

The Combined Effects of Immersion and Instruction on Second Language Pronunciation

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Abstract: *This preliminary study investigates the acquisition of second language phonology with respect to two variables: immersion in a target language community, and explicit instruction in the form of a phonetics/pronunciation class. Specifically, the research examines the second language acquisition (SLA) of specific properties of the Spanish phonology system as achieved by native speakers of English participating in a summer program in Mexico, some of whom had previously taken a Spanish phonetics course. Results suggest that it is not one factor or another in isolation that is most beneficial, but rather the combination of the two. The findings are analyzed not only in terms of how the SLA of sound systems develops, but also with respect to pedagogical, curricular, and administrative implications.*

Key words: *Spanish, immersion, instruction, phonetics, phonology, second language acquisition*

Introduction

The goal of this article is, broadly speaking, to add to an understanding of the potential linguistic benefits of study abroad (SA). Specifically, it investigates what factors, or combination of factors, can contribute to the acquisition of second language (L2) sounds by considering the roles of immersion and instruction in the second language acquisition (SLA) process. While previous work has investigated both of these areas individually, as I discuss below, inconsistent findings are unfortunately the norm. The aim, therefore, of this preliminary study was to add to this existing literature regarding the effects of SA on the SLA process, but it takes the investigation further by considering the combination of factors. The results suggest that it is not one factor or another in isolation that is most beneficial, but rather the combination of the two.

The specific feature under investigation in this study is the fricative/occlusive distinction in Spanish voiced consonants, e.g., the contrast between occlusive [b, d, g] and [β, ð, γ] (bilabial, dental, and velar, respectively), as acquired by native English speakers. English and Spanish both have voiced fricative and occlusive sounds, but they do not share the same pairs of allophones and, even where there are articulatory similarities, their contexts can differ. It is generally recognized (i.e.,

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Cressey, 1978; Hualde, 2005; Schwegler & Kempff, 2007, among others) that while the occlusive phones are considered the base phonemes and the fricatives their allophonic variants, the fricatives are in fact much more common in Spanish. In virtually all dialects of Spanish, the occlusive allophones are found after a pause (i.e., in word- or phrase-initial position) and after a nasal (i.e., /m, n, n/); the dental [d] occurs additionally after a lateral (i.e., /l, λ/). The fricative allophones occur in all other contexts, be they word-initial, word-medial, or word-final. While there is some dialectal variation in this distribution, it is not substantial compared to other consonantal variation in the Spanish-speaking world (i.e., Hammond, 2001). In parts of Colombia, for example, an occlusive variant may be used after another consonant, even if that consonant is not a nasal. In no case, however, is the above distribution considered unacceptable. Further, what I describe above is what is taught to English-speaking students as the standard rule (i.e., Hammond, 2001; Schwegler & Kempff, 2007, in addition to many others). Table 1 provides a summary of the fricative/occlusive allophone occurrences in Spanish.

While English has some of these same sounds, as I mention previously, they do not occur in the same patterns (see, for example, Chomsky & Halle, 1968, for general English phonology), a situation often termed “allophonic split” (i.e., Eckman, Elreyes, & Iverson, 2003). English also has a fricative /ð/ sound which, while similar to

the Spanish [ð], is interdental rather than dental as in Spanish. The English sound is a phoneme rather than an allophone, and it is most often realized faithfully with its [ð] allophone. An additional difference from Spanish is the fact that /ð/ is represented orthographically with the letters *th* rather than with the letter *d*. Finally, while the fricative sounds [β] and [ɣ] can occur sporadically in rapid speech in English (for example, in the word “sugar,” if uttered rapidly), they do not occur consistently in any dialect and are not considered standard allophones of /b/ and /g/, respectively.

The challenges facing L2 learners, therefore, are multiple. They must not only learn the different articulations in the two languages, but also understand the differences between the phonemes and allophones and learn their respective distributions. Granted, the differences between the sets of Spanish and English sounds are, on the whole, minor when considering overall pronunciation, comprehensibility, and communicative needs. However, the inability to select and produce the correct allophone in the correct utterance can undoubtedly lead to the perception of a foreign accent. Given the frequency with which the sounds, and particularly the fricative sounds, occur in Spanish, it is a feature that L2 learners should endeavor to learn.

