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STUDENTS' AWARENESS OF SPANISH SPIRANTIZATION ALLOPHONIC RULE

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El propósito de este estudio es determinar si aprendices de español como lengua extranjera con diferentes niveles de habilidad lingüística tienen conciencia de la regla de espirantización de las oclusivas sonoras del español. Se espera que los resultados ayuden a determinar si esta regla se puede adquirir de forma natural, sin intervención pedagógica alguna, o si, por el contrario, se necesita entrenamiento enfocado en la forma para hacer que los estudiantes sean conscientes de la regla y consecuentemente la aprendan.

The purpose of this study is to determine the extent to which L2 Spanish learners at different levels of proficiency are aware of the spirantization rule of Spanish voiced stops. The results of this study help determine whether general exposure to the language is enough to acquire the target rule or more form-focused phonological training is needed to bring their attention to the rule and consequently learn it.

INTRODUCTION

One source of accentedness in learners of Spanish who are native speakers of English is the use of voiced stops [b, d, g] instead of the fricative [ß, ð, γ] in certain obligatory contexts for these fricative allophones (Dalbor, 1997). Spanish's spirantization allophonic rule dictates that [b, d, g] are produced as [ß, ð, γ] in rapid speech mode (andante, allegretto, and presto styles) in intervocalic position (e.g., "hada" > ['aða]) and between a vowel or a liquid (e.g., "alba" > ['alßa], "arder" > [arðer']), except in the case of [l] + [d] (e.g., "falda" > ['falda]). English does not have this rule. Although the sound [ð] is part of the English phonetic inventory as a phoneme, it has a different distribution. The sounds [ß] and [γ] rarely occur in English and are often erroneously identified as [v] and [w] respectively. Therefore, the Spanish word "haba" (['aßa]) will be pronounced as *['aba]; "hada" (['aða]), as *['ada]; and "lago" (['laγo]), as *['lago] (Table 1).

Table 1. *Lack of spirantization rule in English-accented Spanish*

Spanish word	Correct Spanish pronunciation	English-accented pronunciation
"haba"	['aßa]	*['aba]
"hada"	['aða]	*['ada]
"lago"	['laγo]	*['lago]

The purpose of this study is to determine the extent to which L2 Spanish learners at different levels of proficiency are aware of the spirantization rule of Spanish voiced stops. To that end, English-speaking students learning Spanish as an L2 were given a perception test consisting of Spanish words containing one of the obligatory Phonetics contexts for the spirantization of the target sounds [ß, ð, γ]. The spirantization rule was applied in some instances (for example, the word "dedo" was produced as [deðo]) but not in others (for example, the word "dedo" was produced as *[dedo]). Participants were asked to identify either token as "correct" or "incorrect" in the assumption that, if they were aware of the spirantization rule, they would select "incorrect" whenever they heard a stop in an obligatory context for a fricative, and vice versa.

In addition, and given that experimental studies have consistently shown a close link between production and perception in L2 learners (Llisterri, 1995), participants also read aloud a passage containing many instances of the target sounds, and their production was acoustically analyzed in order to determine if there is relationship between learners' perception and production.

Lastly, we also explore the effect of being enrolled in a Phonetics course on the perception and production of participants at the advanced level. Descriptive analysis is used to show a relationship between the test results and levels of language proficiency, and also whether a Phonetics course is taken or not. Implications for the need of form-focused phonological training are addressed.

LITERATURE REVIEW

As far back as 1941, and framed within the Markedness Theory, fricative sounds were said to be more marked than stop sounds (Jakobson, 1941). Later, when Eckman (1977) developed the Markedness Differential Hypothesis, fricatives were deemed more difficult to acquire due to their higher degree of markedness. Although the stop phones are considered the base phonemes and the fricatives their allophonic variants, in spite of the latter being more marked, fricatives are in fact much more common in Spanish than their stop counterparts (Hualde, 2005; Schwegler & Kempff, 2007).

