SPANISH AS A SECOND LANGUAGE:

WELL-FORMEDNESS JUDGMETNS AND

THE PHONOLOGICAL DISTRIBUTION OF /b,d,g/

By

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A Thesis Submitted to The Honors College

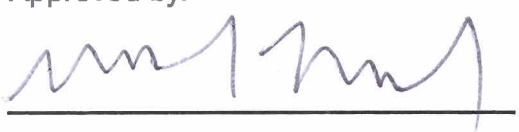
In Partial Fulfillment of the Bachelors degree
With Honors in

Linguistics

THE UNIVERSITY OF ARIZONA

MAY 2011

Approved by:



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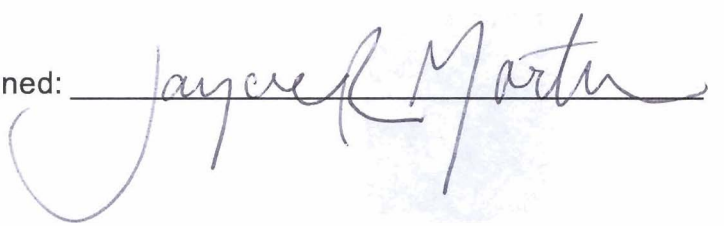
Signed: 

INTRODUCTION

This paper investigates whether well-formedness judgments reflect an acquisition of phonological generalizations in second language learning. Specifically, this study examines the acquisition of the phonological distribution of the sounds [b,d,g] in Spanish among English-speaking university students with varying levels of experience learning the language.

In Spanish, the sounds [b,d,g] occur in complementary distribution with their allophonic counterparts /β, ð, ɣ/. In English, the phonemes [b,d,g] only occur as /b,d,g/. The sound /ð/ does occur in English, but it is phonemically, rather than allophonically, distinct from /d/ (Elliott 2003:26).

This study considers the distribution of these sounds in four phonological environments within Spanish words: word-initially, intervocalically, after a nasal, and after a liquid. As presented in Dalbor (1980:56), Harris (1969), and other Spanish grammars, the distribution of [b,d,g] in these environments is summarized in Table 1. The distribution of these sounds in English is given in Table 2.

Table 1: Distribution of Target Sounds in Spanish

	Labial	Dental	Dorsal
Initial	b	d	g
Intervocalic	β	ð	ɣ
Post Nasal	b	d	g
Post Liquid	β	d	ɣ

Table 2: Distribution of Target Sounds in English

	Labial	Dental	Dorsal
Initial	b	d or ð	g
Intervocalic	b	d or ð	g
Post Nasal	b	d or ð	g
Post Liquid	b	d or ð	g

In order to determine whether English speakers with experience learning Spanish as a second language acquire a native-like awareness of these phonological generalizations or if they simply memorize the pronunciation of words that they learn, we conducted two experiments in which these learners and native speakers were presented with nonsense and real words of Spanish. These experiments were critically different from previous work on the L2 acquisition of Spanish [b,d,g] in that they implemented a judgment rather than production or perception tasks. If learners demonstrated native-like judgments in these tasks, this study would support Zampini's (1998) proposal, discussed in detail below, that second language learners may know the L2 phonological system despite being unable to consistently produce the generalizations accurately in experimental pronunciation tasks.

LITERATURE REVIEW

Previous research has established that experience significantly affects second language learners' acquisition of L2 phonological systems. These previous studies have used production tasks that track improvements in pronunciation accuracy among learners of a second language. An overview of the previous second language work on English and Spanish phonology is given here.

To measure Spanish L2 pronunciation accuracy, Rosenmann (1987) used an analysis of mimetic ability. In his study, fifty native English-speaking children and young adults listened to and repeated Spanish words being modeled by a native speaker. As the subjects had no experience hearing or speaking Spanish, all of these words were considered "nonsensical and meaningless". The subjects' pronunciations were judged as either "good" or "bad", and Rosenmann found that the young adults exhibited better pronunciation than the children did. He ultimately concluded that adults were "more efficient and successful" at learning accurate pronunciations of L2 words.

Though Rosenmann's subjects were able to mimic native Spanish pronunciation after repeated practice, Elliott (2003) argued that "mimetic ability is not the equivalent of natural phonological development". He also argued that a rating scale of "good or bad" disables researchers from "examining intermediate stages of phonological development". Finally, Elliott proposed that research on the phonological acquisition of a second language should examine subjects with some experience learning that language (2003:31).