Second Language Phonology

Within the realm of L2 phonology there are multiple avenues of investigation (see, for

TABLE 1

Comparison of Fricative and Occlusive Contexts in Spanish

Allophone	Phrase-initial	After nasal	After lateral	Other contexts
Occlusive ([b, d, g])	✓	✓	([d] only)	
Fricative ([β, ð, ɣ])			✓	✓

example, Zampini, 2008). Previous work in the past few decades has examined the acquisition of vowels, consonants, and suprasegmental features. Generally speaking, the findings have been promising (albeit perhaps inconsistent), showing that learners can be trained to produce new sounds and can acquire new phonological patterns. For example, learners have been observed to acquire voiceless consonants with different L2 voice onset times (i.e., Flege, 1987; Flege & Hillebrand, 1984; Magliore & Green, 1999), to acquire new vowel systems (i.e., Kingston, 2003; McAllister, Flege, & Piske, 2002), or to learn to pronounce rhotic sounds in the L2 (i.e., Colantoni & Steele, 2006; Face, 2006). It is rare that acquisition is complete or entirely successful, of course, in any of these areas (i.e., Flege, 1987; McAllister et al., 2002; Zampini & Green, 2001), and of great interest to researchers is which factors continue to hinder learner pronunciation.

While there are a number of models and approaches to L2 phonology, and it is well beyond the scope of this article to address those here, it is widely accepted that the first language (L1) somehow interferes in the L2 phonological system. While the process is more complicated than a mere transference of the L1 characteristics to the L2, there is undoubtedly some interference from the phonological properties of the first language (i.e., Hecht & Mulford, 1982, among others). Due to difficulty in mapping the L1 and L2 sounds correctly, learners have been observed to produce sounds that are neither entirely L1 nor L2 but rather share characteristics of both, or fall somewhere in between the two (i.e., Flege, 1991; Flege & Eefting, 1987, 1988; Major, 1992; Thornburgh & Ryalls, 1998). Some have proposed that the greatest difficulties may lie in areas where the L1 and L2 are not drastically different but rather share certain (but not all) features (i.e., Eckman, 2008; Flege, 1987; Major & Kim, 1999).¹ The sounds under investigation here fall into this category, as there are clear similarities between the English and Spanish

sounds and distributions, but not one-to-one associations. The question that arises, then, is: What is the nature of this interaction between systems, and how can we help learners overcome it? Two obvious answers are those variables that are the focus of this study: immersion on one hand, and instruction on the other.

Immersion

Conventional wisdom, academic and otherwise, holds that study abroad (SA) is the best way to acquire a foreign language and, for the most part, the research has concurred (see, for example, Lafford, 2006; Lafford & Collentine, 2006; Segalowitz, Freed, Collentine, Lafford, Lazar, & Díaz-Campos, 2004, for general reviews of research). Findings have, on the whole, been positive, indicating that SA does benefit L2 abilities, although they have not always been consistent.

Fluency² has been the focus of a great deal of work. For example, Freed, So, and Lazar (2003) found that SA students demonstrated more characteristics of oral fluency than at home (AH) students, although the SA participants were slightly less fluent in written Spanish. In a similar study, Segalowitz and Freed (2004) compared the acquisition of oral fluency by SA and AH students, and they also found that SA students made significant gains in their fluency while the AH group did not. Dubiner, Freed, and Segalowitz (2006) also found that SA students were judged more fluent at the semester's end than AH students.

Others have examined the acquisition of particular morphosyntactic areas of Spanish during an SA experience. Isabelli and Nishida (2005) investigated the development of the subjunctive by students participating in an SA program and found greater accuracy than in the AH group. At the same time, they noted that the SA group's acquisition of the subjunctive was nowhere near complete. Similarly, Ryan and Lafford (1992) examined the acquisition of

Spanish copula choice during SA; their results indicated that most participants made considerable progress in this area during their SA experience. Howard (2005) studied the acquisition of French preterit/imperfect and found overall benefits for the SA students, who were able to use the past tense more often, more accurately, and in more varied ways than the AH group. Likewise, Duperron (2006) also found advantages for the SA group in preterit-imperfect accuracy, although she found that most of the gains were made during the first semester of the yearlong study. Finally, a recent case study by Lord (2009) revealed overall improvement in general accuracy on the part of her SA participant, although gains were inconsistent and no one error type dominated or reached perfection during the SA period.

In spite of the documented benefits of SA, findings have not always been consistent or easily interpreted. For example, Freed, Segalowitz, and Dewey (2004) compared SA, AH, and immersion students' oral fluency and found that the AH group made more grammatical repairs, indicating greater grammatical knowledge and/or awareness. The SA students exhibited somewhat greater fluency than the AH students, as did the immersion students. In terms of grammatical acquisition, other studies have not shown evidence in favor of SA over AH experiences. Geeslin and Guijarro-Fuentes (2005) examined copula choice in Spanish and found that their SA and AH groups showed no significant differences. In a large-scale study, Collentine (2004) investigated general grammatical accuracy (i.e., morpho-syntax, lexicon, etc.) in Spanish during a semester-long SA program. His findings indicated that while the SA group showed better narrative abilities and the capacity to produce semantically richer language, the AH group showed superior grammatical accuracy.