These two facts combined represent a challenge to learners of Spanish as a foreign language. A number of studies have addressed the acquisition of Spanish spirantized allophones of voiced stops. Zampini (1994) was one of the first to directly investigate how native English-speaking L2 learners of Spanish acquire Spanish spirantization. Second and fourth-semester students participated in two tasks, one to elicit spontaneous speech and one consisting of reading a passage aloud. These tasks were designed to investigate the acquisition of fricatives and also explore the effect of speech style on their production. Zampini's results showed that all subjects produced fricatives in less than 32% of the expected instances. She also notes that the implementation of the spirantization rule might be hampered by the inability of learners to speak fast enough, but that, nevertheless, they might be aware of the rule.

In González-Bueno's (1995) study, five native speakers of English learning Spanish as an L2 were given oral proficiency tests in the form of OPI, and their productions were analyzed acoustically. In particular, instances of the obligatory contexts for [ß, ð,γ] were counted and used to determine if the spirantization rules had been applied by the students. They were found to produce fricatives about half of the time, at a higher rate than the subjects in the Zampini study.

Both Zampini (1994) and González-Bueno (1995) attribute the difficulties of L2 learners in acquiring the fricative allophones of voiced stops [ß, ð, γ] to phonemic and allophonic differences in English. Later studies also point to the difficulties of L2 learners of Spanish acquiring the spirantization process (Díaz-Campos, 2004; Elliot, 1997).

More recently, Lord (2010) analyzed the oral recordings from two groups of students participating in a study abroad program. One group had previously taken a Spanish Phonetics Course, and the other one had not. Participants read out loud a list of words and phrases in Spanish, each one containing the target sounds ([b, d, g, ß, ð, γ]). Lord (2010) concluded that explicit instruction seems to have a positive effect on the production of Spanish voiced stops, including their fricative allophones.

Given this situation, the present study was set up to contribute to this line of research by determining the extent to which L2 Spanish learners at different levels of proficiency are aware of the spirantization rule of Spanish voiced stops. In addition, and given that, in general, L2 learners do not receive explicit phonological training until they reach higher levels of language instruction, the results of this study might help determine whether general exposure to the language is enough to acquire the target rule or more form-

focused phonological training is needed to bring their attention to the rule and consequently learn it.

To that end, the present study seeks to answer three research questions:

1. At what levels of proficiency are L2 Spanish learners able to recognize whether the spirantization of Spanish voiced stops rule has been applied, as indicated by the results of the perception test?

2. At what levels of proficiency are L2 Spanish learners able to apply the spirantization of Spanish voiced stops rule, as indicated by the results of the production test?

3. Is there a correlation between L2 Spanish learners' perception and production results, as indicated by both tests?

METHOD

Participants

Eighteen native English speakers of American English without speech or hearing impairments participated in the study. They were all undergraduate students learning Spanish as a L2. At the time of the investigation, most participants were enrolled in a Spanish course at a Midwestern American University. They had an age average of 23. Two participants had a low proficiency level in a third language (French and German). Only a few participants indicated some language contact with native Spanish speakers.

Six participants had a low proficiency level; 6 participants had an intermediate proficiency level; and 6 had an advanced proficiency level. Only 2 participants (from the advanced proficiency level group) had taken a Spanish Phonetics/Phonology Course.

Stimuli

The stimuli for the perception test were 30 Spanish words containing one of the obligatory phonetic contexts for the spirantization of the target sounds. The spirantization rule was applied in some instances (for example, the word "dedo" was correctly produced as [deðo]) but not in others (for example, the word "dedo" was produced as *[dedo]). A total of 60 different stimuli were selected: 30 containing the correct fricative sound [ß, ð, γ], 10 per each segment, and 30 containing the incorrect voiced stop sound [b, d, g], 10 per each segment (Appendix A). The stimuli were tape-recorded in a soundproof booth. Before the experiment started, the intelligibility of the stimuli (provided by a female native speaker of Spanish) was assessed by four native speakers of Spanish: one female and three males. Listeners indicated whether the word they heard was correctly or incorrectly. Identification accuracy was 100% for all stimuli.

The stimuli for the production test consisted of an 80-word Spanish written paragraph containing 38 instances of the target sounds: 13 words for the sound [ß], 18 for [ð], and seven for [γ] (Appendix B).

