

The effects of explicit pronunciation instruction on the production of second language Spanish voiceless stops: a classroom study

Pablo Camus

Abstract

The present study examines the effectiveness of second language explicit pronunciation instruction of adult second language (L2) learners of Spanish in a classroom setting. This study seeks to shed light on the effectiveness of teaching pronunciation while considering the level of instruction of first, second and third year students. Eighty-three learners of Spanish as an L2 were recruited to participate in a control (n = 45) or experimental (n = 38) group. From the beginning to the end of a twelve-week semester, participants in the experimental condition received instruction on typically difficult segments in L2-Spanish for first language (L1) English speakers.

Pronunciation gains were measured acoustically by a word-reading task and the target structures were Spanish voiceless stops /p, t, k/. Results suggest that pronunciation instruction is beneficial to all voiceless stops. After a semester of instruction, the experimental group reduced their voice onset time (VOT) and reached native speakers' range, while no difference was observed in the control group. Additionally, instruction was beneficial at each curricular level, suggesting that pronunciation instruction should be part of the L2-Spanish curricular sequence at multiple levels. Results are discussed in terms of the theoretical, methodological and pedagogical implications of these findings and special

Affiliation

Soka University of America
email: pcamus@soka.edu

emphasis is placed on the advantages of pronunciation instruction. A call is made for more teachers and practitioners to include pronunciation instruction in the L2-Spanish classroom.

KEYWORDS: PRONUNCIATION; ACCENT; PHONETICS INSTRUCTION; SPANISH

Introduction

Pronunciation instruction and pedagogy have received increased interest in the last decade, leading to research on how pronunciation instruction may be as effective as vocabulary, grammar or pragmatic instruction in second language (L2) acquisition (Lee, Jang and Plonsky 2014; Thomson and Derwing 2014). Additionally, pronunciation instruction has led to improvement of L2 pronunciation in several target languages (e.g. Derwing, Munro and Wiebe 1998; Moyer 1999; Pennington and Richards 1986; Saito 2011). However, studies of L2 pronunciation instruction have largely been dominated by explorations of English as the target language. Thomson and Derwing (2014) report that 74% of the studies they reviewed examined learners of English as a second or foreign language. Pronunciation instruction studies are less common in Spanish as a target language and even less common than other areas of acquisition. For example, a review of curricula reveals that the teaching of pronunciation has often been excluded or relegated as a peripheral component. This is likely due to a lack of research, as well as the fact that practitioners often feel they do not have the proper training to teach pronunciation (Arteaga 2000; Lord and Fionda 2014). The present study aims to contribute to this growing body of research by examining the effects of explicit phonetic instruction in Spanish, and addressing issues of methodological refinement and the optimal stage in L2 development at which pronunciation should be taught.

Second language Spanish studies have shown the potential benefits of pronunciation instruction (i.e. Castino 1996; Elliott 1995, 1997; González-Bueno 1997a; Lord 2005, 2008, 2010; Olson 2014; Schuhmann and Huffman 2015). In terms of L2-Spanish phonetic development, there has been a fair amount of consonantal research that includes the phones [p, t, k], especially in terms of segmental development (e.g. Colantoni and Steele 2008; Díaz-Campos 2004; Nagle 2014, 2018; Rose 2010; Zampini 1993, 1998). Voiceless stops [p, t, k] are phones recognised as being late acquired for L2-Spanish students with an L1-English background and have been some of the preferred target structures in pronunciation instruction studies (Elliot 1995, 1997; González-Bueno 1997a; Kissling 2013, 2014; Schuhmann and Huffman 2015). In English, these phonemes are aspirated in syllable-initial position and in stressed syllables creating the allophones

[p^h, t^h, k^h]. However, aspiration does not occur in Spanish as voice onset time (VOT) is shorter. Zampini (2014) defines VOT as ‘a temporal acoustic cue of stop consonant and refers to the time that elapses between the release of the stop and the beginning, or onset, of the vocal cord vibration’ (p. 113). Zampini indicates that English voiceless stops usually are produced with long VOT values of approximately 30 to 100 milliseconds (ms), whereas in Spanish voiceless stops are produced with short VOT values of 0 to 25 ms. Long VOT durations are classified as long-lag stops and short VOT durations are classified as short-lag stops. Lisker and Abramson (1964) showed that for Spanish native speakers, VOT values range from 0 to 15 ms for /p, t/ and from 15 to 55 ms for /k/. For this reason, English native speakers have to shorten their VOT values in Spanish. Studies generally report that pronunciation instruction of these phones is beneficial (Elliot 1997) and participants demonstrate reduction, or at least modification, of their VOT values (González-Bueno 1997a; González López and Counselman 2013; Schuhmann and Huffman 2015).

From a theoretical perspective, researchers have been concerned about how second language sound systems are acquired. Flege’s Speech Learning Model (SLM) (e.g. Flege 1995, 1999, 2002) suggests that speech sounds, regardless of whether they are from L1 or L2, exist in one phonological space. In this space, properties of L1 and/or L2 phones continue to develop and hold achievements for each category, and the correct differentiation of L1/L2 phonetic categories leads to accurate native-like production of L2 sounds. In the target structure chosen in this model, voiceless stops, the SLM assumes that Spanish learners from an L1-English background will have problems in producing accurate Spanish stops because the phonetic dissimilarity is mainly based on VOT duration differences. The model predicts a very small difference; therefore, learners will have difficulties in perceiving the differences, impeding the creation of an L2 category and thus merging the categories in their L1 and L2. Flege’s framework does not make any claim about the effects of instruction; however, scholars have related the effects of pronunciation instruction to the predictions of the SLM (González López and Counselman 2013; Kissling 2012). González López and Counselman (2013) stated that ‘if perception of the articulatory differences between L2 phones and their closest L1 counterparts is necessary for the accurate production of L2 phones, then it stands to reason that formal instruction on and practice with L1 and L2 phonetic differences may lead to improved production of L2 phones’ (p. 124).

The present study seeks to shed light on the question of what effect pronunciation instruction has on VOT adjustment in an instructed second language acquisition environment. L2-Spanish development studies have

given empirical support to the prediction that exposure to the language over time will result in accurate production (e.g. Díaz-Campos 2004; Reeder 1998). Previous research has shown promising results. For instance, González López and Counselman (2013) reported that pronunciation instruction had an effect on the production of L2-Spanish voiceless stops. By contrast, Kissling (2013, 2014) found no improvement in production, maybe due to the short nature of the treatment. However, she did find that there was an improvement in preception, which the SLM model predicts as a precursor to production. Perhaps with a longer treatment Kissling would have obtained significant results on production, as input is not as available in an instructed environment as full immersion in a Spanish-speaking country.