Far less work has examined the effects of immersion or SA specifically on L2 pronunciation. Simões (1996) examined overall fluency in addition to vocalic pro-

nunciation in a small-scale study of Spanish L2 speakers. While most of his participants improved to some degree, their fluency improvements were not always significant or notable, and findings were relatively inconsistent with respect to vowel quality. Simões saw some improvements, but the participants continued to reduce and lengthen vowels, features that are found in English but not in Spanish. In another study, Díaz-Campos (2004) studied the L2 production of eight Spanish sounds that are typically problematic for L2 learners ([p, t, k, β, ð, γ, l, n]) in a pretest-posttest design with an SA group and an AH group. Díaz-Campos found that while both groups made some improvement on some of the sounds, there was no consistent advantage for the SA group. Of interest to the current study is that the fricatives [β, ð, γ] appeared to be most resistant to improvement, confirming the difficulty that L2 learners have in acquiring these sounds. Finally, Lord (2006) investigated students' pronunciation and mimicry abilities in Spanish before and after SA, using nonce words. She found that while pronunciation overall did not improve significantly, the participants did improve in their capacity to repeat greater strings of sounds. She interpreted these findings to relate to phonological memory, and claimed that while we may not readily observe phonological changes, i.e., improved pronunciation, acquisition may be taking place in other areas.

What is evident from these studies is that, in many ways, the conventional wisdom that SA is indeed beneficial holds true. What is less clear, though, is what specific areas the SA experience can help, or how. Thus, the goal of this study is to seek further support for the positive outcomes of SA by examining it in relation to another variable often considered beneficial to language learning: instruction.

Explicit Instruction

While a great deal of research into the effects of teaching pronunciation is carried

out in a laboratory setting to train specific sounds in isolation or in limited contexts, and while these studies can further an understanding of L2 phonological systems, of greater relevance here are those studies that have incorporated pronunciation into the standard foreign language curriculum. Pronunciation is often not given the same treatment in classrooms as other aspects of the language, so research in this area is less readily available than in areas such as syntax or morphology. Nonetheless, a growing body of research has found benefits to its inclusion (see Elliott, 2003, for a review of relevant studies).

In very general terms, Elliott (1995) found that accuracy in L2 pronunciation is related to the number of years of instruction, from which one can surmise that increased phonological proficiency comes with increased instruction. Other studies have looked at the inclusion of specific L2 features in lower- or intermediate-level classes. For example, in González-Bueno's (1997) study on the acquisition of occlusive Spanish sounds [p, t, k, b, d, g], the experimental group of intermediate learners received daily pronunciation instruction over the course of a semester. In her post-test, she found that there were significant improvements in student pronunciation of some of the sounds as compared to a control group. One can interpret these findings to imply that the inclusion of such instruction was beneficial to learners.

At higher instructional levels, other studies have looked at the effects of a phonetics class on learner pronunciation. For example, Castino (1996), Lord (2005), and Lord (2008) all examined the incorporation of explicit phonetic instruction in university Spanish phonetics classes. The studies varied in terms of their focus on specific teaching techniques and employed different methodologies, ranging from articulatory instruction to self-analysis to podcasting. Nonetheless, all three found positive effects of this instruction on their participants' abilities to pronounce some sounds more accurately. These works are

perhaps most relevant to the present study because they investigated participants at the same level as the population under investigation here. In the present study the method of instruction itself is not a factor, but rather the end effects of explicit instruction are of interest.

Methodology

The primary inquiry at the heart of this exploratory study was what effect the combination of instruction and immersion could have on L2 acquisition of the fricative/occlusive distinction in Spanish. From this query I derived the following research questions:

RQ1: What is the effect of explicit instruction on the L2 production of voiced occlusive and fricative allophones in Spanish?

RQ2: What is the effect of an immersion experience on the L2 production of voiced occlusive and fricative allophones in Spanish?

RQ3: What is the combined effect of explicit instruction plus immersion on the production of L2 voiced occlusive and fricative allophones in Spanish?