Procedure

The experiment consisted of a perception test and a production test. Both tests were conducted in a language lab, where the participants were tested in a soundproof room. For the perception test, participants were presented a Spanish word on a screen. Once they saw the word, they clicked on it to hear the word pronounced. After listening to the word, they had to identify it as "correct" or "incorrect" on an answer sheet. Prior to the perception test, participants received a training session consisting of five test items to familiarize them with the tasks. For the production test, the participants recorded a paragraph containing several instances of the target sounds.

Perception test

Participants from the three proficiency levels (low, intermediate and advanced) took the perception test, in which they were presented with 60 randomized stimuli, with an inter-trial-interval of three seconds. The listeners were told to respond after each stimulus. They were encouraged to guess if unsure. The perception test lasted about 10 min, with one listener tested per day. All listeners were tested within a two-week period.

Production test

Immediately after the perception test, the participants took the production test. Before recording the paragraph, participants were given a minute to read the paragraph to familiarize themselves with it. The participants had only one chance to read the paragraph. The production test lasted about a minute, with one listener tested per day. All speakers were tested within a two-week period.

Data analysis

For the perception test, errors in identifying the tokens as "correct" or "incorrect" were counted and percentages of errors were calculated. For the production test, all words containing the target sounds were physically cut from each recording using Audacity. An initial aural analysis by the researchers (both native speakers of Spanish) was acoustically

	Low	Intermediate	Advanced

confirmed using the speech analysis program Praat (2010), and percentages of errors were calculated.

RESULTS

Perception

For the perception test, the number of potential errors, number of actual errors, and percentages of errors in perception were obtained for each group and target segment (Table 2).

Table 2. *Number of Potential Errors, Number of Actual Errors, and Percentages of Errors in Perception*

	# of potential errors	# number of errors	%	# of potential errors	# number of errors	%	# of potential errors	# number of errors	%
Bilabial	120	48	40	120	40	33	120	34	28
Dental	120	48	40	120	26	22	120	29	24
Velar	120	47	39	120	23	19	120	29	24

A comparison across proficiency levels per each target segment shows that bilabial errors decrease with higher level of proficiency (Low: 40% of errors, Intermediate: 33% of errors, Advanced: 28% of errors). Dental and velar errors show a very similar pattern across levels, with percentage of errors decreasing from Low to Intermediate (Dentals: Low: 40% of errors, Intermediate: 22% of errors; Velars: Low: 39% of errors, Intermediate: 19% of errors,), but staying stable at the Advanced level (Dentals: 24% of errors; Velars: 24% of errors). Results also indicate that bilabial sounds pose the most difficulties in perception for Intermediate and Advanced levels of proficiency (Low: 40% of errors, Intermediate: 33% of errors, Advanced: 28% of errors). See Figure 1 for a visual display of these results.

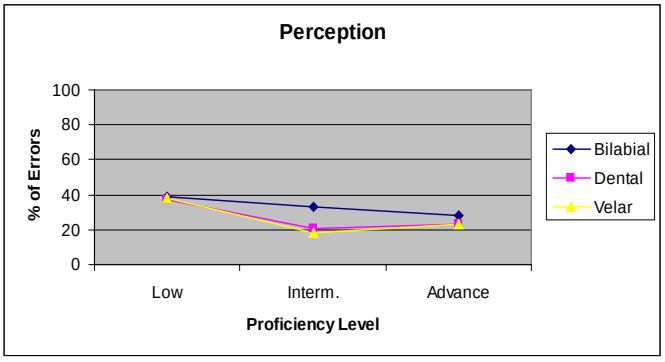

Figure 1. Perception results

A comparison within proficiency levels show that all three target sounds present the same level of difficulty for low proficiency participants (40%, 40% and 39% of errors respectively). For intermediate proficiency participants, bilabials (33% of errors) are the most difficult to perceive followed by dentals (22% of errors) and velars (19% of errors). For advanced proficiency participants, all three articulations present a similar level of difficulty, with bilabials being slightly more difficult than the others (28%, 24% and 24% of errors respectively).

Production

For the production test, the number of potential errors, number of actual errors, and percentages of errors were obtained for each group and target segment (Table 3).

