

The acquisition of the interdental fricative in the Spanish of study-abroad students in Seville, Spain

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1 Introduction

Research on the realization of the interdental fricative in Spanish (e.g., /caθa/ vs. /casa/) shows that this variable may be conditioned by a variety of linguistic and social factors in the speech of both native speakers and second language (L2) learners of Spanish. Previous studies in the fields of sociolinguistics, L2 acquisition, and phonology have started to investigate the role that individual differences play in the acquisition of dialectal features and phonological development (Bongiovanni et al., 2015; Díaz-Campos, 2004; Moyer, 2013), but few have investigated the individual differences relative to the ‘ideal L2 self’ from a sociophonological perspective. The present study adopts the operationalization of the ‘ideal L2 self’ used by Dörnyei (2010), stating, “[the] ‘ideal L2 self’ is the L2-specific facet of one’s ‘ideal self’. If the person we would like to become speaks an L2, the ‘ideal L2 self’ is a powerful motivator to learn the L2” (p. 79). Bongiovanni et al. (2015) noted that individual differences and foreign language context may impact the acquisition of phonological features and phonetic production. Furthermore, in an L2 study on phonetic production, Moyer (2013) mentioned that accent is closely related to individual identity and the variable of integratedness in an L2 context. In the fields of sociolinguistics and phonology, some studies have investigated the production of sociophonological variables by Spanish native speakers in Andalusia (Spain). These findings motivate the present study, which brings together several elements that have been investigated individually within the fields of sociolinguistics, L2 acquisition, and phonology. Specifically, this study explores the acquisition of a sociophonological phenomenon, the interdental fricative [θ] by L2 learners of Spanish in a

study abroad context in Seville, Spain. Recent research by Moyer (2013) and Jiang and Dewaele (2015) reinforce the belief that studies on L2 acquisition and phonological development should incorporate individual differences, such as the ‘ideal L2 self’, into sociolinguistic research. The present study attempts to fill a gap in the present literature by investigating how Spanish learners acquire regional sociophonological variables in the context of study abroad through a variationist analysis. The present study examines the frequency with which L2 learners of Spanish produced the interdental fricative in a study abroad context, if L2 learners follow native speaker tendencies of *ceceo* and *distinction*, and the linguistic and extralinguistic variables that may condition L2 learner production of the interdental fricative. *Ceceo* refers to a characteristic that is often associated with southern Spain (e.g., Seville) and involves the use of a single phenomenon, the interdental fricative /θ/ when pronouncing any of the orthographic letters ‘s’, ‘c’, and ‘z’ (Díaz-Campos, 2014). In the present study the term *distinction* refers to another characteristic that is commonly associated with Spanish spoken in northern and central regions of Spain which involves the production of an apical alveolar fricative /s/ with the sound orthographically represented as an ‘s’, and the production of the interdental fricative /θ/ when pronouncing any of the orthographic letters ‘c’ and ‘z’. For example, speakers who use *ceceo* would pronounce both the words ‘*casar*’ (i.e., to marry) and ‘*cazar*’ (i.e., to hunt) as /caθar/ because they make no phonetic distinction between the two variants. Speakers who use *distinction* would pronounce the word ‘*casar*’ (i.e., to marry) as /casar/ and the word ‘*cazar*’ (i.e., to hunt) as /caθar/ since they make a distinction between the two phonemes represented orthographically by ‘s’ and ‘z’.

2 Previous literature

In order to understand the acquisition of the interdental fricative, subsection 2.1 situates the study and the variable in question within the framework of the sociolinguistic variationist model and

provides the theoretical background for the present study. Subsection 2.2 situates the investigation of the interdental fricative within studies involving native speakers of peninsular Spanish, and details the methods used in previous research to investigate the interdental fricative. Once the phenomenon of a regionally indexed sociolinguistic variable has been located within the L1 context, it becomes easier to discuss it within the specific acquisitional context (i.e., the study abroad context).

2.1 Theoretical background

The present study adopts a sociolinguistic variationist model to investigate the L2 acquisition and L2 variation of the dialectal feature of the interdental fricative used in Andalusian Spanish spoken in southern Spain (Geeslin, 2011). There are three norms that speakers in Andalusia tend to follow: *seseo*, *ceceo*, and *distinction*. While these are the three common norms in Seville, Spain, there is also likely variation among native speakers. While previous studies have reported that in rural areas surrounding Seville there is a widespread use of *ceceo* (where there is almost no distinction made between /s/ and /θ/, present in some dialects in southern Spain), recent studies such as Regan (2017) have shown that even in larger cities such as Huelva and Seville, speakers show signs of merging towards distinction (where there is a distinction made between the sounds /s/ and /θ/). In contrast to *ceceo* and *distinction*, the term *seseo* (the pronunciation of the phonemes ‘z’ and ‘c’ [prior to an ‘e’ or ‘i’] as an /s/ rather than /θ/) describes an additional norm that is used in some parts of northern Spain as well as in Latin America. As learners become increasingly proficient in Spanish while studying abroad, their interlanguage (the linguistic system specific to the learner) can include features from their first language, from languages previously learned as well as overgeneralizations in the target language. As mentioned in George (2012), the sociolinguistic variationist model provides an excellent model to study the acquisition of the dialectal feature of

[θ] in the present study since it is possible that learners have integrated realizations of the interdental fricative that conform with *ceceo* or *distinction*, have not integrated realizations of *ceceo* or *distinction* into their interlanguage, or have overgeneralized the rules. As stated by Tarone (2007):

[A] sociolinguistic variationist model for the study of SLA can provide an indispensable framework to focus SLA research on the interaction of social factors and cognitive processes as they produce the evolving, variable, linguistic system called *interlanguage*. (Tarone, 2007, p. 875).