It must be noted that the term *immersion* is used here to refer to an intensive 2-month summer SA program and is therefore comparable to other studies that have investigated SA and immersive experiences. The investigation of instruction, though, is perhaps somewhat different than previous research has reported. While the instruction itself was standard, as is described below, the participants who received pronunciation instruction did so prior to the immersion experience, not during it. Therefore, the questions asked here are not so much regarding the straightforward effects of instruction but rather what the possible interactions may be between it and immersion, and if the order of the experience has any role to play in the acquisition process of the learners.

Participants

A total of 8 intermediate learners completed the study. The participants were students enrolled in an 8-week university immersion program in Mexico. They were all Spanish majors or minors at the time of testing and had all taken approximately the same number of university-level Spanish courses beyond the language requirement, placing them at an intermediate level (i.e., third- and fourth-year coursework in Spanish).

I classified the participants in two groups according to the one primary difference between their language background: their previous experience with explicit pronunciation instruction. Half of the participants had not taken any course on Spanish phonetics or pronunciation; these formed the No-Instruction group. The other participants had taken the Spanish phonetics course offered by their home department either the spring or fall semester prior to participating in the summer SA program; these were the Instruction group. The phonetics course was required for both the major and the minor in their university but could be taken at any time. Therefore, the fact that some participants had taken it and others had not should not lead to any claims of higher motivation for the former participants, as their enrollments related more to scheduling and other administrative factors.

This phonetics course was a fairly traditional course in Spanish phonetics and phonology with an emphasis on the theoretical aspects of the sounds of the Spanish inventory and a focus on improving students' pronunciation. Students learned the articulation of Spanish sounds and their distribution and the contrasts between English and Spanish. Class time was used to carry out phonetic transcription practice as well as to work on oral pronunciation, particularly of phones that contrast with similar patterns found in English. Students spent time discussing the occlusive/fricative allophones that are the focus of this study but no more so than any other area of pronunciation. The ultimate goal of the course

was to provide the students with a working knowledge of the sound system in Spanish, theoretically and practically.

Procedures and Analysis

Data consist of oral recordings from both participant groups, both prior to and after the SA program. For these recordings, participants read out loud a list of 60 words and phrases in Spanish, each one containing one of the tokens in question ([b, d, g, β, ð, γ]). There were 10 instances of each token, presented in randomized order.³ The phonetic environments of the tokens differed as much as possible in order to achieve a variety of phonetic contexts for the allophones and to avoid any kind of practice effect. In some cases, short phrases rather than isolated words were used in order to create enough different contexts for both allophonic variants. Given the variety of words, word structures, and environments, it was unnecessary to include any distractor items. The list of words and phrases used is presented in the Appendix.

The first test session took place the week prior to departure. All recordings took place in a quiet room and were recorded using a microphone placed approximately 6 inches from the participant. Participants received the written list of words (in randomized order) and read them out loud as naturally as possible, with a slight pause between items. After finishing this recording, the participants learned that they would be asked to return for a second session after their program, but they were not given any information regarding the purpose of the experiment.

During their stay in Mexico, all participants took the same three courses: Spanish conversation, Mexican literature, and Mexican architecture. The architecture class was given in English, but the other two were taught entirely in Spanish, and the participants were otherwise immersed in the Spanish language. They lived with host families, one student per family, and pledged to use only Spanish during the

8-week program (except, of course, during their architecture class). During their stay, they received no explicit instruction in specific features of the Spanish language (i.e., no grammar or pronunciation instruction). Some participants mentioned that their host families or friends occasionally commented on their pronunciation, but only when a severe error interfered with communication.

Upon completion of the SA program, the participants performed the same reading task again, with the words in a different randomized order. After finishing the second recording, they also filled out a short written follow-up survey that asked if they had knowledge of any pronunciation rules, if they were aware of a rule for the production of /b, d, g/ in Spanish, and if they were conscious of any rules while speaking. They answered questions about aspects of their general Spanish knowledge and pronunciation before, during, and after their experience abroad. Only after all testing was complete did participants learn the purpose of the study.

I then isolated the six sounds in question in the participants' recordings and then analyzed them using the Signalyze⁴ software program. Through spectrographic analysis, this program allows for the visual confirmation of the continuant or occlusive nature of the sound. For the subsequent analysis, I assigned every token produced correctly according to its phonetic context assigned a value of 1, while I assigned an incorrect production a 0, thus providing a score, out of 60, for each participant. I then calculated accuracy percentages per participant for each sound, as well as average accuracy percentages per group and per class of sounds (occlusive versus fricative).

