awareness of the L2 phonological or segmental system as a whole.

Whereas many studies employ L1-speaking listeners as raters, we were interested in examining how Brazilian EFL teachers perceive the productions of target phone. First, from an ecological validity standpoint, L2-speaking teachers of the TL usually serve as assessors in FL settings. Second, recent meta-analytic evidence suggests that expert listeners (with training in applied linguistics and language teaching experience) rely particularly on segmental information when assessing L2 speech (Saito, 2021), which argues for the adequacy of recruiting teachers for segmental accuracy assessment. Finally, L1- and L2-speaking listeners as well as monolingual and multilingual listeners seem to be comparable in the L2 speech assessments they provide (Saito, 2021; Teló et al., 2022), rendering listeners' L2 status less pertinent for this study. However, it remains plausible that familiarity with L2-accented speech led to more lenient attitudes towards the deviant target sounds (e.g., Foote & Trofimovich, 2018; Kennedy & Trofimovich, 2008; Saito et al., 2016).

While the teaching of the interdental fricatives might not always be relevant in EFL classrooms due to their low stakes on compromising intelligibility (Jenkins, 2000), a comment should be made about

comprehensibility (ease of understanding; Derwing & Munro, 2015). Accented L2 speech is associated with higher processing effort and with negative affective reactions toward L2 speakers (Dragojevic & Giles, 2016). The substitution of /ð/ by L1 BP speakers of English does not go unnoticed, and inaccurate production of /ð/ has been associated with lower comprehensibility by L1 listeners (Lucarevschi, 2018; Schadech & Silveira, 2013). We can thus assume that the inaccurate production of /ð/ by the speakers in the present study would come with some cost in communicative situations, especially with speakers from different L1 backgrounds.

7. Limitations and conclusions

The small amount of variation in the dataset and the small sample size ask for caution in generalizing the results of the present study. In order to understand how novel segments are acquired in FL settings, especially those that resemble /ð/ in their characteristics, researchers should consider employing larger datasets and a vaster set of individual differences in the background analysis. Concerning the instruments used for data collection, a test that examines participants' awareness of the target segment only might be potentially better in demonstrating the association between phonological awareness and the production of a novel phonetic category. Furthermore, the input-related variables were based on self-reports, and their accuracy may be put into question since this type of estimate is susceptible to inaccurate estimations, memory constraints, and differences in the consideration of what constitutes language use (e.g. passive vs. active skills). Finally, since a single listener group was established, our findings do not capture the potential differences and similarities in how other listeners would rate the productions.

Despite the shortcomings mentioned above, our results point to an interpretation that not all L2 segments can be picked up from input alone without conscious attention to the form, especially in FL settings where input is often far from ideal for pronunciation attainment purposes. This implies that if certain features are considered relevant in terms of intelligibility and comprehensibility, instructors might consider resorting to consciousness-raising activities.

Notes

1. Flege and Bohn's (2021) revised Speech Learning Model addresses L2 speech learning in naturalistic settings. In the absence of an L2 speech learning model for FL and/or instructional settings, the SLM-r is adopted. Caution is nevertheless advised when extrapolating the model's predictions.
2. Acoustic analyses of stop-like modification of /ð/ by L1 AmE speakers often find a period of no acoustic energy before the acoustic burst. Our data show a voiced silent period that we hypothesize to be due to the fact that BP voiced stops have negative VOT and, therefore, speakers may have transferred this characteristic from their L1. BP /d/ is realized as both [d] and [d̪]. This distinction was not deemed relevant for the study.

References

Aoyama, K., & Flege, J. E. (2011). Effects of L2 experience on perception of English /r/ and /l/ by native Japanese speakers. *Journal of the Phonetic Society of Japan*, *15*(3), 5–13. https://doi.org/https://doi.org/10.24467/onseikenkyu.15.3_5

Bartoń, K. (2023). *MuMIn: Multi-model inference*. R package version 1.47.1, https://CRAN.R-project.org/package=MuMIn

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1–48. https://doi.org/10.18637/jss.v067.i01

Boersma, P., & Weenink, D. (2018). *Praat: Doing phonetics by computer* (6.1.41) [Computer software].