Table 3. *Number of Potential Errors, Number of Actual Errors, and Percentages of Errors in Production*

	Low			Intermediate			Advanced		
	# of potential errors	# number of errors	%	# of potential errors	# number of errors	%	# of potential errors	# number of errors	%
Bilabial	78	37	48	78	21	27	78	20	26
Dental	126	96	76	126	58	46	126	53	42
Velar	42	15	36	42	14	34	42	14	33

A comparison across proficiency levels per each target segment shows that bilabial and dental errors decrease from Low to Intermediate levels of proficiency (Bilabials: 48% and 27% of errors respectively; Dental: 76% and 46% of errors respectively) and stays more or less the same from intermediate to advanced (Bilabial: 27% and 26%; Dentals: 46% and 42% respectively). Velar errors are similar for all levels of proficiency (36%, 34% and 33% of errors). Results also indicate that dental sounds pose the most difficulties in production for all three levels of proficiency (Figure 2).

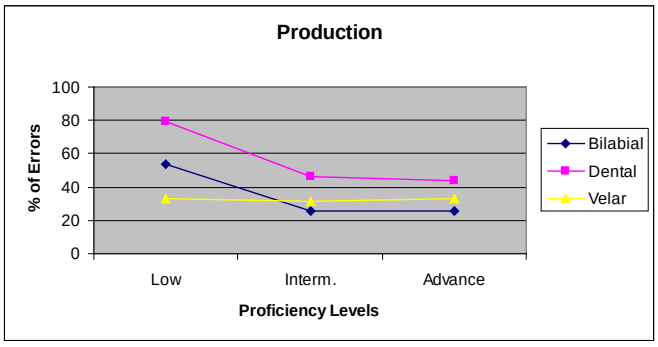

Figure 2. Production results

A comparison within proficiency levels shows that for Low proficiency participants, dentals are the most difficult (76% of errors), then bilabials (48% of errors), and velars are the easiest (36% of errors). For Intermediate proficiency participants, dentals are also the most difficult (46% of errors); whereas bilabials (27% of errors) and velars (34% of errors) show relatively similar levels of difficulty. For advanced proficiency participants, dentals (42% of errors) are the most difficult, then velars (33% of errors), and bilabials (26% of errors) are the easiest.

Perception versus Production

The percentages of errors from each test were compared for each group and target segment (Table 4).

Table 4. *Percentage of Errors in Production and Perception (%)*

	Low		Intermediate		Advanced	
	Perception	Production	Perception	Production	Perception	Production
Bilabial	40	48	33	27	28	26
Dental	40	76	22	46	24	42
Velar	39	36	19	34	24	33

Results show that there is a tendency for bilabials and velars to be perceived and produced with similar degrees of accuracy in all three levels of proficiency. It is in the dental place of articulation where perception and production differs the most, with production being more difficult than perception in all three levels of proficiency (Figures 3, 4, and 5).

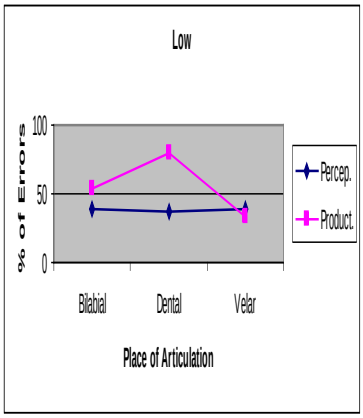

Figure 3. Low Proficiency Level

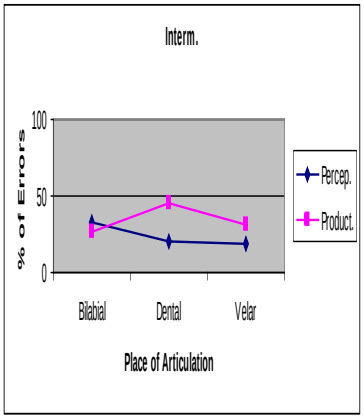

Figure 4. Intermediate Proficiency Level

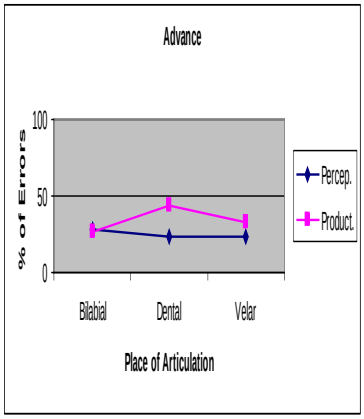

Figure 5. Advanced Proficiency level

DISCUSSION

Each of the research questions will be discussed in turn.