This paper also addresses the question of whether there is a curricular level which is best for pronunciation instruction. There are not many studies that have compared the effects of different levels of linguistic proficiency. Derwing and Munro (2005) report that L2 pronunciation instruction yielded more rapid improvement at the lower learners' level, while Lee, Jang and Plonsky's (2014) meta-analysis of several languages highlights that all levels can benefit from pronunciation instruction. In Spanish, Kissling (2012) found no difference among introductory, intermediate and advanced learners, suggesting that all levels can benefit from pronunciation instruction. Schuhmann and Huffman (2015) reported that pronunciation instruction was effective at the novice level, although they did not compare this population with intermediate or advanced students. They suggested that students start to form a category for Spanish /p/ and /t/ after only one semester of college-level study, therefore instruction should start at lower levels.

In sum, Spanish pronunciation instruction research has presented promising results; in particular, in the improvement of phonetic accuracy and achievement of native-like perception. However, methodological refinement of second language pronunciation instruction is needed before jumping to robust conclusions (Lee, Jang and Plonsky 2014; Saito 2012). For instance, of the studies in Spanish previously cited, only two researchers (see Elliot 1995, 1997; González-Bueno 1997a) included a larger pool of participants ($n > 60$), a longer treatment (twelve weeks or more), and both an experimental and control group. Other studies have included one or more of these elements but not all of them. Therefore, in the case of Spanish, there is still a need for more studies with stronger and replicable designs.

The present study

This study investigates the effectiveness of an L2 treatment that consists of one semester of classroom-based explicit pronunciation instruction in Spanish. First, it aims to contribute by addressing several methodological issues in the field of pronunciation instruction by following suggestions by Thomson and Derwing (2014:2). The design of this study includes a large sample of participants, a control group and descriptive details of participants and procedures. Second, this study compares an experimental group who received a treatment of instructed Spanish pronunciation with a control group that did not. Finally, this study seeks to evaluate the effectiveness of the treatment through an acoustic analysis by comparing changes in VOT in voiceless stops.

The results of this study should have theoretical and pedagogical implications for the role of pronunciation instruction in L2-Spanish, and the curricular level at which pronunciation instruction should be taught. The research questions that will guide this study are as follows. (1) Does pronunciation instruction in L2-Spanish improve learners' ability to produce bilabial, dental and velar voiceless stops /p, t, k/, as measured by a word-reading task? And if so, (2) does it depend on the curricular level?

Participants

The recruitment of participants ($n = 83$)¹ took place in nine L2-Spanish courses at different curricular levels at a private university in the Mid-Atlantic United States. There were three classes for each L2 curricular level at the university (first, second and third years) and each class met for 2.5 hours per week. All participants ($n = 54$ female and $n = 29$ male) completed a background questionnaire. Based on the questionnaire, the mean age of the participants was 19.24 (range 18–23). Language background, including experience in other languages, was self-reported by student participants. The students ($n = 45$) in the controlled condition had completed on average 1.24 college foreign language courses in Spanish, while students ($n = 38$) in the experimental condition had completed 1.84 courses. Native speakers (NSs) of Spanish ($n = 6$) were recruited to provide baseline data and all of them were Spanish-English bilinguals. Each NS Spanish participant attended one data collection session in which they completed the experimental task and a background questionnaire.

Design

This study has a pre-test–intervention–post-test design. Three complete courses were used as the experimental pronunciation instruction group (EXP), and the remaining courses were used as the control group (CON). As in other classroom studies (e.g. Derwing, Munro and Wiebe 1998; Lord 2008; Saito and Lyster 2011b), this is a quasi-experimental study where one course at each curricular level (first, second and third years) was used as the experimental condition.² The courses belonged to the second, fourth and sixth semester in the curricular sequence of the Spanish courses at this institution. The nine courses were taught by seven instructors (two of whom taught multiple sections). All of the instructors were graduate students of Spanish linguistics born in the United States, Spain, Colombia and Venezuela. In this study, being a native speaker was not a requisite to teach pronunciation; four of the instructors were Spanish NSs and three were L2 speakers of Spanish. As Derwing and Munro (2015) stated, ‘teachers who learned the language are generally excellent models’ and the practice of only using native speakers could ‘reinforce the notion that there is something inherently wrong with having an L2 accent’ (p. 81).

The basic design and implementation of this study was as follows.

- Week 1:** Background questionnaire
Pre-test: word-reading task
- Weeks 2–14:** **EXP treatment:** 12 modules (one per week)
- Week 15:** **Post-test:** word-reading task
Post-completion questionnaire

The design was spread out during a fifteen-week semester with the treatment provided to the EXP being twelve weeks.

Experimental group (EXP)

The syllabus for each curricular level of the EXP embedded pronunciation treatment information via twelve modules: one per week, during 15–20 minutes of class time per week during one semester (twelve weeks). Before the introduction of the first module, participants completed a background questionnaire and a pre-test. No participant reported having been taught pronunciation in the past. The three instructors teaching in the experimental condition received preparation on how to teach the modules. As part of the introduction to the modules in the classroom, the principal investigator attended and co-taught the first two sessions in which the modules were scheduled. Once the modules were completed, participants took a post-test and completed an exit questionnaire.

The control group (CON)

The CON attended the same curricular levels as the EXP. The syllabi were the same per curricular level for the EXP and CON with the exception that the CON was not provided with the treatment information. The vocabulary introduced in the modules for the experimental treatment was already part of the course curriculum (see Pronunciation treatment, Section C, below). For that reason, regardless of the experimental condition, all learners were expected to read, hear and practise the assigned vocabulary and use it in communicative situations for activities and tasks during classroom time and homework assignments. While students in the EXP completed the treatment, students in the CON practised the same vocabulary without specific instruction to them or their instructors. Apart from not being explicitly exposed to the target phones in Sections A and B, learners in the CON were never told which phones were the linguistic target of the study, which of course constitutes an important difference in the conditions.

Pronunciation treatment

The materials used in the study were designed to include methodological approaches to classroom-based pronunciation instruction, such as the Presentation, Practice, Production model (Celce-Murcia, Brinton and Goodwin 2010), Form-Focused Instruction (Saito 2007, 2013), awareness-raising practices (Couper 2011; Nibert 2014) and explicit phonetic information (Saito 2013). The materials created consisted of twelve modules (see Table 1) deliberately designed for this study in order to thematically align the pronunciation instruction to the existing class material and to keep linguistic terminology to a minimum since it was important to devote most of the allotted time to practice. The content of all modules consisted of three natural classes commonly found to be problematic for L1-English speakers learning Spanish: voiceless stops /p, t, k/ (the target structure), voiced approximants [β, ð, ɣ] and vowels /a, e, i, o, u/. During the first nine modules, each module session introduced a phone or phones from the identified natural classes. With the exception of modules 1 and 8, all modules also incorporated a review of phone(s) from previous modules.