Hardy (1993) took this approach when he studied a twenty-five year old Spanish-speaking male learning English as a second language. The subject was enrolled in a six month long intensive English course, during which Hardy tracked his pronunciation for phonological improvement. Hardy ultimately found that the subject mastered sounds that differed from Spanish more easily than sounds that existed in both L1 and L2. For example, the subject learned to use [v] more easily than he learned to use [d] and [ð]. Hardy's study demonstrates that experience is a significant factor in L2 phonological acquisition.

Elliott also demonstrates the effect of experience in his 1995 study on pronunciation accuracy. Specifically, Elliott studied the effect of formal instruction in Spanish on sixty-six English-speaking university students' pronunciation of the voiced alveolar trill. After fifteen weeks of instruction, Elliott found a statistically significant improvement in the pronunciation of this phoneme.

In a follow-up study, Elliott (1997) examined the L2 acquisition of the distribution of /b,d,g/ and their fricative allophones /β, ð, ɣ/. After fifteen weeks of instruction, subjects only demonstrated a statistically significant improvement in the distribution of the labial allophones. Some subjects, however, used only [β] in their pronunciation, while other subjects used both allophones in free variation. This study further establishes experience as a factor in L2 phonological acquisition. Subjects' overgeneralization of [β] also suggests that L2 learners may pick up on phonological generalizations without being able to consistently produce that generalization accurately.

This conclusion supports an inference Zampini (1994, 1998) made when reflecting on the limitations of her study of the L2 acquisition of the distribution of [β, ð, ɣ] in Spanish. Zampini's 1994 study focused on the effect of L1 phonology transferring to L2 phonology. She found that this transfer interfered with English-speakers ability to acquire the distribution of [β, ð, ɣ] in Spanish. This interference was particularly apparent for [ð], which is phonemically distinct from [d] English but allophonically distinct from [d] in Spanish. In this study, Zampini also found an interference of the grapheme v – which occurs in both English and Spanish orthography – with the acquisition of [b] and [β].

Zampini's 1994 findings support Major (1987), who stated that phonemic contrasts are easier to acquire than allophonic ones, as "allophones are not at the level of consciousness whereas phonemes are". Her results also support Jakobson (1968) who found that fricatives are universally more marked than stops, and Eckman (1977) who found that marked forms are more difficult to acquire than unmarked forms.

In her 1998 study, Zampini examined voice onset timing of /b/ and /p/ in English and Spanish among English-speaking students in an advanced Spanish phonetics course. She found that subjects could accurately spirantize both sounds more often within words than across word boundaries. From this behavior she, like Elliott, proposed that her subjects may have known the phonological environments in which to spirantize /b/ and /p/, but were unable to consistently produce these generalizations. In addition to this prediction, Zampini's 1998 study also provides support for experience as a significant factor in L2 phonological acquisition. Specifically, the fact that students learning Spanish phonetics could accurately produce correct phonological distributions of spirantized /b/ and /p/ reveals that their experience learning Spanish had a positive effect on their acquisition of the language.

Hardy (1993), Elliott (1995, 1997), and Zampini (1994,1998) all show that experience is a significant factor in L2 phonological acquisition. Elliott (1997) and Zampini (1998) also propose that L2 learners may acquire phonological generalizations despite being unable to demonstrate them in experimental production tasks.

The work of Greenberg & Jenkins (1964) and Ohala & Ohala (1986) demonstrates that experimental judgment tasks can be used to investigate awareness of phonological generalizations. Both studies aimed to show that the well-formedness judgments of English speakers on nonsense items are influenced by the items' similarity to real words of English. In particular, this similarity was determined by neighborhood density and phonotactic probability. Both Greenberg & Jenkins and Ohala & Ohala implemented an auditory presentation of stimuli and their subjects responded to the stimuli on a gradient, 11-point scale. This scale contrasts the "good or bad" measurement used by Rosenmann (1987), and it proved to be effective. Both studies ultimately demonstrate that the methodology of presenting stimuli auditorily and eliciting responses on a gradient scale is useful in the experimental elicitation of well-formedness judgments on phonological generalizations.