This quote suggests that a sociolinguistic approach to L2 acquisition of [θ] would be an appropriate model because it allows the investigation of social factors and cognitive processes in acquisition. The present study examines how social factors such as the ‘ideal L2 self’ in the context of study abroad (in addition to other extralinguistic and linguistic variables) mediate the acquisition of the interdental fricative [θ] in L2 learners of Spanish with English as their L1. For the present study alternative pronunciations (e.g., sounds resembling /θ/, such as an assibilated /s/ but that does not necessarily have the same acoustic correlates as a native speaker) have been collapsed into one category and have treated the participant production of the variants that correspond to the orthographic realization of ‘s, z, ci, ce’ as a binary variable. The collapsing of the ‘other’ pronunciations will be discussed as a possible area for future investigation in the conclusion of this paper. For this reason, this article describes the interlanguage of the participants as moving towards the speaker trend of *ceceo*, *seseo*, or *distinction*.

2.2 Studies investigating the interdental fricative in Peninsular Spanish

Several studies investigating the acquisition of the [θ] in L2 learners of Spanish included linguistic and extralinguistic independent variables that will also be investigated in this study. For instance, Sawoff (1980) and Carbonero (1985) found high levels of production of the interdental fricative

[θ] in native speakers of Seville. Their results are important in that they help to establish that the production of the interdental fricative is a dialectally salient feature in the region of Andalusia, where Seville is located. Additionally, Garcia-Amaya (2008) found that the most significant predictor of the variable use of [θ] was social network. This result is particularly relevant because social network is closely related to the ‘ideal L2 self’ in that they both involve a level of integration into the culture of the target language. The second most significant predictor in this study was orthographic representation: orthographic ‘s’ (e.g., *casa*, ‘house’) favored the use of [s] in 32.9% of the cases analyzed, and [c, z] in the rest. Two linguistic variables that were significant were: phrase initial segments and segments preceded by a vowel both favored the [θ]. Vowels [o], [i], and [u] appeared to favor the use of the [θ] as well (e.g., *cosa*, ‘thing’).

2.3 The L2 learning issue: The acquisition of phonological variables in the study abroad context

Studies that have investigated the acquisition of phonological variables in a study abroad context have shown that this environment may facilitate the acquisition of phonological variables, but several extralinguistic variables may also be at play (Díaz-Campos, 2004; Bongiovanni et al., 2015). Two previous studies that investigated the acquisition of phonological variables in study abroad and foreign language contexts are Díaz-Campos (2004) and Bongiovanni et al. (2015). Díaz-Campos (2004) analyzed the acquisition of phonology by L2 learners of Spanish from a sociolinguistic perspective, with a specific focus on the context of study abroad. Since study abroad is a learning context that provides numerous opportunities of authentic L2 exposure, Díaz-Campos (2004) investigated whether such a learning environment facilitated L2 acquisition of phonology. The study used a corpus of speech samples from 46 L2-Spanish learners. Twenty-six samples were from students studying abroad while the other 20 were from a regular classroom environment. These students were asked to read a paragraph with 60 target words including word-

initial stops [p, t, k], intervocalic fricatives [β, ð, γ], word final lateral [l] and palatal nasal [ɲ]. The results indicated that the two student groups showed similar gains in their acquisition of voiced initial stops and word final laterals. The factors that significantly predicted phonological gain among all learners were years of formal language instruction, reported use of Spanish before the beginning of the semester, reported use of Spanish outside of the class during the semester (days and hours), gender, entry oral proficiency interview, exit oral proficiency interview, and level at which formal instruction began. Based on these results, it is possible that these extralinguistic variables may also be significant predictors in the acquisition of the interdental fricative in the present study.

2.3.1 Individual differences of integratedness and previous experience

Previous experience has been identified in the literature as an extralinguistic variable that may influence L2 acquisition. Two studies that provide a justification for the inclusion of previous experience and individual differences in the study of L2 acquisition of [θ] are Díaz-Campos and Navarro (2009) and Duperron and Overstreet (2009). Although the latter study dealt with native Spanish speakers and their ability to recognize different dialects, Díaz-Campos and Navarro (2009) found that previous experience (with family or friends speaking a different dialect of Spanish) aided in dialectal recognition. This result suggests that there is a correlation between integratedness of native speakers in a dialect community and their ability to recognize and identify a dialect. This result provides additional justification for the inclusion of integratedness as an extralinguistic variable, a term which in this study refers to the desire of a learner to become part of a particular speech community. The present study further elaborates on the idea that previous and current experiences with speakers of the target language can contribute to identification and recognition of dialectal phonological variation. In other words, increased contact with native speakers may

contribute to L2 learners' abilities to identify variations associated with a particular geographical region (e.g., the interdental fricative).

Previous research has shown that L2 coursework may also be considered as a predicting factor of speakers' ability to identify and acquire sociophonological variation in an L2. For instance, Duperron and Overstreet (2009) targeted short-term study abroad programs to examine the interaction between previous coursework and phonological development. They observed three participants in an 8-week study abroad program and found that classroom instruction, when received prior to going abroad, was not a significant predictor of the learners' phonological gains. While their sample size was small and therefore their results are not sufficient to make any generalizations, they add to our understanding of the importance of exploring other individual differences (such as the 'ideal L2 self') as possible significant predictors for phonological development.

2.3.2 The L2-self system

The 'ideal L2 self' is but one component of the L2-self system, an umbrella term used by Dörnyei (2009a) which subsumes three components: 'ideal L2 self', 'ought-to self', and the L2 learning experience. These components make up how L2 learners think about themselves in an L2 (e.g., Jiang & Dewaele, 2015, Dörnyei, 2009; George, 2014; Moyer, 2014). The operationalization of the independent variable of 'ideal L2 self' in the present study comes from Dörnyei (2009a), and refers to the notion that the 'ideal L2 self' represents who the learner hopes to become in a given L2. Dörnyei (2009a) finds that 'ideal L2 self' may have a larger impact on an individual's motivation to learn an L2 as learners attempt to reduce the differences between their current self and who they hope to become in the L2 (Dörnyei, 2009a).