Even though the teaching materials for this study included three of the natural classes (voiceless stops, approximants and vowels), only voiceless stops were selected for the acoustic analysis covered in this article. These target forms were introduced or reviewed during six of the twelve weeks. Ultimately, each module was divided into three sections (A, B and C). Each section was designed with specific goals in mind, and it was developed to address specific theoretical and pedagogical issues.

Table 1: Instructional modules and their contents.

Module 1	<i>Main focus</i>	Voiceless bilabial plosive /p/	Module 7	<i>Main focus</i>	Voiced velar approximant [ɣ]
	<i>Review</i>			<i>Review</i>	[ð] - [β]
Module 2	<i>Main focus</i>	Voiced dental approximant [ð]	Module 8	<i>Main focus</i>	Closed and open vowels /a/ /i/ /u/
	<i>Review</i>	/p/			
Module 3	<i>Main focus</i>	Mid-front vowel /e/	Module 9	<i>Main focus</i>	Voiceless velar plosive /k/
	<i>Review</i>	[ð]		<i>Review</i>	/p/- /t/
Module 4	<i>Main focus</i>	Voiceless dental plosive /t/	Module 10	<i>Review</i>	Voiced approximants [β] - [ð] - [ɣ]
	<i>Review</i>	/e/			
Module 5	<i>Main focus</i>	Mid-back vowel /o/	Module 11	<i>Main focus</i>	Vowels: avoiding centralisation, diphthongisation, laxation and nasalisation
	<i>Review</i>	/e/ -/t/		<i>Review</i>	/a/-/e/- /i/-/o/ /u/
Module 6	<i>Main focus</i>	Voiced bilabial approximant [β]	Module 12	<i>Review</i>	Voiceless plosives /p/- /t/ - /k/
	<i>Review</i>	[ð] - /o/			

Section A was designed to explicitly introduce the target structures. It was composed of two or more columns in which phonetic and allophonic differences between learners' L1 and L2 were juxtaposed in order to create awareness of the different pronunciation in each language. This section aimed to help students build familiarity with unknown phonetic phenomena that occur in L2-Spanish while comparing them with the L1-English equivalent. In the case of voiceless stops, the emphasis was put on the lack of aspiration in all contexts. In most sessions, the instructor went over the materials, pronounced each example, shared his or her own examples and answered any questions. This awareness-raising training (linked to the explicit instruction of these phones) has been ubiquitous in the literature of pronunciation instruction, and it has often reported significant results. For instance, Thomson and Derwing (2014) stated that, 'explicit instruction of phonological forms can have a significant impact, likely because it orients a learner's attention to phonetic information, which promotes learning in a way that naturalistic input does not' (p. 14). Table 2 shows the number of tokens containing the target phones for Sections A and B and Section C of the modules.

Table 2: Tokens of target phones in instructional modules.

Tokens per section				
Sections A and B				
		/p/	/t/	/k/
		20	25	20
Section C (customised per level)				
		/p/	/t/	/k/
1 st year	48	21	10	
2 nd year	34	25	15	
3 rd year	29	22	13	
Total number of tokens				
		/p/	/t/	/k/
1 st year	68	46	30	
2 nd year	54	50	35	
3 rd year	49	47	33	
Average		57	48	33

Section B contained a list of nine pairs of English-Spanish cognates (e.g. president – *presidente*). This section was devised for students to first listen to the pronunciation of the presented words in English and Spanish, and then second, to repeat each pair. Each instructor received an audio-file for each module with the nine pairs of cognates. Instructors asked students to pay attention to how each word was pronounced in each language. After listening, participants were then requested to pronounce each pair as close to the model as possible. Students gathered in groups of two or three to encourage feedback between each other. Cognates were purposely selected to allow students to better perceive the difference in both languages and with the idea that the familiarity of the words could enhance their orientation to the phonetic information. The choice to include perception-production practice is based on theoretical accounts of L2 phonetic development, as Flege's SLM (1995) theorises that accurate L2 perception will eventually develop into accurate L2 production.

Section C was developed to connect the treatment with the content of the class. This section consisted of twelve words or phrases that featured the weekly target phone. These items were also part of the vocabulary that each class was to learn throughout that week, as included in each syllabus. Evidently, the vocabulary of *Section C* in each module was different according

to the curricular level. However, the number and type of target items were equivalent. In the first nine modules, instructors instructed learners to pay attention to previously covered target structures. This section began with traditional drill practice, and ended with students completing an activity from their textbook as scheduled in the syllabus for that week. This section ended with students using the vocabulary practised in order to successfully complete a communicative task assigned from their textbooks. Therefore, students could complete a communicative task in which the target structure was present and had been previously drilled, in the hope that students would have in mind the accurate production of the phones.

Analysis

The pre- and post-test used the same twelve-item word list for participants to read aloud in a word-reading task. The list incorporated four tokens for each target phone in initial position. It also included nine English-Spanish cognates to familiarise students with word meaning. In addition, a low-frequency word per target phone was included. To control for familiarity, participants were asked to translate familiar and unfamiliar words.³ All target items were extracted from word-initial consonant-vowel syllables. Some of the syllables were stressed and some were unstressed. This configuration was chosen because English speakers will aspirate in word-initial syllables (Hualde 2005). Additionally, flapping⁴ does not affect word-initial /t/ in English as it does medial /t/. The pre-test and post-test were completed in a quiet room in a one-on-one meeting with the researcher. Spectrograms and waveforms were used to calculate voice onset time of /p, t, k/ using the software Praat (Boersma and Weenink 2016). Repeated measures analysis of variance (RMANOVAs) were used to compare the effects and interactions of test time, instructional condition and curricular level. In total, three RMANOVAs were used to analyse VOT on each phone. The within-groups factor was time of test (pre-test and post-test) and the between-groups factors were instructional condition (experimental and control) and curricular level (first, second and third year). Histograms and Q-plots were inspected to check for normality of distribution on the data and the assumption was met. In order to examine if learners in the control and experimental condition differ in their VOT values in their pre-tests, independent samples *t*-tests were employed.

Results

Results indicated no significant difference in the pre-test session in any of the phones between the EXP and CON. Moreover, native speakers'

range and average VOTs were extracted. Based on this range, the lowest and highest average of VOTs were computed and used for the comparison to see whether L2 participants approached this range. Based on this information, for /p/ the range with which to compare learners was set at 9–24 ms; for /t/ the range was set at 12–24 ms; and for /k/ the range was set at 21–41 ms.