R.Q. #1: At what levels of proficiency are L2 Spanish learners able to recognize whether the spirantization of Spanish voiced stops rule has been applied, as indicated by the results of the perception test?

Participants at the Intermediate level of proficiency started to recognize the spirantization rule in dentals and velars, but still had some difficulties perceiving spirantized bilabials. Those at the Advanced level showed no difference from the Intermediate ones in perceiving spirantized dentals and velars, but did better in the perception of spirantized bilabials. So the answer to question 1 is that L2 learners of Spanish are able to recognize the spirantization of dentals and velars at the Intermediate Level of proficiency, and is not until the Advanced level that the spirantization of bilabials is shows the same level of recognition.

As for the reason why learners at the Intermediate level have trouble perceiving the spirantization of [b], we might hypothesize that the English phoneme [v] interfered with the perception of [ß], since "v" is a plausible spelling in Spanish of the phoneme /b/. When participants read words containing a "v" (such as "ave" or "cava,") during the perception part of the study, they might have expected it to be pronounced as [v], and when they heard [ß] instead, they labeled the word as "incorrect." On the other hand, when they saw a Spanish word spelled with a "b" and then heard the unfamiliar [ß], they might have taken it as a [v], and therefore labeled the word as "incorrect." This hypothesis falls along the lines of Zampini's (1994) when she also speculates that orthography may have played a role in the pronunciation of /b/ by the native English speakers in her study.

R.Q. #2: At what levels of proficiency are L2 Spanish learners able to apply the spirantization of Spanish voiced stops rule, as indicated by the results of the production test?

Participants at the Low Level of proficiency already produced spirantized velars as well as Intermediate and Advanced participants, but had more problems producing bilabials and especially dentals. It is also interesting to see that there is no difference in the production of spirantized voiced stops between the Intermediate and Advanced levels of proficiency. So the answer to question 2 is that L2 Spanish learners are able to apply the spirantization of Spanish voiced stops rule at the Low level for velars, and at the Intermediate Level for bilabials and dentals.

The difficulty that English-speaking learners of L2 Spanish have in acquiring Spanish dental sounds has been repeatedly reported in the literature (Bowen & Stockwell, 1957; González-Bueno, 1995, 1997, 2002; Macken & Barton, 1979). Macken and Barton (1979) specifically say that "Labial stops are most likely to be spirantized and dental stops are least susceptible to spirantization" (p. 447). There are two main reasons why the spirantization of Spanish voiced stops is particularly difficult for native speakers of English. One is the fact that the sounds [d] has an alveolar articulation in English, unlike the dental articulation in Spanish. The mere anatomical aspect of this alveolar articulation prevents spirantization of this sound. Rather, the weakening of English alveolar sound [d] manifests itself in the process of "flapping" the sound [d] rather than spirantizing it.

R.Q. #3: What is the relationship between L2 Spanish learners' perception and production results, as indicated by both tests?

The results show that there is a tendency for bilabial and velars to be perceived and produced similarly at all three levels of proficiency and that it is in the dental place of articulation where perception and production differ the most, with production being more difficult than perception for all three levels of proficiency. The reasons for this have already been addressed when discussing the answer to and conclusions from research question #2, that is, different place of articulation and the application of the English flapping process.

We initially intended to analyze the effect of a Phonetics course on the perception and production of the target sounds by Advanced proficiency level participants. However, given the small number of participants at this level of proficiency, the results of this analysis were rendered non-significant. Nevertheless, these results are included as anecdotal evidence to support previous studies on the effect of formal instruction on pronunciation.

Production and perception results, in the form of percentages of errors, from the advanced participants (n=6), were separated in two groups (Table 5): Those who took a Phonetics Course (n=4) and those who did not (n=2).

Table 5. *Effect of Phonetics Course*

Phonetics Course	Perception (% of errors)	Production (% of errors)
Yes (n. 4)	28	30
No (n. 2)	18	48

These results seem to suggest that formal instruction in Spanish Phonetics shows an effect on production but not on perception. Participants who took a Phonetics course were perceived spirantization somewhat worse (28% of errors) than those who did not (18% of errors). However, those who took a Phonetics course produced spirantized sounds better than those who did not (Figure 6).