According to Jiang and Dewaele (2015), the ‘ideal L2 self’ provides a comprehensive view of L2 motivation through a social perspective. The ‘ideal L2 self’ was selected as an independent extralinguistic variable based on two justifications. First, the individual differences of ‘ideal L2 self’, as operationalized below, closely corresponds to the idea of integration in a foreign language context. George (2014) found that more contact in Spanish, less contact in English, and a strong Castilian social network were all extralinguistic variables correlated with the production of [θ]. Second, the extralinguistic variables of social network and a positive view of Castilian Spanish closely correspond to the operationalization of the variable of the ‘ideal L2 self’ used in the present study. One characteristic of the ‘ideal L2 self’ often investigated is the desire to learn a language in order to be part of a specific linguistic community. This study examined speakers’ ‘ideal L2 self’ using a questionnaire designed to gather information on their social networks. This operationalization of the ‘ideal L2 self’ is similar to the sociolinguistic variable of ‘social network’ in that both variables are related to a connection within a specific speech community.

2.3.3 L2 acquisition in a study abroad context

While previous research has found that the study abroad context may facilitate the acquisition of the interdental fricative (George, 2014), many contextual and social variables related to the study abroad context remain unexplored. In her study of the acquisition of the interdental fricative within the study abroad context, George (2014) found evidence to suggest that prior experience and social networks correlated positively with the production of the interdental fricative in L2 learners of Spanish. George (2014) identified several extralinguistic variables correlated with the production of the interdental fricative which are relevant to the present study (i.e., prior travel to Spain, more contact in Spanish, less contact in English, a strong Castilian Spanish social network, and awareness of Castilian Spanish). These results provide evidence that contextual factors may impact

linguistic gains for L2 learners and further justify the inclusion of investigating variables related to the learning context (e.g., integratedness) as well as to the L2 learner (e.g., the ‘ideal L2 self’).

3 Present study

3.1 Research questions and hypotheses

The previous literature highlights some of the variables explored in both sociolinguistic and SLA studies of sociophonological variables. Much of the previous research has investigated the L2 gains in a study abroad context and illuminated a need for future studies to investigate how contextual, linguistic, and individual variables impact L2 acquisition of phonological features. Using a variationist analysis the present study adds to the previous literature by investigating the relationship between a social variable, i.e., the ‘ideal L2 self’, and the acquisition of sociophonological variation with respect to the interdental fricative. The present study is guided by the following three research questions:

- 1) With what frequency and in which contexts do L2 learners of Spanish in a study abroad context in Seville produce the interdental fricative [θ]?
- 2) Do students who produce the interdental fricative [θ] in their speech follow the Andalusian native speaker tendencies of *ceceo* or *distinción*, previously exemplified with ‘ci, ce’, ‘s’, and ‘z’?
- 3) Which linguistic and extralinguistic factors condition L2 learner production of the interdental fricative [θ]? Specifically, how do factors such as the ‘ideal L2 self’ and integratedness condition the extent to which students use the interdental fricative [θ]?

Based on Garcia-Amaya (2008), the hypothesis is that the variables of social network, orthographic representation, phrase initial segments, and segments in a preceding vocalic context

may be significant predictors of L2 production of the interdental fricative. Additionally, it is predicted that the ‘ideal L2 self’ will correlate with increased production of the interdental fricative. It is anticipated that words containing an orthographic ‘ci, ce’ and ‘z’ will favor the production of the interdental fricative based on previous results (Garcia-Amaya, 2008). Additionally, those words containing vowels /a/ and /e/ will tend to favor [s] based on articulatory constraints that occur during the production of vowels (Regan, 2017). Lastly, syllabic stress may be a significant predictor of the interdental fricative since stressed sounds tend to be more salient for learners in input and, as a result, more likely to be produced in output.

3.2 Method

3.2.1 Participants and data collection

Six participants (five female and one male; average age = 20) took part in this study. All participants, personally recruited by the researcher, were students at a small liberal arts institution in the U.S. and were studying abroad in Seville, Spain. The study-abroad program coordinator was contacted and forwarded information to every student in the program. Participants eventually contacted the researcher and met at the *Universidad de Sevilla*, in a quiet room, for a sociolinguistic interview at the beginning and end of their semester abroad during the 2018-2019 academic year.

Although the researcher is a non-native speaker of Spanish, she had previously lived in four different Spanish-speaking countries and was highly proficient in Spanish, but did not use *ceceo* (i.e., the use of an interdental fricative in lieu of ‘s’, ‘c’, and ‘z’) or *distinction* (i.e., the use of an /s/ for the orthographic ‘s’ and an interdental fricative for sounds corresponding to the orthographic ‘z’ and ‘c’), but rather she tends towards *seseo* (i.e., the use of /s/ for ‘s’, ‘z’, and ‘c’). As previously mentioned, *seseo* is a term commonly used to characterize Spanish in Latin America and involves the production of /s/ for ‘s’, ‘c’, and ‘z’. Using *seseo* is a limitation when

investigating the acquisition of the interdental fricative, but the researcher encouraged participants to speak as if they were talking with their host families in Seville. While it is possible that the learners in the present study accommodated to the investigator's speech as a result of the Observer's Paradox mentioned by Labov (1972) and/or Giles' communication accommodation theory (Giles, 2016), no changes or accommodations in participants' speech were observed by the researcher during or after the interviews. All interviews were arranged by appointment during the first three weeks and the last week of the semester in order to follow a similar schedule for all participants and to record them as close as possible to their arrival in Seville, and as close as possible to the end of their stay.

3.2.2 Corpus

The corpus gathered in this study is composed of speech elicited during sociolinguistic interviews in Fall 2018, conducted with a sample of six native speakers of English studying Spanish as an additional language in Seville (see § 3.2.1). Two of the students were studying abroad for an entire academic (2018-2019) year, while the other four students were studying abroad for only one semester. These sociolinguistic interviews were recorded at the beginning and end of these students' time spent studying abroad.