While the stimuli in these two studies consisted of nonsense items, our study involves both nonsense and lexical Spanish items. The inclusion of lexical items is motivated by Ortega's (2009:88) consideration of vocabulary depth. Ortega explains that L2 vocabulary depth refers to "how well known words are really known", including whether L2 learners know how a word is supposed to sound. Vocabulary depth also "assumes the existence of implicit long-term memory of ... form-based associations across the mental lexicon" (Meara 2007). Pavlenko (1999) argues that this long-term memory of L2 words is better encoded in naturalistic contexts than in a classroom setting. Ortega, Mera, and Pavlenko's account of memory and vocabulary depth suggest that it is possible for L2 learners to learn words – and how they should sound – rather than acquiring the phonological generalizations that generate them. This consideration is accounted for in our study by including lexical items as stimuli.

Overall, we build on previous work on L2 phonological acquisition by using a judgment task that measures the well-formedness judgments of English speakers learning Spanish on a gradient scale of 1 – 7. We consider years of learning experience as a significant factor in acquiring the phonology of a second language. If well-formedness judgments reflect the acquisition of a language and if experience is a factor in this acquisition, we can expect that:

(i) Native Spanish speakers will prefer the correct distribution of /b,d,g/ in all word positions for both real and nonsense items

(ii) Spanish learners with more experience will give more native-like judgments of real and nonsense items than learners with less experience

METHODOLOGY

Experiment 1

The first experiment establishes the well-formedness judgments of Spanish speakers and Spanish learners on the auditory presentation of nonsense items. It was expected that Spanish speakers' judgments would reflect an awareness of their native phonology and that learners' judgments would improve with experience.

Participants

73 students at the University of Arizona participated in this study for course credit. Fifty-two were native English speakers with zero to fourteen years of experience learning Spanish. Thirteen were native Spanish speakers. Seven were native speakers of Cantonese, and one was a native speaker of Mandarin. All subjects who were native speakers of a language other than English or Spanish had zero years experience learning Spanish.

Stimuli

The stimuli consisted of 67 bisyllabic nonsense words of Spanish. Each item contained only one voiced obstruent. Labial items were presented in three ways: once containing [b], once containing [β], and once containing [v]. For example, subjects heard the item 'busa' pronounced [busa], [βusa], and [vusa]. Pronunciations with [v] were included to account for the grapheme v, which Zampini (1994) found "interfered with the acquisition of Spanish [b] and [β]" (1994). Dental items were presented in two ways: once containing [d] and once containing its allophone [ð]. Dorsal items were also presented in two ways: once containing [g] and once containing [ɣ]. These target sounds occurred either word-initially, intervocalically, after a nasal, or after a liquid. All items were recorded such that other characteristics of Spanish phonology were consistent across items. Examples of the nonsense stimuli are given in Table 3, and a complete list of the stimuli is given in Appendix A.

Table 3: Sample Stimuli (Nonsense)

	Labial	Dental	Dorsal
Initial	**busa** (3) βusa (3) vusa (3)	**dasco** (2) ðasko (2)	**giso** (3) ɣiso (3)
Intervocalic	fiba (2) **fiβa** (2) fiva (2)	mado (3) **maðo** (3)	fago (2) **faɣo** (2)
Post Nasal	**lombe** (2) lomβe (2) lomve (2)	**cunda** (3) cunða (3)	**suenga** (3) suenɣa (3)
Post Liquid	nielba (2) **nielβa** (2) nielva (2)	**talde** (2) talðe (2)	telga (2) **telɣa** (2)

bold = phonologically correct item

Procedure

Subjects were seated in a soundproof booth with a monitor, a keyboard, and a set of headphones. The experiment was presented with E-prime software and the instructions below were presented on the screen.

Instructions: In this experiment you will listen to some words. For each word, you will decide how Spanish-like it sounds to you. You will present your answers along a seven-point scale. '1' indicates a word that does not sound very much like Spanish. '7' indicates a word that sounds a lot like Spanish.

Subjects then listened to the 67 items, which were randomized for each subject, and responded to each one using the keyboard.