Research question 1

The average VOTs produced for the target phones [p, t, k] by speakers at all levels combined are presented in Table 3. Descriptively, the EXP improved and approached very close to native speaker range in all phones.

Table 4 shows that on the RMANOVA for voiceless bilabial stops there was a main effect of test time. In addition, for voiceless bilabial stop /p/, there was an interaction of time and condition $F(1, 77) = 55.83, p < 0.001$ with a large effect size ($n_p^2 = 0.41$). For voiceless dental stop /t/, there was also an interaction of time and condition $F(1, 77) = 55.94, p < 0.001$ with a large effect size ($n_p^2 = 0.42$). Similarly, on the RMANOVA for voiceless velar stop /k/, there was also an interaction of time and condition $F(1, 77) = 24.23, p < 0.001$ with a large effect size ($n_p^2 = 0.23$). In all cases, there was a high statistical power (1.00). These results indicate that the post-test VOT values in the experimental condition for all voiceless plosives declined significantly from their pre-test values. By contrast, VOT scores in the control condition did not seem to experience any reduction. Clearly, there is a significant difference in effectiveness depending on the condition; based on the means (see Table 4), those in the experimental condition reduced their VOT values while those in the control condition did not. Therefore, those

Table 3: Average voice onset time in production of stop consonants (milliseconds).

		EXP (<i>n</i> = 38)	CON (<i>n</i> = 45)	NS (<i>n</i> = 6)
		<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
/p/	Pre-test	42 (18)	44 (17)	16 (7)
	Post-test	21 (16)	44 (18)	
/t/	Pre-test	48 (17)	51 (20)	16 (6)
	Post-test	26 (14)	50 (29)	
/k/	Pre-test	54 (17)	57 (17)	29 (9)
	Post-test	40 (15)	55 (18)	

Table 4: RMANOVA of the word-reading task, separated by phonemes.

/p/		
Condition	$F(1, 77) = 12.51$	$p < 0.001, \eta_p^2 = 0.14$
Time	$F(1, 77) = 59.56$	$p < 0.001, \eta_p^2 = 0.42$
Time \times Condition	$F(1, 77) = 55.83$	$p < 0.001, \eta_p^2 = 0.41$
Time \times Condition \times Level	$F(2, 77) = 0.05$	$p = 0.94$
/t/		
Condition	$F(1, 77) = 12.63$	$p < 0.001, \eta_p^2 = 0.14$
Time	$F(1, 77) = 76.02$	$p < 0.001, \eta_p^2 = 0.49$
Time \times Condition	$F(1, 77) = 55.94$	$p < 0.001, \eta_p^2 = 0.42$
Time \times Condition \times Level	$F(2, 77) = 1.39$	$p = 0.25$
/k/		
Condition	$F(1, 77) = 6.76$	$p < 0.001, \eta_p^2 = 0.08$
Time	$F(1, 77) = 31.88$	$p < 0.001, \eta_p^2 = 0.29$
Time \times Condition	$F(1, 77) = 24.23$	$p < 0.001, \eta_p^2 = 0.23$
Time \times Condition \times Level	$F(2, 77) = 1.06$	$p = 0.35$

in the experimental condition performed significantly better than those in the control condition.

The word-reading task scores for /p, t, k/ are plotted in Figures 1, 2 and 3, respectively. Learners in the experimental condition reduced their VOT

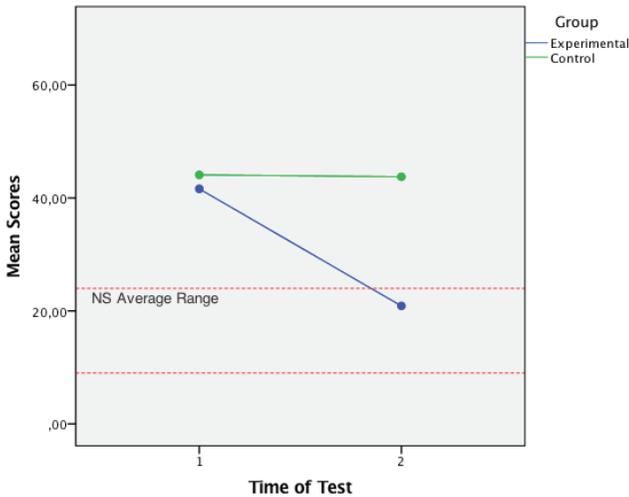


Figure 1: Word-reading task for /p/.

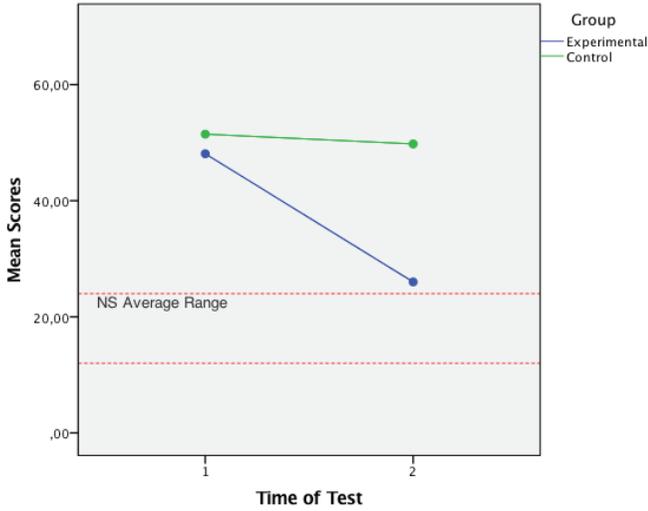


Figure 2: Word-reading task for /t/.

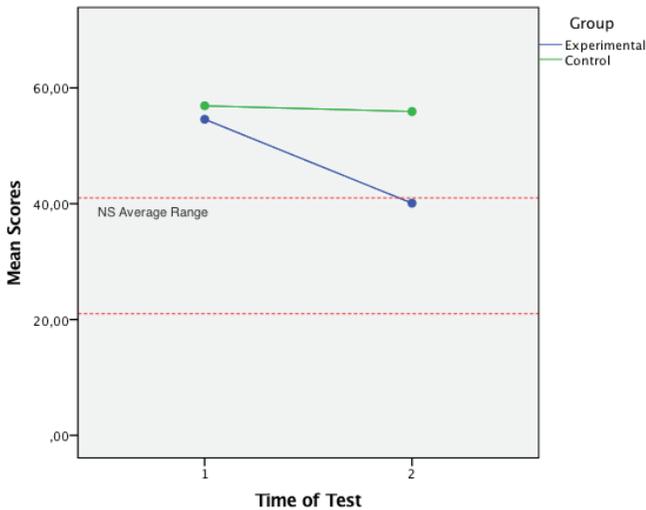


Figure 3: Word-reading task for /k/.

average score considerably, reaching the average native speakers' range. After the treatment, the average VOT of the experimental condition ($M = 20.86$ for /p/, $M = 26.08$ for /t/, and $M = 40.26$ for /k/) came considerably closer to the average score of the native speaker baseline, while the control condition showed virtually no decrease in the VOT values from the pre- to the post-test.