The sociolinguistic interview included three parts which were conducted in the following order: (1) a semi-spontaneous conversation with open ended questions about the participants background, family, social network in Seville; (2) questions about the participants' past experiences with family, questions about plans in their near future, and questions about plans in the more distant future; (3) attitudinal questions about their 'ideal L2 self', their motivation, their integratedness in Spanish, and questions about any polite or impolite experiences they had while

studying abroad. The interviews ranged from forty-five minutes to one hour and were all conducted by the author and recorded using a digital recorder.

3.2.3 Instruments

In addition to the sociolinguistic interviews, participants completed a background questionnaire, a proficiency test, and monthly questionnaires administered via Qualtrics (Qualtrics, Provo, UT). In the sociolinguistic interviews, participants were asked about whom they spoke Spanish with and how frequently they spoke Spanish with people in Seville. The background questionnaire gathered personal information such as age, gender, Spanish courses previously taken, dialects of previous Spanish instructors, languages spoken at home, and years of formal language instruction in Spanish. Institutional course level and a 10-item proficiency questionnaire were used to determine proficiency upon time of arrival and departure. All participants completed the questionnaire at the beginning and end of each semester abroad. The questionnaires were used to follow the development of the ‘ideal L2 self’ during the study abroad experience and contained questions regarding the participants’ social networks, time spent speaking Spanish, time spent speaking English, and contact with native speakers in Seville. These questionnaires were sent to participants electronically once a month to record and measure any changes and/or patterns pertaining to extralinguistic variables throughout the semester. Additional qualitative questionnaires were sent to the participants, who were asked to rate their relationships with the people that they spoke Spanish with on a four-point scale (consisting of the categories ‘stranger’, ‘acquaintance’, ‘close friend’, and ‘significant other or close family member’). An average score was calculated among the different types of social networks participants mentioned to give them an overall score out of four. For example, if someone said they interacted mostly with a stranger and a close friend in Spanish, they received a social network score of 2 (taking the average between 1 and 3).

4 Data analysis

4.1 *Dependent variables*

The dependent variables in this study are the binary realizations of [θ] or “other realizations” for syllable initial orthographic ‘s’ and ‘z, ci, ce’ (e.g., *zapato*, ‘shoe’). The “other” is used in the present study because several of the phonetic realizations of ‘s, z, ci, ce’ were not [s] and while some of the realizations resembled [z], the syllable coda was not analyzed in the present study since phonemes in syllable coda position are susceptible to elision as well as other types of variation in Andalusian Spanish (Hualde, 2014). All possible contexts of the interdental fricative were investigated among the interviews collected with participants. All interviews were transcribed and analyzed impressionistically by the researcher for production of the interdental fricative. The orthographic contexts in which an interdental fricative could appear were first identified and then inspected spectrographically using the acoustic software Praat (Boersma & Weenink, 2018).

Fricatives are produced by a very narrow constriction in the oral cavity (Hualde, 2005). In their study, Jongman et al. (2000), found that spectral and amplitudinal properties provided the most critical information about the place of articulation for fricatives in English. Based on these results, and the description of the interdental fricative in Spanish found in Hualde (2014), the researcher analyzed the spectral energy of each token to determine the place of articulation in the present study to distinguish between interdental and alveolar fricatives. Additionally, decisions on whether the realization was an interdental fricative [θ] or another variant were made using the spectrogram and by comparing the spectral energy to that of a native speaker of Andalusian Spanish. The native speaker productions were recorded and analyzed for their spectral properties, amplitude, and duration. Additionally, the images from the native speaker from Andalusia were

used as a baseline to illustrate the difference between the different variants of the dependent variable through two images (Figure 1 and Figure 2). One figure contained the prototypical interdental fricative, [θ] produced by a native speaker, and the other contained a prototypical alveolar fricative, [s] produced by the same native speaker.

The impressionistic analysis revealed that four of the six participants did not produce any interdental fricatives. Of the two participants that did produce interdental fricatives, the researcher spectrographically analyzed and coded 358 tokens. Based on spectrogram analyses, the researcher determined whether a sound was [θ] or “other” by comparing the spectral energy of fricatives, as seen in Figures 1 and 2.

Spectral energy of an interdental fricative is far more concentrated than the spectral energy of an [s] or realizations of phonemes other than the interdental fricative. In order to distinguish between [θ] and [s], the researcher used Hz values and the amount of energy in the spectrogram to determine the point of articulation. In a spectrogram of [θ] produced by a native speaker from Seville, we see high frequency turbulence concentrated between 3900Hz and 5000Hz formant (Figure 1). This example can be taken to represent the approximate range of sonority for this consonant, although variation in this measure is undoubtedly found in this corpus. In the spectrogram for [s] we see that the frequency turbulence is concentrated between 3000Hz and 5000Hz (Figure 2). In addition, the intensity for [θ] in the native speakers’ production peaks at 70.15 dB, compared to 62.05 dB for production of the native speaker [s]. Therefore, one should expect to see a wider range of frequency turbulence for the interdental fricative [θ] and a lower intensity than that of a [s].

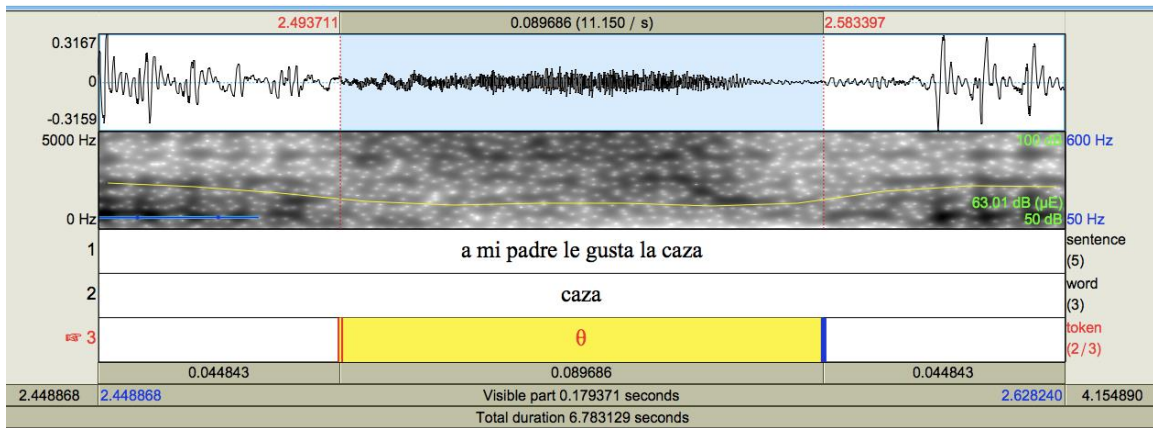


Figure 1. Interdentals fricative production by a native Spanish speaker from Seville.