Results

Prior to discussing the significant effects of Experiment 1, the anomalous results should be noted. Native Spanish speakers, for example, performed poorly on items in which the target sound occurred after a liquid. Specifically, since the rule is part of their native phonology, it was expected that Spanish speakers would judge labial and dorsal fricatives as better than stops in this environment and that they would judge dental stops as better than fricatives in this environment. Ultimately, however, these subjects preferred stops for all three places of articulation. Table 4 shows these subjects' mean responses for occurrences of dental, dorsal, and labial fricatives and stops in the post-liquid position of correct items. This figure shows that the mean response for all three positions of articulation was higher for stops than for fricatives.

Table 4: Mean Responses (Native speakers, post-liquid nonsense items)

	fric	stop
dent	5.00	5.60
dors	3.30	3.45
lab	3.20	3.55

Additionally, while it was expected that subjects would give low well-formedness judgments to items containing the labial-dential fricative [v], they often judged these items as well-formed as items containing the labial fricative [β]. These judgments are reflected in Table 5, which shows the mean responses of all subjects for occurrences of the place of articulation of labials and labio-dental sounds occurring in each of the phonological positions manipulated in this study. In each position, subjects gave labio-dental [v] an equal or higher response than they did for labial [β].

Table 5: Mean Response (All subjects, POA by Position, Nonsense)

	init	intV	postL	postN
lab	3.433790	4.657534	3.401826	3.376712
labdent	3.712329	4.680365	4.027397	3.538813

Considering these anomalies analyses will henceforth exclude post-liquid items and items containing [v].

Native Spanish speakers demonstrate an awareness of the phonological distribution of /b,d,g/ in nonsense items. Table 6 shows Spanish speakers' mean response for incorrect and correct nonsense items. The mean response for correct items is higher than the mean response for incorrect items.

Table 6: Mean Responses (Native speakers, Nonsense Items)

	Mean Response
Incorrect	4.290476
Correct	4.740909

For native Spanish speakers, a two-factor ANOVA shows a significant effect of correctness by subject and a trending effect of correctness by item for nonsense items ($F_1(1,9) = 5.7209$, $p = 0.04044$, $F_2(1,41) = 3.5906$, $p = 0.06517$.

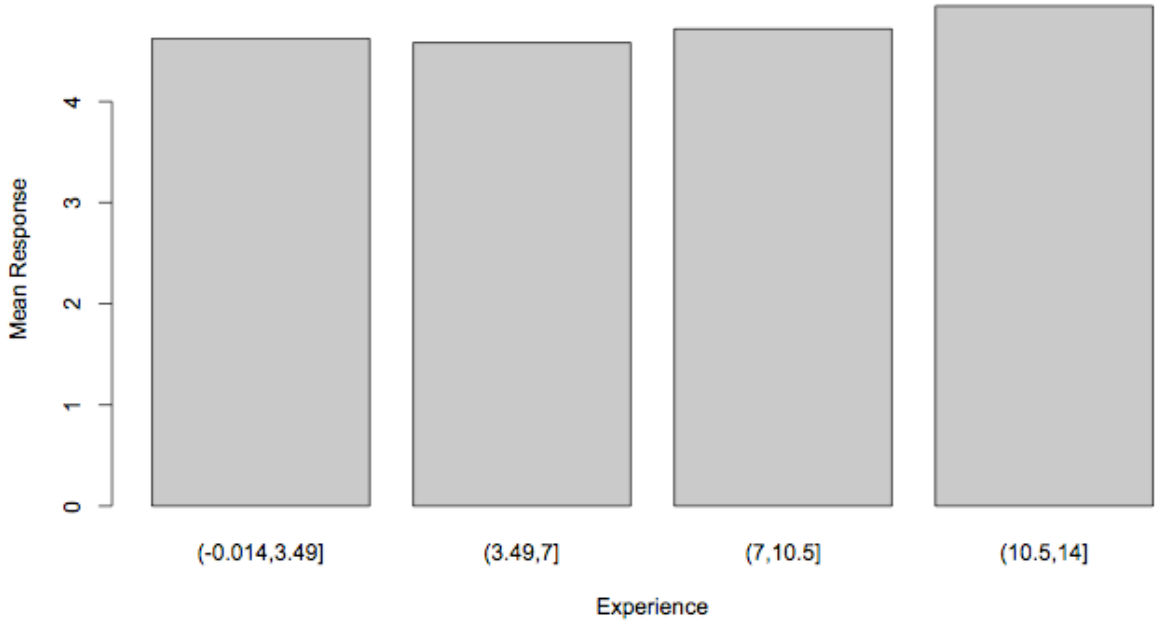
Spanish learners also seem to demonstrate an awareness of the phonological distribution of /b,d,g/ in nonsense items. Table 7 shows these subjects' mean response for incorrect and correct items. Spanish learners judge correct items as better than incorrect items.