Hypotheses

I hypothesized that, because English (the L1 of all participants) systematically employs only occlusive sounds in the contexts examined here, the default value used by participants would be the occlusive [b, d, g]

sounds. In other words, I predicted an overuse of occlusive and underuse of fricative sounds. According to most of the previous literature reviewed above, both instruction and immersion can play a beneficial role in acquiring L2 phonological patterns. Therefore, I further hypothesized that the Instruction group, even prior to SA, would produce more accurate allophones in the correct contexts than the No-Instruction group. I also hypothesized that the benefits of SA could be extended to phonological systems and expected both groups to improve after their immersion experience. The following sections discuss the findings of the analysis in light of these hypotheses and of the research questions that motivated the study.

Results and Discussion

General Findings

As predicted, students produced the occlusive sounds more accurately than the fricative sounds in the corresponding occlusive contexts. In fact, students produced occlusives 100% of the time in the required contexts,⁵ as can be seen in Table 2.

It is most likely that these perfect accuracy scores were the result of transfer from the L1 (i.e., Eckman, 2008), which in this case is possible and beneficial, and they are probably not indicative of a learning process. I cannot claim that this success is due to instruction, as the No-Instruction group also performed with the same accuracy. While these results may be encouraging, indicating that some aspects of the Spanish phonological system can successfully be transferred from English, they are not of great interest here as they cannot shed light on either of the processes under investigation. Therefore, I do not discuss the occlusive sounds further.

The fricative allophones, on the other hand, provide more interesting results and open the door for a discussion of both instruction and immersion and their potential roles in the learning process. Table 3 provides an overview of the pre-immersion and

TABLE 2

Raw Scores (/60) and Accuracy Percentages (%) on [b, d, g] Before and After Immersion

	Pre-immersion						Post-immersion					
	[b]		[d]		[g]		[b]		[d]		[g]	
	Score	%	Score	%	Score	%	Score	%	Score	%	Score	%
No-Instruction	60	100.0	60	100.0	60	100.0	60	100.0	60	100.0	60	100.0
Instruction	60	100.0	60	100.0	60	100.0	60	100.0	60	100.0	60	100.0

post-immersion accuracy scores on the three fricative sounds, for each group.

Figure 1 presents the accuracy percentages visually, allowing for a greater comparison between groups and between pre- and posttest values.

I ran Friedman tests⁶ on the three fricative sounds prior to and after immersion, and they revealed no significant differences between the sounds for either group (pretest $p = 1.000$, posttest $p = 0.135$), so from this point forward I discuss the sounds as a group.

Effects of Instruction

While neither group performed at even 25% accuracy, it is clear that prior to SA the Instruction group had higher accuracy percentages than the No-Instruction group on all three allophones. On the pretest, the No-Instruction group averaged 3.3% (1.98/60 tokens) accuracy in fricative production (examining [β, ð, γ] together), while the Instruction group started with an average of 8.6% (5.16/60 tokens) accuracy. The difference between the two groups prior to the immersion experience was significant (Mann-Whitney U; $Z = -2.646$; $p = 0.029$).

In this respect, one can say that the effects of prior instruction are positive, because those who had taken the phonetics class outperformed those who had not. However, two factors must be considered here. First, the purpose of this study was to investigate the combined effects of instruction and immersion, and it was therefore not designed specifically to test the results of instruction alone; it is possible that the students in the Instruction group would have outperformed the others even without the instruction experience. With no data prior to the instruction, it is impossible to know for sure. It is nonetheless worth recalling that those in the Instruction group had taken the course at different times and with different instructors, so any effects of instruction are in fact generalized across those variables.

Also of note are the low accuracy rates for all participants, even those in the

TABLE 3

Raw Scores (/60) and Accuracy Percentages (%) on [β, δ, γ] Before and After Immersion

	Pre-immersion						Post-immersion					
	[β]		[δ]		[γ]		[β]		[δ]		[γ]	
	Score	%	Score	%	Score	%	Score	%	Score	%	Score	%
No-Instruction	3	5.0	1.38	2.3	1.5	2.5	4.8	8.0	2.7	4.5	3	5.0
Instruction	4.5	7.5	9.54	15.9	1.5	2.5	16.8	28.0	27.3	45.5	7.5	12.5

Instruction group, which are strikingly evident in Figure 1. While one may claim that pronunciation instruction can help improve the accuracy of L2 fricative allophone production, it is clear that instruction alone is insufficient to produce the correct allophone even one-quarter of the time. It is precisely for this reason that I turn now to the other factor at the heart of this study: immersion.