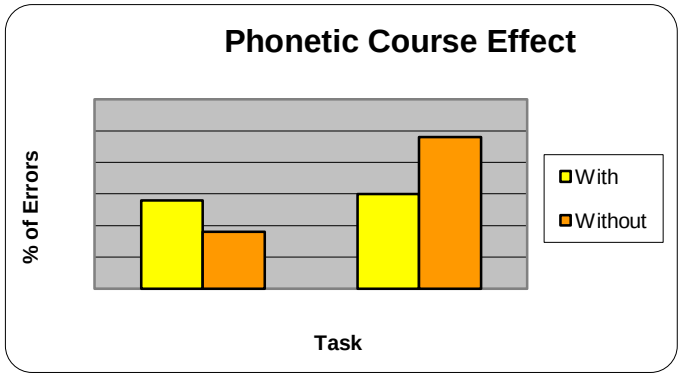

Figure 6. Phonetics Course Effect Results

Lord (2010) also found a positive effect of a Phonetics course on the production of the voiced stop's spirantized allophones. However, a Phonetics course did not show an effect in the perception part of the present study (participants who took a Phonetics course perceived spirantized sounds worse than those who did not).

This might sound counter-intuitive, since in general, perception develops earlier than production, as reported by previous studies (Bradlow, Pisoni, Akahane, & Tohkura, 1997; Rochet, 1995; Wang, Jongman, & Sereno, 2003.) Aside from the effect of the formal instruction in pronunciation, we can observe that although learners at the Advanced level made fewer errors in production (M = 33.7% of errors) than the Intermediate level (M = 35.7% of errors) this difference is not as dramatic as the one between the Intermediate level and the general production of the Low level (M = 53.3% of errors). This leads us to speculate that general exposure to the target language seems to have a definite positive effect on the pronunciation of the fricative allophones of Spanish voiced stops. Furthermore, if the Phonetics course has the effect of moving advanced level students slightly up in the scale of accuracy, the effect might be greater if this Phonetics instruction were available to lower level learners.

In view of these results, we can conclude that, at least for the participants in this study, level of proficiency has a direct effect on the level of awareness of the Spanish spirantization rule. Learners at the Intermediate level start showing awareness of the Spanish spirantization rule in perception and production: In perception: for velars and dentals, but not for bilabials, and in production, in all three places of articulation. When comparing how the spirantization rule is recognized with its application in production, there is a relationship between the perception and production of the fricative allophones of bilabials and velars, but not of dentals. Both bilabials and velars seem to present similar levels of difficulty in both perception and production. For dentals, on the other hand, the results show that they are always more difficult to produce than to perceive, and this happens in all three levels of proficiency.

An additional conclusion that can be drawn from this study is that of the order of appearance of the target sounds in the interlanguage of learners. The rank order of fricative allophones in González-Bueno's (1995) study resembles the results obtained by Zampini (1994). Learners produced [ɣ] most frequently, [ß] was the second most

frequently pronounced fricative, and [ð] was produced the least. In the present study, the observed order of acquisition in production is also similar only for learners at the Low Level proficiency: low level participants made fewer errors in the production of [ɣ], followed by [ß], and they made the most errors in the production of [ð]. However, for learners at the Intermediate and Advanced levels, the order in terms of number of errors is slightly different: they made fewer errors in [ß], followed by [ɣ], and they made the most errors in the production of [ð]. In other words, [ß] and [ɣ] exchanged orders, but [ð] was still the most difficult one (Table 6).

Table 6. *Rank Order in Production*

Rank Order	Zampini (1994)	González-Bueno (1995)	This study		
			Low	Intermediate	Advanced
1st	[ɣ]	[ɣ]	[ɣ]	[ß]	[ß]
2nd	[ß]	[ß]	[ß]	[ɣ]	[ɣ]
3rd	[ð]	[ð]	[ð]	[ð]	[ð]

This comparison reinforces this study's conclusion of [ð] being the Spanish sound that is more difficult to produce of the three fricative allophones. In terms of perception, we saw that it was [ß] the most difficult to perceive, but we cannot compare this with previous studies, since they did not address perception of [ß, ð, ɣ], only production.