Table 7: Mean Responses (Learners, Nonsense Items)

	Mean Response
Incorrect	4.150416
Correct	4.652958

Additionally, Spanish learners show a general improvement in their judgment of phonologically correct nonsense items by experience level. In other words, more experienced learners judge correct nonsense items as more correct than less experienced learners do. These judgments are reflected in Figure 1. In this analysis, subjects are binned into four groups based on experience level in order to create a clearer picture of the general judgments of Spanish learners.

Figure 1: Experience and Correctness (Nonsense)



While Spanish learners' judgments of correct items improved with experience, the effect was not significant. A single-factor ANOVA shows that experience is not a significant factor by subject or by item ($F_1(1,61) = 0.0453$, $p = 0.8322$, $F_2(1,42) = 0.499$, $p = 0.4838$). There is, however, a significant effect of correctness by subject and a trending effect of correctness by item ($F_1(1,62) = 49.393$, $p < .001$, $F_2(1,42) = 3.5504$, $p = 0.06663$). Furthermore, a two-factor ANOVA does

not show a significant interaction between correctness and experience ($F_1(1,61) = 0.2888$, $p = 0.593$, $F_2(1,41) = .4888$, $p = 0.4884$).

Overall, Experiment 1 reveals that the well-formedness judgments of both Spanish speakers and learners are driven by a significant effect of phonological correctness of nonsense items. The experiment does not reveal evidence that learners' judgments on nonsense items improve with experience. To further investigate both subject group's judgments on the phonological distribution of /b,d,g/ a similar experiment was conducted using real words of Spanish as stimuli.

Experiment 2

The second experiment establishes the well-formedness judgments of Spanish speakers and Spanish learners on the auditory presentation of lexical items. It also examines the effects of correctness and experience on the acquisition of the phonological distribution of /b,d,g/.

Participants

The same 73 university students participated in Experiment 2. Subjects began Experiment 2 immediately after completing Experiment 1.

Stimuli

The stimuli consisted of 70 real words of Spanish. The items that were chosen are words that would be familiar to students in beginning to intermediate level Spanish courses. The conditions outlined in Experiment 1 were also applied to the stimuli in Experiment 2. Examples of the lexical stimuli are given in Table 8, and a complete list of the stimuli is given in Appendix B.

Table 8: Sample Stimuli (Lexical)

	Labial	Dental	Dorsal
Initial	**bueno** (3) βueno (3) vueno (3)	**dulse** (3) ðulse (3)	**gusta** (3) ɣusta(3)
Intervocalic	nuebe (3) **nueβe** (3) nueve (3)	adios (3) **aðios** (3)	agua (3) **aɣua** (3)
Post Nasal	**ambas** (2) amβas (2) amvas (2)	**tienda** (2) tienða (2)	**tengo** (2) tenɣo (2)
Post Liquid	salbar (2) **salβar** (2) salvar (2)	**aldea** (2) alðea (2)	mielga (2) **mielɣa** (2)

Procedure

The same procedure was followed for Experiment 2. Subjects began Experiment 2 immediately after completing Experiment 1.

Results

The same conditions were anomalous in Experiment 2. In the post-liquid environment, native Spanish speakers preferred dorsal and labial stops and preferred dental fricatives, all of which are the wrong realizations of [b,d,g] in this position. Table 9 shows these subjects' mean response for dental, dorsal, and labial fricatives occurring after a liquid. The figure reveals that dorsal and

labial stops were judged better than fricatives, and that the dental fricative was judged as better than the dental stop.

Table 9: Mean Response (Native speakers, post-liquid lexical items)

	fric	stop
dent	4.90	4.70
dors	4.65	5.60
lab	4.05	5.05

For real items, subjects also judge items containing [v] as well-formed or better formed than items containing [β]. These judgments are reflected in Table 10, which shows the mean response for labial and labio-dental fricatives in all four manipulated phonological environments.