In brief, these results indicated that for all phones, there is an effect of test time, which clearly varies between EXP and CON instruction. These data strongly suggest that Spanish pronunciation instruction improves learners' ability to produce native-like voiceless stops, as measured by a word-reading task.

Research question 2

The average VOTs produced for the target phones [p, t, k] by speakers separated by curricular level are presented in Table 5. This table shows improvement in all experimental conditions, which could suggest that instruction is beneficial at any level. However, Table 4 indicates that the interaction of time and level, and the interaction of time, condition and level were not significant (all $F \leq 0.37$, all $p \geq 0.25$). This could suggest that curricular level did not have a significant effect, and that the treatment was equally effective in participants from the first, second and third year in the experimental condition. Nevertheless, it is also important to emphasise that the number of participants per group is reduced when separated by curricular level. Therefore, it is unclear if this lack of main effects is due to the lack of observed power to detect a true effect in the interaction of time, condition and level as seen in Table 4.

Even though the RMANOVA showed no statistical difference between levels, Table 5 shows that there is a descriptive trend which suggests that, in the experimental condition, VOT reaches lower values as curricular level increases. In the case of /p/, VOT scores in the post-test from third year participants ($M = 18$) are lower than those of second year participants ($M = 20$). And second year participants' scores are lower than first year participants' scores ($M = 25$). In the case of /t/, VOT scores in the post-test from third year participants ($M = 22$) are only slightly lower than second year participants ($M = 23$), but second and third year participants' scores are considerably lower than first year participants' scores ($M = 33$). Finally, for /k/, pronunciation instruction seems to have a stronger impact on the second year students' post-test ($M = 36$ ms), followed by third year scores ($M = 37$ ms), and it is less effective in first year participant scores ($M = 47$ ms). In any case, all curricular levels improved more in the experimental than in the control condition.

Overall, the RMANOVAS completed for /p, t, k/ indicate that there is an effect of time, which varies by instructional condition, but it does not vary by curricular level. The data suggest that for research question 2 curricular level is not a factor, but there is a descriptive trend that shows that instruction becomes slightly more effective as the curricular level increases.

Table 5: Average voice onset time in production of stop consonants by level (milliseconds).

Curricular level:		First year		Second year		Third year	
		EXP (n = 13)	CON (n = 13)	EXP (n = 11)	CON (n = 17)	EXP (n = 14)	CON (n = 15)
		<i>M (SD)</i>					
/p/	Pre	48 (21)	46 (19)	40 (16)	44 (17)	37 (16)	42 (17)
	Post	25 (21)	45 (14)	20 (15)	45 (18)	18 (9)	41 (21)
/t/	Pre	57 (15)	53 (20)	45 (18)	52 (20)	42 (15)	49 (22)
	Post	33 (19)	50 (19)	23 (8)	56 (22)	22 (10)	44 (20)
/k/	Pre	59 (14)	61 (19)	55 (17)	59 (15)	50 (20)	51 (17)
	Post	47 (16)	60 (19)	36 (12)	58 (21)	37 (14)	49 (16)

Discussion

The research questions asked (1) whether pronunciation instruction in L2-Spanish would improve learners' ability to produce voiceless stops /p, t, k/, and, if so, (2) to what extent the improvement depended on the curricular level. The data suggest that learners in the experimental conditions achieved more native-like values of the voiceless stops for L1-English learners of Spanish. Therefore, pronunciation instruction seems to provide an advantage in the word-reading task, as compared to the control group. These findings also align with other studies (e.g. González López and Counselman 2013), which suggested that phonetic training at introductory levels of language learning might facilitate early category formation, which in turn will lead to improved pronunciation over time.

The data did not suggest that the outcomes from pronunciation instruction were influenced by curricular level. Participants in the experimental condition reduced their VOT in the first, second and third year groups. Nevertheless, all phones seem to have a descriptive trend that show that the effectiveness of pronunciation becomes higher as the curricular level increases. This descriptive trend might have not been detected statistically due to the lack of observed power in the interaction of time, condition and level (since the number of participants per group was reduced when divided into six groups instead of two). As in Kissling (2013), the data suggest that instruction can be beneficial at all levels, and can be taught from introductory courses onwards. It is worth mentioning that improvement is not also contingent on instruction. Table 5 shows that VOT scores in the pre-test are highest in the first year, decline in the second year and are lowest in the third curricular year. As studies in L2 development illustrate (Nagle 2014),

input alone results in improvement of VOT; however, as the results of the post-test suggest, pronunciation instruction will likely accelerate and facilitate L2 native-like production (e.g. Derwing, Munro and Wiebe 1998; González López and Counselman 2013; Lord 2005).

From a theoretical perspective, VOT in voiceless stops was chosen because Flege's SLM predicted that the contrasts between English and Spanish would cause perceptual and production difficulties. Moreover, it predicted that these categories could not develop due to the fact that the Spanish VOT is heard to be very similar to L1 sounds, as short and long lag stops are in complementary distribution in English. As predicted, the control group did not improve their VOT as quickly and accurately as the EXP. By contrast, the EXP approached and in some cases reached native speaker VOT range. Therefore, as Saito (2013) predicts, results suggest that drawing attention to the target forms in terms of perception will eventually have an effect on participants' production of L2 phones. Consequently, it could be argued that pronunciation instruction is effective in the production of the type of segments that the SLM predicts it would be hard to acquire, especially with the limited input of an instructional setting. Results of this study also align with theories that put an emphasis on the importance of noticing, such as Schmidt's (1990) Noticing Hypothesis. The modules pushed students to notice the relevant input, which in turn might have helped them to process the target phones, hence facilitating category formation.

Although this study did not account for perception development, it held the view of the SLM that perception precedes production, as it was reflected in the design of the materials. The perception exercises contained in the modules might have helped to discriminate between and perceive the different VOTs in English and Spanish and accurately perceive the long/short lag contrast, which in time, as the SLM predicts, results in accurate production. Kissling (2013) found that only two weeks of phonetic training is sufficient to have an impact on L2 perception.