LIMITATIONS AND RESEARCH RECOMMENDATIONS

The results of the present study cannot be taken as definitive given the two following drawbacks:

1. Low number of participants. Recruiting participants was one of the most challenging tasks in this investigation. Despite personal visits to different Spanish classes, display of flyers, electronic messages to Spanish students inviting them to participate, recruitment was extremely low. One obstacle was that the Spanish Department would not give extra credit for students' participation in the research (given the tight grading system already in place.) We even went as far as to offer $5 in order to recruit enough Spanish students so we could have a reasonable number of participants. Similar studies should be carried out with larger numbers of participants. A greater population sample will allow for greater confidence in the results and findings.

2. Low validity of the approach to determine participants' language proficiency level:

The participants' levels of language proficiency were already determined by the course in which they had been placed by the Spanish Department. For convenience reasons, we did not conduct any additional test that might have provided a more valid assignment of participants' proficiency levels. Future studies should include in their methodological design a more valid assessment procedure to more accurately determine participant's levels of proficiency.

3. Undetermined previous instruction: It was assumed that, aside from the Phonetics course taken by some of the participants at the Advanced level, no formal instruction on Phonetics was provided. It could be that some participants might have received this kind of instruction during their Spanish studies, which was not controlled for in this research.

Notwithstanding the methodological drawbacks, the contributions of this study should not be disregarded, considering the implications outlined below.

Pedagogical Implications

Given that dental sounds pose the most difficulty in production for all three levels of proficiency, it can be assumed that one cause of this difficulty may be the different place of articulation of this sound in Spanish (dental) and English (alveolar). Therefore, the first goal of a training program to help with the pronunciation of the voiced dental allophone of [d] is to make learners aware of the different place of articulation of Spanish dentals. An accurate anatomical description of the oral cavity to show the location of both the alveolar ridge (English pronunciation) and the back of the frontal teeth (Spanish pronunciation) should help achieve this goal (Figures 7 and 8).

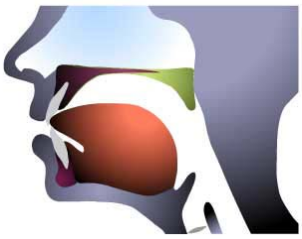

Figure 7. Spanish Dental articulation of [d]

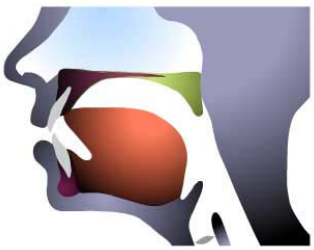

Figure 8. English Alveolar articulation of [d][1]

Learners should also made be visually aware of the articulation of the interdental allophone of the voiced dental Spanish sound, which is only slightly different from the articulation of their familiar English [ð] used to pronounce the grapheme "th" as in "they" (Figures 9 and 10).

[1] Images taken from *The Sounds of Spoken Language* (www.uio.edu/~acadtech/Phoneticss/)

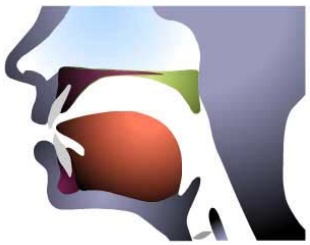

Figure 9. Spanish Interdental articulation of [ð]

Figure 10. English Interdental articulation of [ð]

In addition, controlled practice of the target sound [ð], both in perception but most importantly in production, should be provided. The very design of the perception test used in this study could serve as a model to design these perception exercises. For example, learners should first be asked to determine whether the intervocalic [d] in the Spanish "nada," for instance, has been correctly pronounced as [ð] or incorrectly as [d]. Then, attention should be paid to the accurate pronunciation of [ð] by having learners pronounce phrases such as "un dato," "el dato" where both instances of "d" are pronounced as [d], and "¿qué dato?" in which "d" is pronounced as [ð] (Table 7).