Table 10: Mean Responses (All subjects, POA by MOA, Lexical)

	init	intV	postL	postN
lab	3.433790	4.657534	3.401826	3.376712
labdent	3.712329	4.680365	4.027397	3.538813

Considering these anomalies, analyses will exclude post-liquid items and items containing [v].

Native Spanish speakers demonstrate an awareness of the phonological distribution of /b,d,g/ in lexical items. Table 11 shows their mean response for incorrect and correct real items. These subjects give higher judgments for correct items than they do for incorrect items.

Table 11: Mean Responses (Native speakers, Real Items)

	Mean Response
Incorrect	5.508000
Correct	5.695833

Though Spanish speakers tend to give a higher response for correct items, a two-factor ANOVA does not show that correctness is significant by subject or by item for real items ($F_1(1,9) = 2.2593$, $p = 0.1671$, $F_2(1,47) = 2.2147$, $p = 0.1434$.

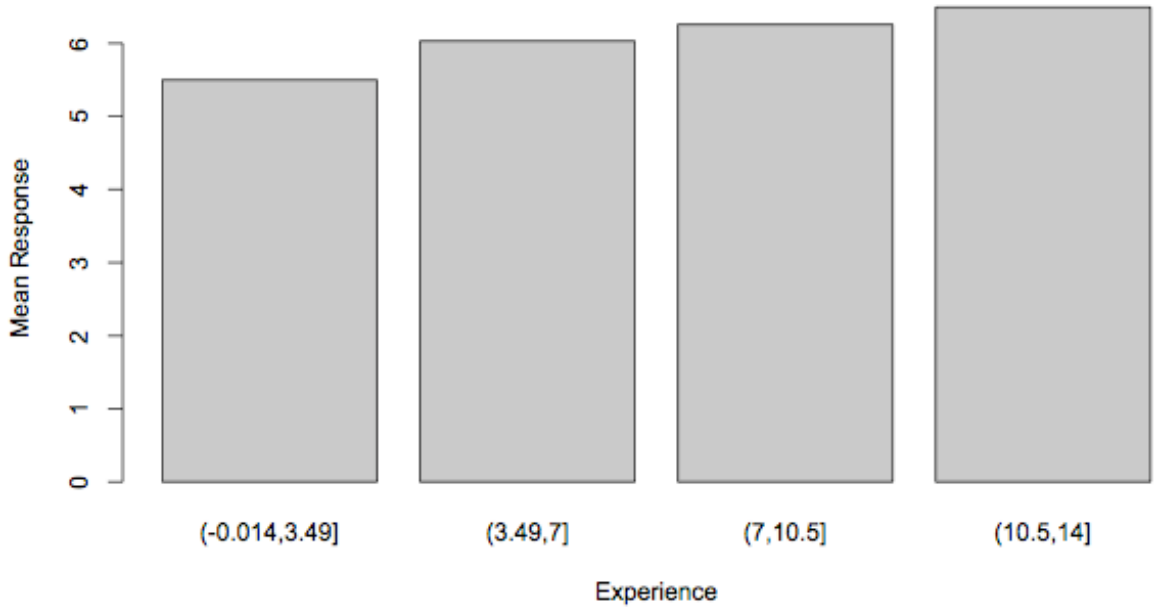
Spanish learners also seem to demonstrate an awareness of the phonological distribution of /b,d,g/ in real items. Table 12 shows these subjects' mean response for incorrect and correct real items. Spanish learners judge correct items as better than incorrect items.

Table 7: Mean Responses (Learners, Nonsense Items)

	Mean Response
Incorrect	5.496508
Correct	5.863757

Spanish learners also show a general improvement in their judgment of correct lexical items by experience level. In other words, more experienced learners judge correct lexical items as more correct than less experienced learners. These responses are shown in Figure 2 below, in which subjects are again binned into four groups based on experience level.