From a pedagogical point of view, this study addresses several methodological issues that have been identified by scholars in previous research. The design of this study followed Thomson and Derwing's (2014) prescription that studies should provide (1) enough details of participants and procedures, (2) a large sample and (3) a control group. Along with other scholars, they have also prescribed that pronunciation studies and materials should help learners to become more understandable (Levis 2005; Munro and Derwing 2015). However, the pedagogical value of this study lies in the finding that the instructional modules do not substantially disrupt the communicative L2 classroom and their implementation,

even only from a foreign accent reduction point of view, can have many benefits. For instance, pronunciation instruction could have an impact on L2 motivation, a striking avenue of future research. In the exit questionnaire, many students stated that learning about the segmental differences between Spanish and English helped them feel more confident in terms of their L2 oral usage. It is also worth mentioning that even though the sections of these modules were done in class, language practitioners could assign Section A and B as homework, and only work on Section C in class, which has more communicative components. Accordingly, these should be compelling arguments for practitioners to include these segments in the curricula, even if the benefits might only be connected to socio-pragmatic reasons of approaching native-like patterns.

Individual results shed light on a central issue. Despite the fact that most students in the experimental condition seemed to reach or approach native speaker patterns of VOTs after instruction, there was a great deal of variation as well. Tailoring the teaching of pronunciation to individual needs has already been highlighted in previous research. Thomson and Derwing (2014) indicated that ‘teachers should individualize instruction, assigning work to students who need it, while others focus on different tasks’ (p. 14). Students’ self-reports also provided evidence of these individual differences; when students in the experimental condition were asked how helpful the modules were in the exit questionnaire, on a scale of 1 to 10, fifteen students scored the modules between 8 and 10 points, sixteen between 5 and 7 points, and five students between 2 and 4 points. Therefore, the instruction had a different impact depending on each student’s struggle with pronunciation, highlighting how important it is to attend to individuals’ needs.

Conclusion

This study aimed to examine the effects of the teaching of L2-Spanish pronunciation on voiceless stops. These segments were chosen because they were found to be problematic for L1-English students of Spanish and have been explored in previous research. Undoubtedly, future research needs to explore the effects of instruction on the acoustic properties of other phones that might be problematic for L2 learners of Spanish in more depth. Other phonetic phenomena problematic for L1-English learners of languages that have not been prominent in the literature should be addressed, such as non-velarisation of laterals in coda position (Hualde 2005) or syllabification (Arteaga 2000). In addition, apart from Saalfeld (2012), few studies in Spanish have studied the effects of pronunciation instruction beyond the word level. Future research should start exploring the effects of instruction

of prosodic aspects such as phonotactics, stress (word and sentence level) and intonation in explicit instruction.

Even though type of instruction was not a variable addressed in the study, it seems that a combination of explicit phonetic information (Section A), traditional drilling activities (Section B) and a Focus on Form Instruction component (Section C) had an impact on the development of L2 pronunciation. Further research will have to parse these variables and assess which one has a stronger effect, or whether a combination of these three types of instruction is more effective than separated. In this line, Saito (2013) found that a combination of explicit phonetic instruction and Focus on Form Instruction had a bigger impact than a group that received explicit phonetic instruction alone.

Another limitation is in the method of data elicitation. A controlled task such as the word-reading task has both advantages and limitations. Since these tasks required learners to read isolated words and phrases from a printed list, it does not reflect spontaneous speech and can cause exaggerated learning effects from instruction. Future research should also focus on the effects of different types of tasks, with controlled and spontaneous speech.

Finally, a few other areas need to be addressed as it is also important that future research in L2-Spanish pronunciation instruction goes beyond the construct of foreign accent as the sole target structure. As pointed out by scholars, pronunciation instruction should help learners to become more comprehensible rather than just to focus on reducing the degree of foreign accent (Saito 2012; Thomson and Derwing 2014). In terms of methodological design, longevity effects by means of a delayed post-test should be included in future research. Also, there is much needed research on the intersection of pronunciation instruction and individual differences. As previously commented, we need to tailor instruction to the necessities of each particular student as some of them are prone to struggle with pronunciation more than others. Moreover, we need to address individual factors such as motivation, language awareness, language (and phonological) aptitude, working memory or phonological short-term memory.

This strand of research should persuade language teachers and programme coordinators of the advantages of teaching pronunciation in the L2-Spanish classroom. With time, pronunciation instruction could be as common as grammar or vocabulary instruction in today's L2-Spanish classroom. In summary, the main goal of the present study was to contribute to the existing research by evaluating the putative effects of pronunciation instruction in the L2 classroom. Results align with this claim, as the data suggest that pronunciation instruction has an effect on achieving

L2 accuracy in the selected target phones. It is hoped that the results of this study will encourage further research and the implementation of L2-Spanish pronunciation instruction in the classroom.

About the author

Pablo Camus is an Assistant Professor of Spanish at Soka University of America. He has published journal articles on second language acquisition, particularly on phonetics, morphology, and classroom methodologies. He has taught undergraduate courses on SLA, on Spanish culture and all levels of Spanish.

Acknowledgements

The research reported here was part of my PhD thesis at Georgetown University. I am thankful to my supervisor Dr Alfonso Molares-Front for his guidance and support. Also I want to extend my gratitude to the *Language Learning Journal* whose Doctoral Dissertation Research Grant helped to financially support this research. Finally, I want to thank the anonymous ISLA reviewers for their comments that helped shape this article in its final version.

Notes

- 1 Initially, a total of 101 participants of L2-Spanish learners were recruited, but sixteen did not follow through and missed the post-test or withdrew from the class. Another two were eliminated from the analysis for not meeting the background criteria such as having spent more than a month in a Spanish-speaking country, not being 18–25 years of age, or having taken a phonetics and/or phonology course.
- 2 Originally, one course in each level (first year, second year and third year) was also to be used as the control condition. However, due to the fact that not all learners in the control condition were available to participate in the study, participants from another course for each curricular level were also recruited.
- 3 Learners' familiarity with the word-reading task items was assessed by calculating the accuracy in a random sampling of 20% of the data. On the pre-test, learners translated the English-Spanish cognates with 94% accuracy compared with 0% accuracy for low-frequency words.
- 4 Flapping is a phonological process found in American English in which consonants /t/ and /d/ may be pronounced as an alveolar flap [ɾ], particularly between vowels.

References

- Arteaga, D. L. (2000) Articulatory phonetics in the first-year Spanish classroom. *Modern Language Journal* 84(3): 339–54. <https://doi.org/10.1111/0026-7902.00073>
- Ausín, A. and Sutton, M. (2010) An L2 pronunciation judgment task. In *Selected Proceedings of the 12th Hispanic Linguistics Symposium* 234–45. Somerville, MA: Cascadia Proceedings Project.