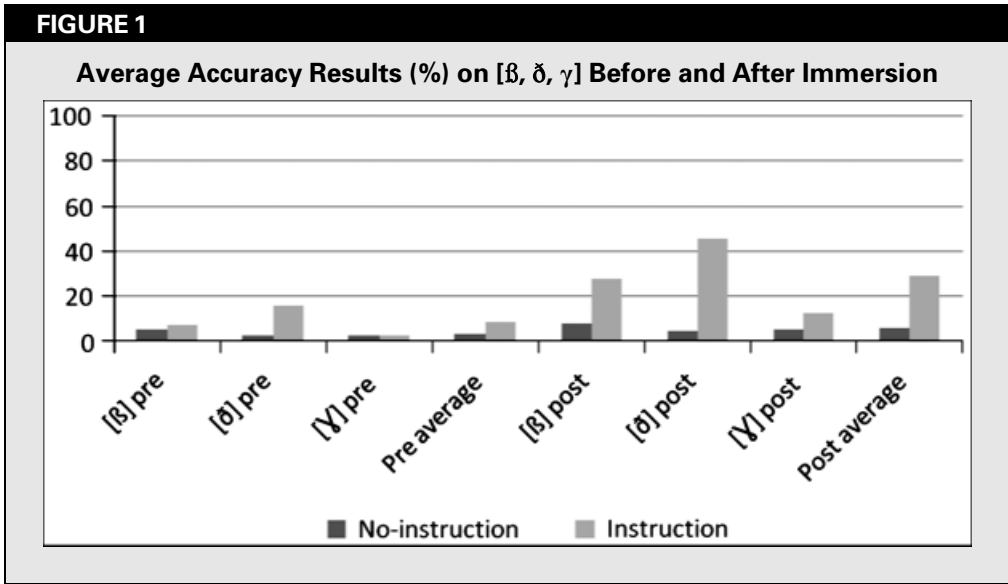
Effects of Immersion

If immersion were to have a beneficial effect on L2 phonological acquisition, then one would expect to see an increase in accuracy rates after the immersion experience, in both groups, as I have hypothesized. This was in fact the case, as both groups improved in their fricative production from the pretest to the posttest, increasing from 3.3% accuracy (on [β, δ, γ] together) to 5.8% for the No-Instruction group, and from 8.6 to 28.7% for the Instruction group. According to a pair of Wilcoxon Signed Ranks Tests, both groups experienced significant changes between the two testing periods (No-Instruction group $p = 0.046$, Instruction group $p = 0.024$). In other words, both groups evidenced significant improvements in their choice of fricative allophones after the immersion experience. One can therefore claim that SA is beneficial in the acquisition of L2 phonology.

However, of additional interest is the fact that the two groups' accuracy rates remained significantly different from each other after immersion (Mann Whitney U, $Z = -2.309$, $p = 0.029$). Therefore, while both groups made improvements during the two months abroad, the Instruction group retained its superiority in terms of ability to produce the correct allophone in the correct context.

Combined Effects of Instruction Plus Immersion

Participants with instruction in phonetics began the experiment with greater accuracy than those who did not, and all participants made significant gains during the immer-



sion experience. In this respect, immersion appears to be beneficial, but it seems that those with instruction in addition to immersion may reap even more benefits. It must be noted, though, that in no case did either group achieve above 45% accuracy on any particular sound, with the highest post-immersion accuracy ratings averaging only about 30% (17.22/60 tokens). In other words, even those participants who benefited from both instruction and immersion were phonologically accurate only about one-third of the time. The variables in question are beneficial, but insufficient in terms of native-like production. I discuss these issues further in the following sections.

Conclusion

Summary of Findings

With the data presented above in mind, I now return to the three research questions that motivated this study.

RQ1: What is the effect of explicit instruction on the L2 production of voiced occlusive and fricative allophones in Spanish?

It appears that explicit instruction can be beneficial in acquiring this aspect of L2

pronunciation. Participants who had had instruction in Spanish phonetics started off with higher accuracy ratings than those who had not.

RQ2: What is the effect of an immersion experience on the L2 production of voiced occlusive and fricative allophones in Spanish?

Similarly, the data presented here indicate that the immersion experience is also beneficial for L2 phonological acquisition. Both groups, those with and without prior instruction, made significant improvements in accuracy over the course of the immersion experience.

RQ3: What is the combined effect of explicit instruction plus immersion on the L2 production of voiced occlusive and fricative allophones in Spanish?

Both variables have been shown to be beneficial, although the Instruction group improved their accuracy by a far greater degree than the No-Instruction group. The No-Instruction group evidenced an accuracy improvement of 2.8%, while the Instruction group improved by 20.1%. Thus, based on these findings, it would appear that the combination of

variables is more beneficial to learners than either one variable alone.