Brown, A. (1988). Functional load and the teaching of pronunciation. *TESOL Quarterly*, *22*(4), 593–606. https://doi.org/10.2307/3587258

Denes, P. B. (1963). On the statistics of spoken English. *The Journal of the Acoustical Society of America*, *35*(6), 892–904. https://doi.org/10.1121/1.1918622

Derwing, T. M., & Munro, M. J. (2015). *Pronunciation fundamentals: Evidence-based perspectives for L2 teaching and research*. John Benjamins.

Douven, I. (2018). A Bayesian perspective on Likert scales and central tendency. *Psychonomic Bulletin and Review*, *25*(3), 1203–1211. https://doi.org/10.3758/s13423-017-1344-2

Dragojevic, M., & Giles, H. (2016). I don't like you because you're hard to understand: The role of processing fluency in the language attitudes process. *Human Communication Research*, *42*(3), 396–420. https://doi.org/10.1111/hcre.12079

Ellis, N. C. (2018). Salience in usage-based SLA. In S. M. Gass, P. Spinner, & J. Behney (Eds.), *Salience and second language acquisition* (pp. 21–40). Routledge.

Flege, J. E. (2018). It's input that matters most, not age. *Bilingualism: Language and Cognition*, *21*(5), 919–920. https://doi.org/10.1017/S136672891800010X

Flege, J. E. (2019). A non-critical period for second-language learning. In A. M. Nyvad, M. Hejná, A. Højen, A. B. Jespersen, & M. H. Sørensen (Eds.), *A sound approach to language matters: In honor of Ocke-Schwen Bohn* (pp. 501–541). Dept. of English, School of Communication & Culture, Aarhus University. https://doi.org/10.7146/aul.322.218

Flege, J. E. (2021). New methods for second language (L2) speech pesearch. In R. Wayland (Ed.), *Second language speech learning: Theoretical and impirical progress* (pp. 119–156). Cambridge University Press. https://doi.org/10.1017/9781108886901.004

Flege, J. E., & Bohn, O.-S. (2021). The revised Speech Learning Model (SLM-r). In R. Wayland (Ed.), *Second language speech learning: Theoretical and impirical progress* (pp. 3–83). Cambridge University Press. https://doi.org/10.1017/9781108886901.003

Flege, J. E., Bohn, O.-S., & Jang, S. (1997). Effects of experience on non-native speakers' production and perception of English vowels. *Journal of Phonetics*, *25*(4), 437–470. https://doi.org/10.1006/jpho.1997.0052

Flege, J. E., & Liu, S. (2001). The effect of experience on adults' acquisition of a second language. *Studies in Second Language Acquisition*, *23*(4), 527–552. https://doi.org/10.1017/S0272263101004041

Flege, J. E., & MacKay, I. R. A. (2004). Perceiving vowels in a second language. *Studies in Second Language Acquisition*, *26*(1), 1–34. https://doi.org/10.1017/S0272263104026117

Flege, J. E., Munro, M. J., & MacKay, I. R. A. (1995). Factors affecting strength of perceived foreign accent in a second language. *The Journal of the Acoustical Society of America*, *97*(5), 3125–3134. https://doi.org/10.1121/1.413041

Flege, J. E., Munro, M. J., & MacKay, I. R. A. (1996). Factors affecting the production of word-initial consonants in a second language. In R. Bayley & D. Preston (Eds.), *Second language acquisition and linguistic variation* (pp. 47–73). John Benjamins. https://doi.org/10.1075/sibil.10.03fle

Flege, J. E., & Wayland, R. (2019). The role of input in native Spanish late learners' production and perception of English phonetic segments. *Journal of Second Language Studies*, *2*(1), 1–44. https://doi.org/10.1075/jsls.00004.fle

Foote, J. A., & Trofimovich, P. (2018). Is it because of my language background? A study of language background influence on comprehensibility judgments. *The Canadian Modern Language Review*, *74*(2), 253–278. https://doi.org/10.3138/cmlr.2017-0011

Forster, K. I., & Forster, J. C. (2012). *DMDX* (4.0.6.0).