Table 7. *Examples of phrases with instances of [ð]*

	[d]		[ð]
Dedo	un dedo	el dedo	mi dedo
Duna	gran duna	mil dunas	la duna
Dama	gran dama	tal dama	una dama
Dote	sin dote	tal dote	la dote

Similarly, learners should be made aware of the Spanish articulation of intervocalic [b] by providing them with an accurate anatomical description of the oral cavity to show the articulation of the fricative allophone [ß] (Figures 11 and 12).

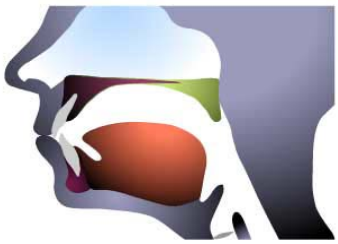

Figure 11. Spanish stop articulation of [b]

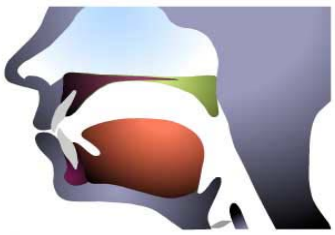

Figure 12. Spanish fricative articulation of [ß]

The results of this study also indicated that the sound [ß] poses the most difficulty in perception for all three levels of proficiency. Therefore, controlled practice of the target sound [ß] in perception, should be provided. As suggested above for the training of [ð]), perception exercises could follow the model of the perception test used in this study. For example, learners should first be asked to determine whether the intervocalic [b] in the Spanish word "bota," for instance, has been correctly pronounced as [ß] or incorrectly as [b]. Then, attention should be paid to the accurate pronunciation of [ß] by having learners pronounce phrases such as "un beso," in which "b" is pronounced as [b], and "el beso" where "b" is pronounced as [ß] (Table 8).

Table 8**.** *Examples of phrases with instances of [ß]*

[b]		[ß]
burro	un burro	mi burro
bota	con bota	la bota
beso	un beso	tu beso
balón	un balón	su balón

Special attention should be given to the fact that the grapheme "v" is pronounced in identical way as "b," and therefore the spirantization rule applies equally to it. To that end, learners should practice with phrases such as "un vaso" in which "b" is pronounced as [b] and "el vaso" where"b" pronounced as [ß] (Table 9):

Table 9. *Examples of phrases with instances of grapheme "v" pronounced as [b] and [ß]*

[b]		[ß]
veneno	con veneno	el veneno
visado	sin visado	mi visado
vuelta	gran vuelta	una vuelta
valor	con valor	su valor

It goes without saying that instructors should implement the controlled practice described above in a contextualized and meaningful way, the design of which is beyond the scope of this study.

With the present study, we hope to have contributed to the line of research focusing on the acquisition (both perception and production) of Spanish fricative allophones of voiced sounds. There is a growing global demand for accurate communication in a foreign language, and pronunciation plays an important role in accurate oral performance. A strong foreign accent can interfere with communication, and the mispronunciations of the sounds addressed in this study greatly contribute to a foreign accent. Therefore, we urge Spanish teachers to adopt the pedagogical strategies presented here to help students overcome the difficulties of these sounds, and become efficient communicators in the target language. Furthermore, we recommend that this pronunciation training be available to learners at all levels of proficiency.

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Appendix A

STIMULI LIST

	[ß]
1.	Haba
2.	Iba
3.	Bebe
4.	ave
5.	Sabe
6.	baba
7.	Boba
8.	cava
9.	lobo
10.	hubo

	[ð]
1.	Dedo
2.	Nada
3.	Oda
4.	Codo
5.	Lodo
6.	Lado
7.	Mide
8.	Pide
9.	hada
10.	mudo

	[ɣ]
1.	Hago
2.	Mago
3.	Lego
4.	miga
5.	fuga
6.	higo
7.	siga
8.	logo
9.	daga
10.	llego

Appendix B

READING PASSAGE

La cueva del lobo

El mago llegó a la cueva todo cubierto de lodo y baba, asustando a las aves posadas en una higuera que había al lado de la entrada. El lobo, antes de darse a la fuga, le había mordido en el codo y en los dedos, y ahora apenas podía sostener la daga con la que intentó defenderse. Llegó hasta el lago para lavarse y beber un poco. No se oía nada, era como si el bosque se hubiera quedado mudo.