- Boersma, P. and Weenink, D. (2016) Praat: doing phonetics by computer [Computer program]. Version 6.0.19. Retrieved 13 June 2016 from <http://www.praat.org>.
- Castino, J. M. (1992) *Markedness as a Predictor of Difficulty in the Second Language Acquisition of Spanish Phonology* (unpublished doctoral dissertation). Pittsburgh, PA: University of Pittsburgh.
- Castino, J. (1996) Impact of a phonetics course on FL learners' acquisition of Spanish phonology. *Selecta: Journal of the Pacific Northwest Council on Foreign Languages* 17: 55–8.
- Celce-Murcia, M., Brinton, D. M. and Goodwin, J. M. (2010) *Teaching Pronunciation Hardback. A Course Book and Reference Guide*. Cambridge: Cambridge University Press.
- Colantoni, L. and Steele, J. (2008) Integrating articulatory constraints into models of second language phonological acquisition. *Applied Psycholinguistics* 29(3): 489–534. <https://doi.org/10.1017/S0142716408080223>
- Couper, G. (2011) What makes pronunciation teaching work? Testing for the effect of two variables: socially constructed metalanguage and critical listening. *Language Awareness* 20(3): 159–82. <https://doi.org/10.1080/09658416.2011.570347>
- DeKeyser, R. (2003) Implicit and explicit learning. In C. Doughty and M. Long (eds) *Handbook of Second Language Acquisition* 313–48. Oxford: Blackwell.
- DeKeyser, R. (2007) Skill acquisition theory. In J. Williams and B. VanPatten (eds) *Theories in Second Language Acquisition: An introduction* 97–113. Mahwah, NJ: Erlbaum. <https://doi.org/10.1002/9780470756492.ch11>
- Derwing, T. M. and Munro, M. J. (1997) Accent, intelligibility, and comprehensibility. *Studies in Second Language Acquisition* 19(1): 1–16. <https://doi.org/10.1017/S0272263197001010>
- Derwing, T. M. and Munro, M. J. (2005) Second language accent and pronunciation teaching: a research-based approach. *TESOL Quarterly* 39(3): 379–97. <https://doi.org/10.2307/3588486>
- Derwing, T. M. and Munro, M. J. (2015) *Pronunciation Fundamentals: Evidence-Based Perspectives for L2 Teaching and Research, Volume 42*. Philadelphia, PA: John Benjamins Publishing Company. <https://doi.org/10.1075/llt.42>
- Derwing, T. M., Munro, M. J. and Wiebe, G. (1998) Evidence in favor of a broad framework for pronunciation instruction. *Language Learning* 48(3): 393–410. <https://doi.org/10.1111/0023-8333.00047>
- Díaz-Campos, M. (2004) Context of learning in the acquisition of Spanish second language phonology. *Studies in Second Language Acquisition* 26(2): 249–73. <https://doi.org/10.1017/S0272263104262052>
- Elliott, A. (1995) Foreign language phonology: field independence, attitude, and the success of formal instruction in Spanish pronunciation. *Modern Language Journal* 79(4): 530–42. <https://doi.org/10.1111/j.1540-4781.1995.tb05456.x>
- Elliott, A. (1997) On the teaching and acquisition of pronunciation within a communicative approach. *Hispania* 80(1): 95–108. <https://doi.org/10.2307/345983>
- Flege, J. E. (1988) Factors affecting degree of perceived foreign accent in English sentences. *Journal of the Acoustical Society of America* 84(1): 70–9. <https://doi.org/10.1121/1.396876>
- Flege, J. E. (1995) Second-language speech learning: theory, findings, and problems. In W. Strange (ed.) *Speech Perception and Linguistic Experience: Issues in Cross-Language Research* 229–73. Timonium, MD: York Press.

- Flege, J. E. (1999) Age of learning and second-language speech. In D. Birdsong (ed.) *Second Language Acquisition and the Critical Period Hypothesis* 101–32. Hillsdale, NJ: Lawrence Erlbaum.
- Flege, J. E. (2002). Interactions between the native and second-language phonetic systems. In P. Burmeister, T. Piske and A. Rohde (eds) *An Integrated View of Language Development: Papers in Honor of Henning Wode* pp. 217–244. Trier, Germany: Wissenschaftlicher Verlag.
- Flege, J. E., Munro, M. J. and MacKay, I. R. (1995) Factors affecting strength of perceived foreign accent in a second language. *Journal of the Acoustical Society of America* 97(5): 3125–34. <https://doi.org/10.1121/1.413041>
- González-Bueno, M. (1997a) Effects of formal instruction on the improvement in the pronunciation of Spanish stops by second language learners: changes in voice onset time in initial stops /p, t, k/ and /b, d, g/. PhD thesis, Pennsylvania State University, Pennsylvania.
- González-Bueno, M. (1997b) The effects of formal instruction on the acquisition of Spanish stop consonants. *Contemporary Perspectives on the Acquisition of Spanish 2*: 57–75.
- González López, V. and Counselman, D. (2013) L2 acquisition and category formation of Spanish voiceless stops by monolingual English novice learners. In J. Cabrelli Amaro, G. Lord, A. de Prada Perez, J. E. Aaron (eds) *Selected Proceedings of the 16th Hispanic Linguistics Symposium* 118–27. Somerville, MA: Cascadilla Proceedings Project.
- Hualde, J. I. (2005) *The Sounds of Spanish*. Cambridge: Cambridge University Press.
- Kissling, E. M. (2012) The effect of phonetics instruction on adult learners' perception and production of L2 sounds. Unpublished doctoral dissertation, Georgetown University, Washington, DC.
- Kissling, E. M. (2013) Teaching pronunciation: is explicit phonetics instruction beneficial for FL learners? *Modern Language Journal* 97(3): 720–44. <https://doi.org/10.1111/j.1540-4781.2013.12029.x>
- Kissling, E. M. (2014) Phonetics instruction improves learners' perception of L2 sounds. *Language Teaching Research* 19(3): 254–75. <https://doi.org/10.1177/1362168814541735>
- Lee, J., Jang, J. and Plonsky, L. (2014) The effectiveness of second language pronunciation instruction: a meta-analysis. *Applied Linguistics* 36(3): 345–66. <https://doi.org/10.1093/applin/amu040>
- Levis, J. M. (2005) Changing contexts and shifting paradigms in pronunciation teaching. *TESOL Quarterly* 39(3): 369–77. <https://doi.org/10.2307/3588485>
- Lisker, L. and Abramson, A. S. (1964) A cross-language study of voicing in initial stops: acoustical measurements. *Word* 20(3): 384–422. <https://doi.org/10.1080/00437956.1964.11659830>
- Lord, G. (2005) (How) can we teach foreign language pronunciation? On the effects of a Spanish phonetics course. *Hispania* 88(3): 557–67. <https://doi.org/10.2307/20063159>
- Lord, G. (2008) Second language acquisition and first language phonological modification. In J. Bruhn de Garavito and E. Valenzuela (eds) *Selected Proceedings of the 10th Hispanic Linguistics Symposium* 184–93. Somerville, MA: Cascadilla Proceedings Project.
- Lord, G. (2010) The combined effects of immersion and instruction on second language pronunciation. *Foreign Language Annals* 43: 488–503. <https://doi.org/10.1111/j.1540-4781.2010.01202.x>