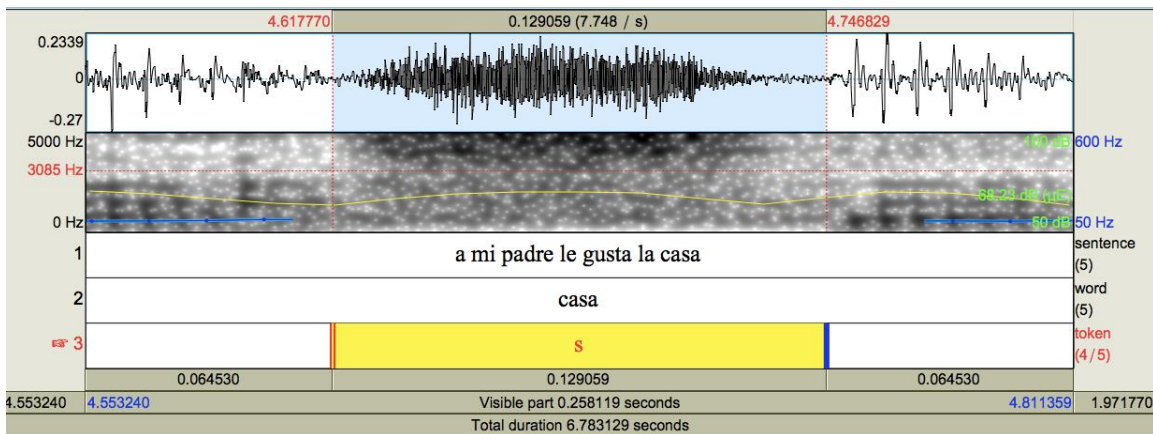


Figure 2. Alveolar fricative production by a native Spanish speaker from Seville

The dependent variable, the interdentals fricative, was coded as a binary variable. Díaz-Campos (2004) justifies the collapsing of the dependent variable in his study into a binary variable since the logistic regression only works with a binary variable. In the present study, while there is variation in the production of the interdentals fricative in the sense that learners may produce several variations that are neither the prototypical native speaker $[\theta]$ nor $[s]$, the researcher collapsed the variable into production of the interdentals fricative or “other variant”, which includes realizations of $[s]$ as well as other target-like consonants such as $[\delta]$ or $[\phi]$.

4.2 Independent variables

This study examines six independent variables to investigate what linguistic and extralinguistic variables condition learner production of the interdental fricative [θ]. The four extralinguistic variables were participant (Participant 1 or Participant 2), integratedness (e.g., social network, contact with native speakers), the time participants were interviewed (e.g., beginning of the semester vs. end of the semester), and measures gauging the ‘ideal L2 self’. The ‘ideal L2 self’ was also investigated as an extralinguistic variable. In the sociolinguistic interviews and questionnaires, participants were asked to describe their ideal Spanish speaking self. Their responses were analyzed based on integratedness, i.e., whether they described traits in their ‘ideal L2 self’ that exhibited integratedness or non-integratedness. The following is an example of an *integrated* response that appeared in a written questionnaire:

- (1) *Speak with confidence, make jokes, be able to argue with someone, and have Spanish friends.* (Taken from Interview 1)

This was coded as an integrated response because “make jokes, be able to argue with someone, and have Spanish friends” illustrate parts of the L2 learner identity and ‘ideal L2 self’ that exhibit a desire to be part of the culture of the target language. Example (2) is from one of the questionnaires that shows a different participant’s response to the question about their ‘ideal L2 self’. This response was coded as non-integrated because it only specifies instrumental use of grammar and language, rather than any desire to integrate into the L2 culture:

- (2) *Be able to use the past tense, and conjugate more quickly. Hold a 10-minute conversation in Spanish. Not have to look up as many words in Google translate.* (Beginning of the semester interview, Participant 2)

This response was coded as non-integrated because none of the elements that the participant mentioned as part of their ‘ideal L2 self’ relate to integratedness into Spanish culture

or to forming a social network. The only part of the response that could be interpreted as integrated is “holding a 10-minute conversation”, which was nonetheless coded as non-integrated because of the other comments around it and because the researcher perceived that the 10 minutes referred to being able to talk for an extended amount of time and less about forming a relationship.

In addition to extralinguistic variables, four linguistic variables included in the present analyses were.

1. Orthography (‘s, z, ci, ce’)
2. Morphosyntactic category (noun, determiner, adjective, preposition, and verb).
3. Previous segment (phrase initial, /a/, /e/, /i/, /o/, /u/ or consonant)
4. Syllabic stress (stressed, unstressed)

Orthography was included as an independent variable because of its role as a significant predictor of the orthographic ‘s’ favoring the [s] realization in Garcia-Amaya (2008). The independent variable of previous segment was also included in the present study because of previous findings in García-Amaya (2008) who found that phrase initial and preceding consonants favored the [s], while preceding vowels disfavored the [s]. Morphosyntactic category was included in García-Amaya (2008), and although it was not selected as one of the significant predictors of interdental fricative usage in Jerez, Spain. Similar to Regan (2017), the hypothesis in the present study is that the vowels /a/ and /e/ will favor [s] or “other” because of the articulatory constraints that occur during the realization of the vowels /a/ and /e/. That is, it is easier to articulate an [s] after producing a vowel than an interdental fricative based on the placement of the tongue during vowel production. Lastly, syllabic stress was included as a variable because it was assumed that stressed syllables with the interdental fricative would be more frequent in the learner input from

native speakers in a study abroad context, and as a result, learners might also tend to produce the interdental fricative in stressed syllables.