Ingvalson, E. M., McClelland, J. L., & Holt, L. L. (2011). Predicting native English-like performance by native Japanese speakers. *Journal of Phonetics*, *39*(4), 571–584. https://doi.org/10.1016/j.wocn.2011.03.003

Jenkins, J. (2000). *The phonology of English as an International Language*. Oxford University Press.

Kennedy, S., & Trofimovich, P. (2008). Intelligibility, comprehensibility, and accentedness of L2 speech: The role of listener experience and semantic context. *Canadian Modern Language Review*, *64*(3), 459–489. https://doi.org/10.3138/cmlr.64.3.459

Kennedy, S., & Trofimovich, P. (2010). Language awareness and second language pronunciation: A classroom study. *Language Awareness*, *19*(3), 171–185. https://doi.org/10.1080/09658416.2010.486439

Kivistö de Souza, H. (2015). *Phonological awareness and pronunciation in a second language* [Doctoral dissertation, Universitat de Barcelona]. Tesis Doctorals en Xarxa. http://hdl.handle.net/10803/393726

Kivistö de Souza, H. (2017). Brazilian EFL learners' awareness about L2 phones: Is mall pronounced as 'mall'? *Trabalhos em Linguística Aplicada*, *56*(1), 235–258. https://doi.org/10.1590/010318135071200021

Kivistö de Souza, H. (2021). Consciência fonológica. In F. F. Kupske, U. K. Alves, & R. Lima Jr. (Eds.), *Investigando os sons de línguas não nativas: Uma introdução* (pp. 153–174). Editora da Abralin. http://doi.org/10.25189/9788568990117

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, *82*(13), 1–26. https://doi.org/10.18637/jss.v082.i13

Lee, J., Jang, J., & Plonsky, L. (2015). The effectiveness of second language pronunciation instruction: A meta-analysis. *Applied Linguistics*, *36*(3), 345–366. https://doi.org/10.1093/applin/amu040

Leech, G., Rayson, P., & Wilson, A. (2001). *Word frequencies in written and spoken English*. Routledge.

Levis, J. M., Sonsaat, S., Link, S., & Barriuso, T. A. (2016). Native and nonnative teachers of L2 pronunciation: Effects on learner performance. *TESOL Quarterly*, *50*(4), 894–931. https://doi.org/10.1002/tesq.272

Lucarevschi, C. R. (2018). *The role of storytelling in the development of pronunciation of Brazilian learners of English as a foreign language* [University of Victoria]. UVicSpace. https://doi.org/http://hdl.handle.net/1828/9267

Meara, P. M. (2005). *X_Lex: The Swansea vocabulary levels test* (2.05). Lognostics.

Meara, P. M., & Miralpeix, I. (2006). *Y_Lex: The Swansea advanced vocabulary levels test* (2.05). Lognostics.

Milton, J. (2010). The development of vocabulary breadth accross the CEFR levels. In I. Bartning, M. Martin, & I. Vedder (Eds.), *Communicative proficiency and linguistic development: Intersections between SLA and language testing research* (pp. 211–232). Eurosla.

Moyer, A. (2004). *Age, accent and experience in second language acquisition*. Multilingual Matters. https://doi.org/10.21832/9781853597190

Moyer, A. (2008). Input as a critical means to an end: Quantity and quality of experience in L2 phonological attainment. In T. Piske & M. Young-Scholten (Eds.), *Input matters in SLA* (Issue 2, pp. 159–174). Multilingual Matters. https://doi.org/10.21832/9781847691118-011

Moyer, A. (2011). An investigation of experience in L2 phonology: Does quality matter more than quantity? *Canadian Modern Language Review*, *67*(2), 191–216. https://doi.org/10.3138/cmlr.67.2.191

Muñoz, C. (2008). Symmetries and asymmetries of age effects in naturalistic and instructed L2 learning. *Applied Linguistics*, *29*(4), 578–596. https://doi.org/10.1093/applin/amm056

Munro, M. J., & Derwing, T. M. (2006). The functional load principle in ESL pronunciation instruction: An exploratory study. *System*, *34*(4), 520–531. https://doi.org/10.1016/j.system.2006.09.004

Nagle, C. (2022). Individual difference factors for second language pronunciation. In S. Li, P. Hiver, & M. Papi (Eds.), *The Routledge handbook of second language acquisition and individual differences* (pp. 269–281). Routledge. https://doi.org/10.4324/9781003270546-23

Norris, R., & French, A. (2008). *Ready for CAE*. Macmillan.