Figure 2: Experience and Correctness (Lexical)

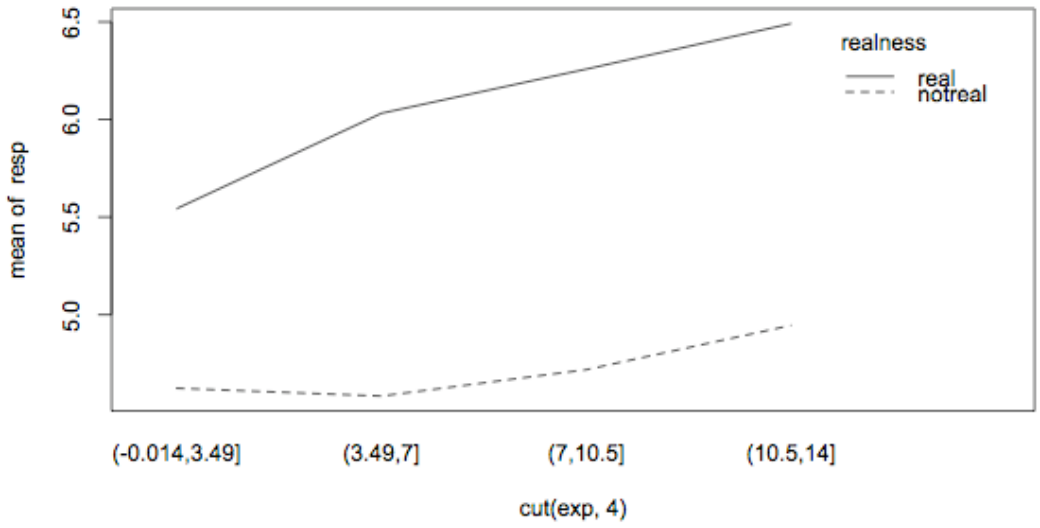


For Spanish learners, a two-factor ANOVA shows that there is a significant effect of correctness by subject but not by item ($F_1(1,62) = 49.713$, $p < .001$, $F_2(1,47) = 2.1712$, $p = 0.1473$). For Spanish learners there is a significant effect of experience by subject and by item ($F_1(3,59) = 3.7296$, $p < .001$, $F_2(3,1485) = 22.924$, $p < .001$). A two-factor ANOVA does not show a significant interaction between correctness and experience for lexical items $F_1(1,61) = 2.063$, $p = 0.1560$, $F_2(1,47) = 1.1082$, $p = 0.2979$)

Overall, Experiment 2 reveals that the well-formedness judgments of Spanish speakers was not driven by correctness of stimuli but that correctness was a significant factor for the well-formedness judgments of Spanish learners. Experiment 2 also demonstrates the significant effect of experience among Spanish learners' well-formedness judgments of real Spanish words.

The designs of Experiments 1 and 2 only differ by one factor: the realness of the stimuli. Specifically, the stimuli in Experiment 1 were nonsense words of Spanish and the stimuli of Experiment 2 were real words of Spanish, but both sets of items were manipulated by the same conditions. The comparable design of Experiments 1 and 2 enable an analysis that accounts for the stimuli from both experiments. For example, when considering both nonsense and lexical items for Spanish learners, there is a significant interaction between realness of item and experience of subject for correct items ($F_1(1,2833) = 327.783$, $p < .001$, $F_2(1,2850) = 31.249$, $p < .001$). This interaction is shown in Figure 3. This interaction indicates that learners get better at words over time, but do not get better at the generalizations over time.

Figure 3: Interaction between realness and experience (Learners)



GENERAL DISCUSSION

In general, we find that native speakers prefer the correct realizations of /b,d,g/ in both nonsense and lexical items. These results confirm that native speakers know the phonological distribution of /b,d,g/, particularly because they correctly apply these generalizations to nonsense words they have not heard before.

Learners, however, only demonstrate a statistically significant preference for correct forms in lexical items, which does not confirm the hypothesis that Spanish learners with more experience will give more native-like judgments of real and nonsense items than learners with less experience. A main effect of experience for lexical items, however, suggests that subjects have learned or acquired *something*. From Ortega (2009), Meara (2007), and Pavlenko (1999)'s account of vocabulary depth and long-term memory, we might expect that they have learned words of Spanish, but not the phonological generalizations of the language. If subjects have in fact learned words rather than generalizations, we would expect their well-formedness judgments would be more native-like for lexical items they are familiar with than for nonsense items that could not be encoded in their long-term memory.