Two extralinguistic variables investigated in previous studies, but not included in the present study because of methodological limitations, were gender and age. Although gender and age have often been considered as predicting factors in sociolinguistic research (e.g., García-Amaya, 2008; Villena Pondosa, 1996), the largely homogenous speaker sample in this study did not allow for inclusion of these factors, as all participants were 20 years old and all but one of the participants were female.

4.3 Data coding, factors, and modeling

Several methodological issues arose during the analysis of participants' production. First, only two of the six participants produced the interdental fricative which significantly reduced the number of possible tokens (see § 6 for more information). As a result, only the data from two participants in four different interviews (the beginning and end of the semester for each participant) were coded and will be presented in the present study. As previously stated, the goal of this methodology was to examine learners' production of the interdental fricative and whether this sound shows patterns similar to those of *seseo*, *ceceo*, and/or *distinction*. To do this, participants' utterances were coded as either 'interdental fricative' or 'other' for the orthographic representations 's, z, ci, ce'.

4.4 Statistical Analysis

Although the questionnaires were qualitative, the results are coded quantitatively and treated as binary variables in the statistical analysis (e.g., integrated vs. non-integrated) as in Garcia-Amaya (2008), who also analyzed the (usually qualitatively treated) variable "social network" quantitatively as a binary variable. The social networks were investigated through the use of

qualitative questionnaires concerning the ‘ideal L2 self’ and used a similar binary coding scheme as in Garcia-Amaya (2008).

After coding the tokens for the linguistic factors (orthography, morphosyntactic category, previous segment, and syllabic stress) and extralinguistic factors (participant, integratedness, interview, and measures of the ‘ideal L2 self’) illustrated in the previous section, a multivariate logistic regression analysis was conducted on the data using the statistical software Rbrul (Johnson, 2009). The regression analysis was a stepwise regression which creates a model of variation including the independent variables that most precisely explain variation occurring in regard to the dependent variable, i.e., the production of the interdental fricative. While 360 tokens were originally coded, two tokens were excluded from the statistical analysis because of their phonetic nature could not be categorized through spectrographic or auditory means. As a result, 358 tokens were included in the final statistical analysis. ‘Participant’ was included as a random effect in the statistical model since each learner can exhibit interlanguage variation. In the statistical model, the variable of social network patterned so similarly to the independent variable of the ‘ideal L2 self’ that it interacted and impacted the calculations of the individual predictors. For this reason, it was excluded from the statistical analysis and will only be reported on qualitatively in the next section.

5 Results

Descriptive analyses first show that only Participant 1, who produced the greatest quantity of tokens (75.6%), showed trends towards *distinction* in production of the interdental fricative. Because of the smaller number of tokens (25%) produced by Participant 2, it was not possible to determine if Participant 2 trended towards *distinction* or *seseo*. Another reason that made it difficult to determine if Participant 2 trended towards *distinction* or *seseo* was that she also

produced the interdental fricative /θ/ for ‘d’ in one instance (which was not included in the analysis), suggesting signs of exaggerated pronunciation of the interdental fricative.

During the preliminary statistical analysis, a logistic regression was conducted including the variable ‘social network’, and both the ‘ideal L2 self’ and ‘social network’ appeared as significant predictors of the interdental fricative but showed multicollinearity, meaning that they were patterning similarly. While they did not change the predictive power of the statistical model as a whole, social network was excluded as an independent variable because of the possibility that it was impacting the calculations of the other independent variables. The ‘ideal L2 self’ did not prove to be a significant predictor in the revised statistical model. Table 1 includes the results of the crosstabulations in Rbrul (Johnson, 2009) for all independent variables and provides information on the factors that were not significant in the regression analysis.

Table 1. Results of crosstabulations in Rbrul for all independent variables.

	Other production		θ		Total tokens	Total tokens
	#	%	#	%	#	%
Participant						
1	164	57.7	56	75.6	220/358	61.4
2	120	33.5	18	24.4	138/358	38.6
Orthographic representation						
ce	40	14	35	47.2	75	20.9
ci	39	13.7	16	21.6	55	15.3
z	192	67.6	19	25.6	211	58.9
s	13	4.5	4	5.4	17	4.7
<i>Total</i>	284		74		358	
Interview						
1	136	47.8	26	35.1	162	45.2
2	148	52.2	48	64.9	196	54.7
<i>Total</i>	284		74		358	
Stress						
Unstressed	131	46	38	51.3	169	47.2
Stressed	153	54	36	48.7	189	52.7
<i>Total</i>	284		74		358	

Morphosyntactic category

adverb	21	7.3	1	1.3	22	6.1
determiner	18	6.3	2	2.7	20	5.5
adjective	40	14	11	14	51	14.2
noun	145	51	42	56.7	187	52.2
verb	60	21.4	18	24.3	78	21.7
<i>Total</i>	284		74		358	

Preceding vowel sound

a	43	15.1	18	24.3	16	4.4
e	45	15.8	13	17.5	58	16.2
i	26	9.1	7	9.4	33	9.2
o	15	5.2	3	4	18	5
u	8	2.8	2	2.7	10	2.7
Consonant	147	51.7	31	41.8	178	49.7
<i>Total</i>	284		74		358	

Ideal L2 self

integrated	156	54.9	38	51.3	194	54.1
unintegrated	128	45	36	48.6	164	45.8
<i>Total</i>	284		74		358	

Using a regression analysis (step-up, step-down) the current analysis sought to examine:

1) The frequency and the contexts in which L2 learners of Spanish in a study abroad context in Seville, Spain produced the interdental fricative [θ]; 2) whether these learners followed native speaker tendencies of *ceceo* or *distincion*; and 3) the linguistic and extralinguistic factors that conditioned L2 production of the interdental fricative, specifically if the ‘ideal L2 self’ or integratedness conditioned the extent to which L2 learners produced the interdental fricative.