- [org/10.1111/j.1944-9720.2010.01094.x](https://doi.org/10.1111/j.1944-9720.2010.01094.x)
- Lord, G. and Fionda, M. I. (2014) Teaching pronunciation in second language Spanish. In K. L. Geeslin (ed.) *The Handbook of Spanish Second Language Acquisition* 514–29. Chichester, UK: Wiley-Blackwell.
- Lyster, R. (2007) *Learning and Teaching Languages through Content: A Counterbalanced Approach*. Amsterdam: John Benjamins. <https://doi.org/10.1075/llt.18>
- Moyer, A. (1999) Ultimate attainment in L2 phonology. *Studies in Second Language Acquisition* 21(1): 81–108. <https://doi.org/10.1017/S0272263199001035>
- Munro, M. J. and Derwing, T. M. (1995a) Processing time, accent, and comprehensibility in the perception of native and foreign-accented speech. *Language and Speech* 38(3): 289–306. <https://doi.org/10.1177/002383099503800305>
- Munro, M. J. and Derwing, T. M. (1995b) Foreign accent, intelligibility and comprehensibility in the speech of second language learners. *Language Learning* 45(1): 73–97. <https://doi.org/10.1111/j.1467-1770.1995.tb00963.x>
- Munro, M. J. and Derwing, T. M. (2015) A prospectus for pronunciation research in the 21st century: a point of view. *Journal of Second Language Pronunciation* 1(1): 11–42. <https://doi.org/10.1075/jslp.1.1.01mun>
- Nagle, C. L. (2014) A longitudinal study on the role of lexical stress and motivation in the perception and production of L2 Spanish stop consonants. Unpublished doctoral dissertation, Georgetown University, Washington, DC
- Nagle, C. L. (2018) Examining the temporal structure of the perception–production link in second language acquisition: a longitudinal study. *Language Learning* 68. <https://doi.org/10.1111/lang.12275>
- Nibert, H. (2014) Disassociating English [a, ɔ, ʌ, ə] from Spanish ‘o’. Presented at IGNITE CASPSLaP 2014, Georgetown University, Washington, DC.
- Olson, D. J. (2014) Benefits of visual feedback on segmental production in the L2 classroom. *Language Learning and Technology* 18(3): 173–92.
- Ortega, L. (2013) SLA for the 21st century: disciplinary progress, transdisciplinary relevance, and the bi/multilingual turn. *Language Learning* 63(s1): 1–24. <https://doi.org/10.1111/j.1467-9922.2012.00735.x>
- Pennington, M. C. and Richards, J. C. (1986) Pronunciation revisited. *TESOL Quarterly* 20(2): 207–25. <https://doi.org/10.2307/3586541>
- Reeder, J. T. (1998) English speakers’ acquisition of voiceless stops and trills in L2 Spanish. *Texas Papers in Foreign Language Education* 3(3): 101–18.
- Rose, M. (2010) Intervocalic tap and trill production in the acquisition of Spanish as a second language. *Studies in Hispanic and Lusophone Linguistics* 3(2): 379–419. <https://doi.org/10.1515/shll-2010-1080>
- Saalfeld, A. K. (2012) Teaching L2 Spanish stress. *Foreign Language Annals* 45(2): 283–303. <https://doi.org/10.1111/j.1944-9720.2012.01191.x>
- Saito, K. (2007) The influence of explicit phonetic instruction on pronunciation in EFL settings: the case of English vowels and Japanese learners of English. *Linguistics Journal* 3(3): 16–40.
- Saito, K. (2011) Examining the role of explicit phonetic instruction in native-like and comprehensible pronunciation development: an instructed SLA approach to phonology. *Language Awareness* 20(1): 45–59. <https://doi.org/10.1080/09658416.2010.540326>
- Saito, K. (2012) Effects of instruction on L2 pronunciation development: a synthesis of 15 quasi-experimental intervention studies. *TESOL Quarterly* 46(4): 842–54.

- <https://doi.org/10.1002/tesq.67>
- Saito, K. (2013) Reexamining effects of form-focused instruction on L2 pronunciation development. *Studies in Second Language Acquisition* 35(1): 1–29. <https://doi.org/10.1017/S0272263112000666>
- Saito, K. and Lyster, R. (2011a) Effects of form-focused instruction and corrective feedback on L2 pronunciation development: the case of English /ð/ by Japanese learners of English. *Language Learning* 62(2), 595–633. <https://doi.org/10.1111/j.1467-9922.2011.00639.x>
- Saito, K. and Lyster, R. (2011b) Effects of form focused instruction and corrective feedback on L2 pronunciation development of /ɪ/ by Japanese learners of English. *Language Learning* 62(2): 595–633. <https://doi.org/10.1111/j.1467-9922.2011.00639.x>
- Schmidt, R. (1990) The role of consciousness in second language learning. *Applied Linguistics* 11(2): 129–59. <https://doi.org/10.1093/applin/11.2.129>
- Schuhmann, K. S. and Huffman, M. K. (2015) L1 drift and L2 category formation in second language learning. In The Scottish Consortium for ICPHS 2015 (ed.) *Proceedings of the 18th International Conference of Phonetics Sciences*. Glasgow: University of Glasgow.
- Thomson, R. I. and Derwing, T. M. (2014) The effectiveness of L2 pronunciation instruction: a narrative review. *Applied Linguistics* 36(3): 326–44. <https://doi.org/10.1093/applin/amu076>
- Zampini, M. L. (1993) Spanish and English voiced stop phonemes and spirantization: a study in second language acquisition. Unpublished doctoral dissertation, Georgetown University, Washington, D.C.
- Zampini, M. L. (1994) The role of native language transfer and task formality in the acquisition of Spanish spirantization. *Hispania* 77(3): 470–81. <https://doi.org/10.2307/344974>
- Zampini, M. L. (1998) The relationship between the production and perception of L2 Spanish stops. *Texas Papers in Foreign Language Education* 3(3): 85–100.
- Zampini, M. L. (2014) Voice onset time in second language Spanish. In K. L. Geeslin (ed.) *The Handbook of Spanish Second Language Acquisition* 111–29. Chichester, UK: Wiley-Blackwell.