O'Brien, M. G. (2019). Attending to second language lexical stress: Exploring the roles of metalinguistic awareness and self-assessment. *Language Awareness*, *28*(4), 310–328. https://doi.org/10.1080/09658416.2019.1625912

Pennington, M. C. (2021). Teaching pronunciation: The state of the art 2021. *RELC Journal*, *52*(1), 3–21. https://doi.org/10.1177/00336882211002283

Piske, T., MacKay, I. R. A., & Flege, J. E. (2001). Factors affecting degree of foreign accent in an L2: A review. *Journal of Phonetics*, *29*(2), 191–215. https://doi.org/10.1006/jpho.2001.0134

R Core Team (2023). *R: A language and environment for statistical computing* (Version 4.3.0) [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org

Reis, M. S. (2006). *The perception and production of English interdental fricatives by Brazilian EFL learners* [Master's thesis, Universidade Federal de Santa Catarina]. Repositório Institucional UFSC. http://repositorio.ufsc.br/xmlui/handle/123456789/89154

Saito, K. (2019). Individual differences in second language speech learning in classroom settings: Roles of awareness in the longitudinal development of Japanese learners' English /ɹ/ pronunciation. *Second Language Research*, *35*(2), 149–172. https://doi.org/10.1177/0267658318768342

Saito, K. (2021). What characterizes comprehensible and native-like pronunciation among English-as-a-second-language speakers? Meta-analyses of phonological, rater, and instructional factors. *TESOL Quarterly*, *55*(3), 866–900. https://doi.org/10.1002/tesq.3027

Saito, K., Suzuki, S., Oyama, T., & Akiyama, Y. (2019). How does longitudinal interaction promote second language speech learning? Roles of learner experience and proficiency levels. *Second Language Research*. https://doi.org/10.1177/0267658319884981

Saito, K., Trofimovich, P., Isaacs, T., & Webb, S. (2016). Re-examining phonological and lexical correlates of second language comprehensibility: The role of rater experience. In T. Isaacs & P. Trofimovich (Eds.), *Second language pronunciation assessment: Interdisciplinary perspectives* (pp. 141–156). Multilingual Matters. https://doi.org/10.21832/ISAACS6848

Schadech, T. S., & Silveira, R. (2013). How do the non-target pronunciations of the consonants /θ/ and /ð/ by Brazilian learners of English affect comprehensibility? *Cadernos do IL*, *46*, 4–23. https://doi.org/10.22456/2236-6385.35862

Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics*, *11*(2), 129–158. https://doi.org/10.1093/applin/11.2.129

Schmidt, R. (1995). Consciousness and foreign language learning: A tutorial on the role of attention and awareness in learning. In R. Schmidt (Ed.), *Attention and awareness in foreign language learning* (pp. 1–64). University of Hawai'i Press.

Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 3–32). Cambridge University Press. https://doi.org/10.1017/CBO9781139524780.003

Sewell, A. (2017). Functional load revisited: Reinterpreting the findings of "lingua franca" intelligibility studies. *Journal of Second Language Pronunciation*, *3*(1), 57–79. https://doi.org/10.1075/jslp.3.1.03sew

Shi, R., Morgan, J. L., & Allopena, P. (1998). Phonological and acoustic bases for earliest grammatical category assignment: A cross-linguistic perspective. *Journal of Child Language*, *25*(1), 169–201. https://doi.org/10.1017/S0305000997003395

Suzukida, Y., & Saito, K. (2021). Which segmental features matter for successful L2 comprehensibility? Revisiting and generalizing the pedagogical value of the functional load principle. *Language Teaching Research*, *25*(3), 431–450. https://doi.org/10.1177/1362168819858246