Results of this regression analysis are summarized in Table 2, which provides information about the degree to which individual variables were significant in predicting the production of the interdental fricative. Upon entering data in the statistical model, Orthographic representation ($p=.001$), Interview ($p=0.003$), Stress ($p=0.023$), and Participant, as a random factor, all appeared as significant predictors of the realization of the interdental fricative (Table 2). This model had an

R^2 of 0.295 indicating that the three predictors analyzed accounted for 29.5% of the variance in the model. With respect to research question (2), of the variables selected as significant predictors within the group of orthographic representation, [ce] and [ci] were more significant predictors of the interdental fricative than [s] or [z]. Additionally, as for the variable ‘interview’, the interview at the end of the semester (Interview 2) was more significant in predicting the production of the interdental fricative than the interview at the beginning of the semester (Interview 1). Lastly, within the variable ‘stress’, unstressed syllables appeared to be a greater predictor of the interdental fricative than stressed syllabus.

Taken together these results show that neither of the L2 learners produced the interdental fricative frequently in their speech. Because of the few instances produced, it is unclear whether the L2 learners follow native speaker tendencies towards *ceceo* or *distinction*. The linguistic features that conditioned L2 learner production of the interdental fricative were preceding segment and syllable stress. The extra linguistic variable of interview predicted the L2 learner production of the interdental fricative but neither the ‘ideal L2 self’ nor the variable of integratedness were significant in predicting the production of the variable.

Furthermore, the first column in Table 2 indicates the results of the regression analysis for the dependent variables of [θ] and “other productions”. The first column indicates the variable and its variants while the second column indicates the weight (a value higher than .50 favors the application value while a value lower than .50 disfavors it). The positive logodds in the third column show which variables favor the application while the negative logodds disfavor it. The fourth column shows the percentages of the application value along with the total number of tokens for that particular variant. Lastly, the fifth column shows the total number of the application value along with the total number of tokens for each of the variants. In this column, variables that include

a higher range indicate a higher magnitude effect. The *p-value* that is part of the regression model is also included, which indicates the magnitude effect of the factors selected by this particular model. The range and the *p-values* show the same magnitude effect for the factors that were selected.

Table 2. Rbrul step-up/step-down logistic regression analysis of production of the interdental fricative with participant as a random factor.

Input					0.295
AIC					305.266
Total					358
	Weight	Logodds	% θ	N	
Orthographic representation					
ce	.76	1.17	46.7	75/358	
ci	.63	0.56	29.1	55/358	
z	.44	0.20	23.5	17/358	
s	.17	-1.53	9.0	211/358	
	<i>Range</i>	.59			
	<i>P-value</i>	.001			
Interview					
1	.38	-0.46	16.0	162/358	
2	.61	0.46	24.5	196/358	
	<i>Range</i>	.23			
	<i>P-value</i>	.003			
Stress					
Unstressed	.58	0.35	22.5	168/358	
Stressed	.41	-0.35	19.0	189/358	
	<i>Range</i>	.17			
	<i>P-value</i>	.0228			

In addition, the extralinguistic variable of interview was originally added to the model to examine differences between the beginning and the end of the semester which, according to the results of Table 2, was a significant predictor of the interdental fricative. This finding illustrates a positive relationship between the acquisition of sociophonological variables and study abroad, and shows that both participants increased their realization of the interdental fricative during their time

abroad. During the first interview, Participant 1 showed evidence of moderate realizations of the interdental fricative in comparison to Participant 2, who only produced the interdental fricative in three instances. By the time of the second sociolinguistic interview at the end of the semester, both participants had increased in their production of the interdental fricative, but with Participant 2 showing a greater increase than Participant 1 (as shown in Figure 3 below).

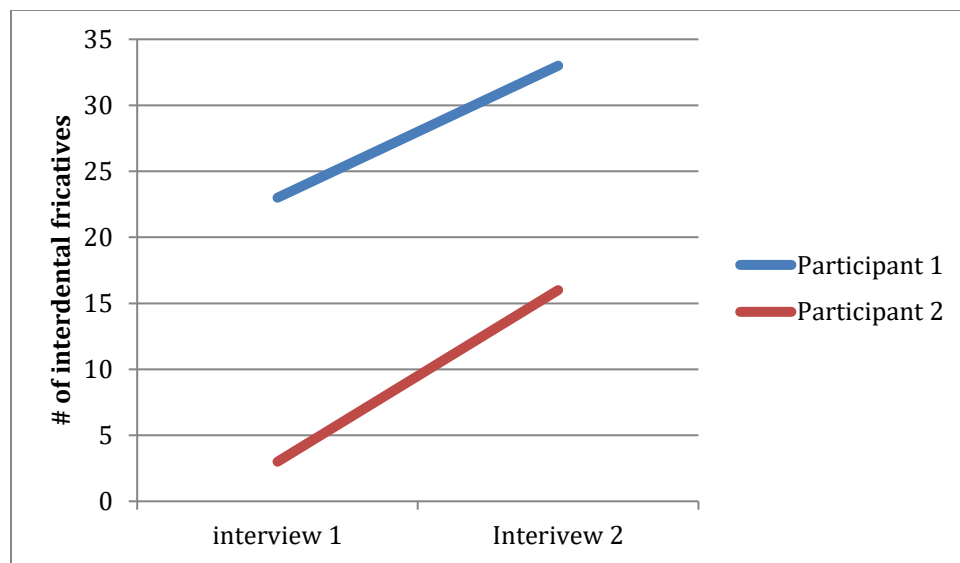


Figure 3. Number of realizations of the interdental fricative in interviews 1 and 2.