Given these findings, why did two groups who shared the same SA experience evidence different results? One possible account may be found in psycholinguistic approaches to language learning and processing (i.e., Pienneman, 1999, 2007), and specifically in Bialystok's (2001) Analysis and Control Model. This proposal distinguishes between the two processes of analysis and control processes, whereby the *analysis* of knowledge enables mental representations to be organized into explicit representations of formal structures, and *control* of processing is the means by which attention is focused on specific representations as they are needed in real time. Quantitative and qualitative findings of the present study can be supported by this view.

When asked in the follow-up questionnaire about specific pronunciation rules, all the participants in the Instruction group accurately described the rule for fricative/occlusive distribution in Spanish, while only one member of the No-Instruction group mentioned this rule. Thus, it seems that the students who did possess the specific /b, d, g/ distribution rule prior to SA—thanks to the instruction they had received at an earlier point in their acquisition—may not have been able to make use of this information prior to their immersion but were able to access the knowledge later, most likely due to a greater control and automatization (McLaughlin, 1990) over other linguistic functions that, according to those studies reviewed above, have been shown to improve during SA (fluency, morphosyntax, or lexical knowledge). The greater input and increased output opportunities (e.g., Ellis, 1995; Ellis & He, 1999; Swain, 1985, 1995) of the immersion experience most likely enabled the real-time use of previous phonetic knowledge, resulting in the greater gains overall for the Instruction group.

The No-Instruction group, on the other hand, did not possess this phonological rule

prior to SA, so they could not make use of or automatize it during their immersion. This is not to say that this group did not benefit from the SA experience. On the contrary, they improved their fricative production accuracy (although not as much as the Instruction group) and also most likely improved other linguistic areas as well. On the follow-up survey, all participants indicated some degree of improved fluency (self-perceived) or comfort with Spanish in general. Participants noted that they felt more confident, that they had improved vocabulary, and that they thought they were more fluent or speaking “faster” as a result of their time abroad.

In sum, the immersion experience allowed these L2 learners to automatize aspects of their language production, which in turn facilitated the access of previous knowledge of other processes. They thus could control their attentional resources and concentrate specifically on other areas. In the case of the Instruction group, they used these newly available resources to improve aspects of their pronunciation, thanks to knowledge they had gained previously through explicit instruction. Although not a conscious process on the part of the learners, obviously, it is indeed remarkable that learners “stored” the knowledge acquired in the classroom 6 to 12 months prior to data collection until their linguistic systems were able to make use of it with the necessary time and resources. By these standards the No-Instruction group would also have automatized certain language functions and could devote more attentional resources to other linguistic functions as well—they just were not the functions under investigation here. As these students did not possess the knowledge of the fricative/occlusive distinction in Spanish, they did not make as noticeable gains in that area. While the benefits of either variable are clear, the combination of the two on learners' abilities to process and utilize linguistic information allows for increased language gain.

These findings raise many further questions and open a variety of research

avenues in language acquisition in general, and the roles of instruction and immersion more particularly. Of course, as with any study, there are a number of methodological issues that future research must remedy. I address these drawbacks, along with questions for future research, in the following section.

Limitations and Future Directions

The greatest flaw with this study is unquestionably the small sample size. The fact that only 8 participants took part was a consequence of circumstances related to the student population as well as the small size of the SA program. It was unavoidable in this case, but similar studies should be carried out with larger populations. A greater sample size would allow for better statistical procedures, less probability of skewed data, and greater confidence in the findings.

Another methodological weakness inherent in the study design is the fact that no data were collected prior to the phonetics course taken by half of the participants. Because the students took this course at different points in their undergraduate careers, and because participants were identified upon enrolling in the SA program, it would have been impossible to test them one or two semesters prior to the start of the study. In sum, given the promising findings of this study, a more ambitious methodological design should be undertaken, tracking students longitudinally through specific courses as well as immersion experiences. Such a study could sort out the effects of one variable from the other and more confidently analyze the combined effects of the two.

Nonetheless, the possibilities opened up for future study are numerous. For example, will the No-Instruction group, upon return and enrollment in the required phonetics course, catch up to the Instruction group's accuracy levels? Will they surpass them? In other words, is there an ideal order of presentation for the variables? Future work should examine cases of immersion

followed by instruction, as well as instruction during immersion, to be able to compare to the instruction-then-immersion findings. In addition, the duration of time abroad should be considered as well. Perhaps a short-term summer program is insufficient for making certain phonological changes in some learners' systems, but longer-term stays, such as a semester or a full academic year, might evidence greater gains in pronunciation skills. Future studies can address this issue by incorporating participants from a variety of SA experiences.