Teló, C., Trofimovich, P., & O'Brien, M. G. (2022). Disentangling professional competence and foreign accent. *Journal of Second Language Pronunciation*, *8*(3), 413–443. https://doi.org/10.1075/jslp.22013.tel

Thomson, R. I., & Derwing, T. M. (2015). The effectiveness of L2 pronunciation instruction: A narrative review. *Applied Linguistics*, *36*(3), 326–344. https://doi.org/10.1093/applin/amu076

Uchihara, T., & Clenton, J. (2020). Investigating the role of vocabulary size in second language speaking ability. *Language Teaching Research*, *24*(4), 540–556. https://doi.org/10.1177/1362168818799371

Venkatagiri, H. S., & Levis, J. M. (2007). Phonological awareness and speech comprehensibility: An exploratory study. *Language Awareness*, *16*(4), 263–277. https://doi.org/10.2167/la417.0

Wulff, S., & Ellis, N. C. (2018). Usage-based approaches to second language acquisition. In D. Miller, F. Bayram, J. Rothman, & L. Serratrice (Eds.), *Bilingual cognition and language: The state of the science accross its subfields* (pp. 37–56). John Benjamins. https://doi.org/10.1075/sibil.54.03wul

Recebido em: 29/06/2023
Aceito em: 18/08/2023

Appendix A

Paragraph from Norris and French (2008). Target words in italics. In the table, the stimuli (words) and their context.

It may come as no surprise to learn *that* household chores can make you feel depressed. *There* is evidence to suggest *that the* more housework men and women do, *the* more likely *they* are to suffer from mood swings "Any form of repetitive cyclical work is bound to be depressing. Domestic chores are open-ended tasks, so *there* is no defined end-point. People prefer tasks *they* can complete, and without a satisfactory conclusion they become stressed", says psychologist Nicholas Emler.

Word	**Context**	***N***
That	"To learn that"	18
That	"To suggest that"	18
There	"There is"	36
The	"The more"	36
They	"They can"	18
They	"They are"	18

Appendix B

Phonological self-awareness questionnaire (from Kivistö de Souza, 2015).

1. Give your opinion on the following statements. Write ✗ on the corresponding box.					
	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
I can hear there are some English sounds I don't pronounce correctly although I try.					
I can hear my English intonation and rhythm are not correct although I try.					
I can hear I have a foreign accent when I speak in English.					
There are some specific English sounds that are difficult for Brazilians.					
There are some specific features in English intonation/rhythm that are difficult for Brazilians.					
Brazilians have a characteristic accent when they speak in English.					

2. **How easy it is for you to.... *Write ✗ on the corresponding box.***					
	Very easy	Quite easy	Quite difficult	Very difficult	I can't do this at all
notice pronunciation mistakes in the production of *individual* sounds in other non-native speakers' speech?					
notice pronunciation mistakes in the *intonation and rhythm* in other non-native speakers' speech?					
tell where a *native* speaker of English comes from based on their English accent?					
tell whether a *non-native* speaker of English is Brazilian based on their English accent?					
tell where a *non-native* speaker of English (other than Brazilian) comes from based on their English accent?					
notice whether *a sound combination* you hear is possible in English or not?					
notice whether the *intonation and rhythm* you hear in an English sentence are possible or not?					
notice whether an *individual sound* you hear is pronounced correctly in English or not?					
explain why a sound combination you hear is possible or impossible in English?					
explain why the intonation and rhythm you hear are correct or incorrect in English?					
explain why an individual sound you hear isn't pronounced correctly in English?					

Appendix C

Correlation matrix for the continuous variables included in the models reported in Tables 2 and 3.

	1	2	3	4	5
1. L2 experience		.001	.191	.407	.190
2. L2 use	.70		.335	.830	.302
3. Input quality	.32	.24		.340	.360
4. Phonological awareness	.21	−.05	.24		.395
5. Phonological self-awareness	.32	.26	.23	.21	

Note. $N = 18$. Pearson r coefficients in lower diagonal; p-values in upper diagonal.