6 Discussion

The results of the current study corroborate findings from previous studies in that several linguistic and extralinguistic variables were preliminarily shown to have influenced learners' production of the interdental fricative (Díaz-Campos, 2004; Bongiovanni et al., 2015). The results also diverge from previous findings in that the participants' social networks and desire to integrate (or not) into the target culture (as measured by the 'ideal L2 self' variable) were not significant predictors of their use of the interdental fricative.

Similar to previous research that investigated individual differences and L2 acquisition (Dörnyei, 2009a), individual factors may have impacted learners' gains (either positively or

negatively). Evidence from this can be found in the difference in the amount of interdental fricative produced by Participant 1 and Participant 2. As shown in Figure 1, Participant 1 produced more interdental fricatives by the end of the semester than participant 2. One possible explanation for the sharp increase in the production of the interdental fricative by Participant 2 is the movement of the ‘ideal L2 self’ towards integratedness, while the slower increase in realizations of the interdental fricative in Participant 2 could be the result of their movement towards non-integratedness. Another possible explanation for the difference in increase between the first and last interviews of each participant is that Participant 1 started with a higher rate of realizations of interdental fricative and therefore did not have as much to progress.

An important issue that impacts the significance of extralinguistic variables predicting the production of the interdental fricative is the small number of participants in the present study. While the extralinguistic variables of the ‘ideal L2 self’ and integratedness did not result as significant predictors of the production of the interdental fricative, previous research on these variables (Dörnyei, 2009a) has shown that there may be considerable variation across participants. Therefore, given the small population sample, it is difficult to know if these variables would have been significant had a larger number of participants with a more diverse set of individual differences been tested.

Another important point to highlight is that the majority of the tokens that were produced were not the interdental fricative, but rather [s] or ‘other’. When compared to other studies that investigated the acquisition of the interdental fricative (Bongionvanni et al., 2015; George, 2014), these results do not seem significantly different in that the production of the interdental fricative is a dialectal feature often acquired late by learners of Spanish and therefore does not frequently show up (George, 2014). The results of this study seem to suggest that the interdental fricative

appears in the L2 interlanguage, but slowly and at varying rates among participants. A greater pool of participants as well as more frequent data collection would help to better illustrate the acquisition of the interdental fricative among study abroad students and how it interacts with extralinguistic and social features such as the ideal L2 self.

With respect to independent linguistic variables, the effect of orthography supports both Regan's (2017) and García-Amaya's (2008) findings. The effect of stress reported here is similar to Regan's (2017) findings that stressed syllables favored the realization of [s] while unstressed did not. A possible explanation is that participants produced more words with unstressed syllables.

A future avenue to explore would be investigating the frequency of stressed vs. unstressed syllables featuring an interdental fricative to see how often they appear in the interlanguage of L2 learners of Spanish. Of the two participants that produced the interdental fricative, Participant 1 had a more integrated 'ideal L2 self' upon arrival and a stronger desire to integrate and form a social network in the host city, as evidenced from the answers to the questionnaire and during the interview. Participant 2 had a less integrated 'ideal L2 self' possibly because of previous experience with Spanish and/or contextual factors during her study abroad, and as a result produced only three instances of the interdental fricative in her first interview. Additionally, the fact that other participants did not produce the interdental fricative at all may be attributed to their own L2 knowledge or language attitudes (i.e., either they did not notice the variation or they noticed it but decided not to integrate it into their speech), previous L2 instruction (or lack thereof) in pronunciation, and/or additional contextual features (e.g., time spent with host family, time spent with native speakers, etc.), all of which merit future investigations. Ethnographic observations and retrospective interviews with these participants may illuminate possible reasons for their lack of production of this particular variable.

7 Conclusions and areas for future investigations

Several tentative conclusions can be drawn from the results presented in this study. The first is that the interdental fricative may be a dialectal feature that is hard to acquire even among study abroad learners, and that its production is highly variable.

While these findings add to our understanding of the interaction of extralinguistic variables, such as the ‘ideal L2 self’, and L2 acquisition of a sociophonological variable, this study is not without limitations. The biggest is the small sample of participants that produced the interdental fricative, which makes it difficult to draw conclusions regarding the interaction between the extralinguistic variable of ‘ideal L2 self’ and the realization of the interdental fricative. However, the fact that only two of the six participants produced the interdental fricative suggests that not all six students may have been well-integrated during their study abroad experience and/or had a relatively low L2 proficiency that did not allow them to recognize this phonological feature. Second, a future investigation of the acquisition of the interdental fricative by L2 Spanish learners in a study abroad context would benefit from incorporating oral production data from the participants’ host families and social networks. Due to lack of information regarding the use of the interdental fricative by members of each host family, it was difficult to draw firm conclusions as to possible reasons why Participant 1 was trending towards *distinction*.

Additional avenues to explore include investigating the frequency of stressed vs. unstressed syllables featuring an interdental fricative in the interlanguage of L2 learners of Spanish. Observing the frequency of the interdental fricative in distinct lexical items would shed light on whether there exist particular high-frequency words that condition the use of the interdental fricative. A second possible avenue to explore is to separately analyze all interdental fricative variants coded as ‘other’ in the present study, categorizing them according to their spectrographic

properties, in order to identify possible patterns of acquisition. While many of these utterances did not have the same characteristics as the interdental fricative, it is possible that the four other learners who did not produce any instances of interdental fricative did in fact produce a sound that was moving towards a native-like realization of the interdental fricative. Future studies would also benefit from investigating the same feature within a much larger population sample and across different tasks. The first suggestion would be to significantly widen the pool of participants to include a larger number of learners at different levels of proficiency. Another suggestion is to use a picture-based elicitation task to investigate the acquisition of the interdental fricative in a more controlled way in addition to sociolinguistic interviews. Oral interview data could be collected at more frequent intervals (at least once in the middle of each semester or every month) to chart acquisition of the interdental fricative as well as to collect data from the host families of the L2 learners studying abroad.

In conclusion, this study adds to the literature by investigating the ‘ideal L2 self’, which has received little attention in previous literature, and highlights the importance, for future studies, to look at the connection between the acquisition of sociophonological variables and the ‘ideal L2 self’.

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