Another relevant question is how necessary explicit instruction in phonology is. In other words, can learners acquire pronunciation without knowing or being able to state (as in the follow-up survey) the specific rule for a phonological process? The No-Instruction group did improve in the present study, so it is probable that explicit metalinguistic knowledge is not strictly necessary. SA provides a maximum of language input and output, which are likely the most important factors. In the case of fricatives, too, is the issue of the frequency and salience of the feature. The fricatives are undoubtedly frequent in Spanish but may not be acoustically salient to learners, as they are not essential in capturing meaning or communication. According to Schmidt (1990, 1993), frequency and salience determine whether input is noticed or not, and only input that is noticed can be available for intake and processing. Future work can investigate in more detail the differences between those who have explicit awareness and those who do not, to determine the role of noticing.

Implications

In spite of the methodological drawbacks and the remaining unanswered questions, the contributions of this study should not be forgotten, especially considering the implications they offer. While the above paragraphs have described some research questions that future work will want to address, there are also numerous implica-

tions in terms of language teaching, course offerings, and curricula in general.

Based on the present findings, language departments should recognize the value of both instruction and immersion, both in general and with respect to L2 phonology. The majority of college and university Spanish departments offer a course on Spanish phonetics and phonology that addresses the primary pronunciation problems for students, but most do not require it for undergraduates. In light of the increased accuracy seen here for students who had taken this course, administrators may want to consider making it a requirement. At the same time, then, one must consider the most effective ways of teaching pronunciation, an issue that has yet to be settled (e.g., Elliott, 1995; González-Bueno, 1997; Lord, 2005, 2008).

In addition, while most language departments already offer and encourage SA programs, they now can offer additional evidence in favor of the linguistic gains such an experience may have. Language instructors tend to recognize the inherent benefits of language immersion, although research has not always consistently backed these intuitions, as discussed above. Finally, the issue of when to do what must be addressed. Based on the findings of this study, instructors may want to encourage their students to enroll in a pronunciation course prior to participating abroad. Of course, future work may determine that a different order is more or equally beneficial. For the time being, however, it should be clear that both variables can only help students' language acquisition, and specifically their pronunciation.

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Notes

1. Of course, in cases where the L2 contains brand new sounds for learners, there may also be difficulties of a purely articulatory nature, as in the case of the trill /r/ in Spanish: Learners generally know when to use it, but they are not always able to carry out its articulation successfully (e.g., Face, 2006).
2. Fluency is notoriously difficult to define, and I do not attempt a definition here. In this case, as in the case of the majority of studies reviewed, I use it as being synonymous with general oral communication skills.
3. Due to an error on the part of the researcher, there were only 9 instances of occlusive [g], and 11 instances of fricative [ð]. I did not discover this error until data collection was complete, but I took the different totals into consideration in all analyses.
4. Signalyze (<http://www.signalyze.com>) is an interactive program, made specifically for Macintosh computers, designed to analyze speech and other acoustic material. It contains a large set of signal editing, signal analysis, and signal manipulation tools and thus allows for easy analysis of certain acoustic phenomenon such as fricative/occlusive distinctions, voice onset time, or vowel formants, to name just a few.
5. There were two cases in the data of occlusive contexts in which it was not clear—either through audio analysis or spectrograph analysis—which sounds were produced. I eliminated these two tokens (from two No-Instruction group participants) from further analysis.
6. Due to the small sample size, all statistical tests were nonparametric. Further, their outcomes must be interpreted extremely cautiously given the limited number of participants, as is discussed further in “Limitations and Further Directions.”

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APPENDIX

List of Words and Phrases Used

Items were presented in randomized order and in regular text. They are presented here by phone, in alphabetical order and with the token sound phonetically transcribed and bolded.

	[b]	[d]	[g]	[β]	[ð]	[ɣ]
1.	asombroso	Aldea	gabinete	aβbuela	absurðo	aɣua
2.	barrio	condos	gallina	aβ a	cuidaðo	aɣunos
3.	bastante	cuando	garbanzo	ceβolla	edað	estómayo
4.	bata	entender	gato	daβa	fiðeo	fueɣo
5.	embargo	Grande	gracias	encontraβa	hablaðo	juɣar
6.	en bez de	Decir	gramática	Estoyβien	Maðre	lleɣar
7.	hambbe	hablando	ninguno	garβanzo	pasaðos	neɣra
8.	hombre	Mundo	un gozo	háβitos	proðuce	oréɣano
9.	también	profundos	un gran chico	responsable	sarðinas	peliɣro
10.	un buen niño	un día		soβre	sorða	unasɣotas
11.					tarðe	