Although there is not a main effect of experience for both lexical and nonsense items, the effect of experience among these subjects should not be discounted. Figures 1 and 2 showed a general improvement in their judgment of phonologically correct lexical *and* nonsense items. This behavior, along with the significant interaction between experience and realness, supports Hardy, Zampini, and Elliott's conclusions that experience is a significant factor in L2 phonological

acquisition. Our study also tested Zampini and Elliott's inference that L2 learners are capable of knowing a characteristic of the second language without being able to produce that knowledge consistently. In particular, this study gave learners an opportunity to demonstrate their knowledge of a second language in a judgment task rather than production task.

This study considers the significance of three factors: correctness of items, realness of items, and experience of subjects. Although native Spanish speakers generally demonstrated an awareness of the phonological distribution of /b,d,g/, there are places of articulation and positions within words for which the results were anomalous. For example, as noted earlier, the results for the post-liquid environment were atypical. With these irregularities in mind, we might expect that native speakers' well-formedness judgments are influenced by dialectal variation. If, for example, a native speaker has heard both [baka] and [βaka], they may give statistically similar well-formedness judgments to both variations. Future research should consider the influence of dialectal variation on well-formedness judgments by investigating which sounds in which phonological environments vary by dialect, and by determining whether these variations are given comparable well-formedness judgments by Spanish-speaking subjects.

Spanish learners also exhibit anomalous results. While these subjects do not statistically reflect an awareness of the phonological distribution of /b,d,g/ for nonsense items, there are places of articulation and positions within words for which they do accurately judge correct items as better than incorrect items. For example, because there is a phonemic difference between /d/ and /dh/ in English, we might expect further analysis of our data to reveal a significant effect of place of articulation.

Another factor related to place of articulation is markedness. As noted earlier, Eckman concluded that marked forms are more difficult to acquire than unmarked forms (1977). That is to say that for English speakers learning Spanish, the marked forms [β, ð, ɣ] are more difficult to acquire than the unmarked [b,d,g]. A similar concept to consider is frequency. Just as universally unmarked features are more difficult to acquire, L2 features occurring less frequently in L1 will be more difficult to acquire than L2 features that occur more frequently. Future analysis of our data will consider the relative frequencies of labial, dental, and dorsal sounds in English and Spanish and whether well-formedness judgments reflect an influence of these frequencies.

To conclude, this study has shown that well-formedness judgments of Spanish speakers and learners are influenced by realness and correctness of items, but not statistically by experience of subjects. It revealed that Spanish speakers judgments of nonsense items reflect an awareness of the phonological distribution of /b,d,g/ in their native language. The study did not however, demonstrate that English speakers learning Spanish as a second language acquire these generalizations. The study ultimately shows that these subjects are learning something, and it leaves an abundance of data for further investigation of the second language acquisition process.

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APPENDIX A: Nonsense Items

	Labial	Dental	Dorsal
Initial	(1) **busa** βusa vusa (2) **boma** βoma voma (3) **bifo** βifo vifo	(1) **dasko** ðasko (2) **dista** ðista (3) **dome** ðome	(1) **gantas** ɣantas (2) **giso** ɣiso (3) **guma** ɣuma
Intervocalic	(1) fiba **fiβa** fiva (2) teba **teβa** teva	(1) fudo **fuðo** (2) mado **maðo** (3) tida **tiða**	(1) fago **faɣo** (2) kego **keɣo**
Post Nasal	(1) **lombe** lomβe lomve (2) **niemba** niemβa niemva	(1) **fiendo** fienðo (2) **kunda** kunða (3) **londa** lonða	(1) **suenga** suenɣa (2) **miengo** mienɣo
Post Liquid	(1) ilbo **ilβo** ilvo (2) nielba **nielβa** nielva	(1) **talde** talðe (2) **raldo** ralðo	(1) telga **telɣa** (2) falgo **falɣo**

bold = phonologically correct item

APPENDIX B: Lexical Items

	Labial	Dental	Dorsal
Initial	(1) **baka** ‘cow’ βaka vaka (2) **bueno** ‘good’ βueno vueno (3) **botas** ‘boots’ βotas votas	(1) **dulse** ‘sweet’ ðulse (2) **dose** ‘twelve’ ðose (3) **ducha** ‘to shower’ ðuchar	(1) **gusta** ‘like’ ɣusta (2) **gafas** ‘glasses’ ɣafas (3) **gana** ‘win’ ɣana
Intervocalic	(1) pabo ‘turkey’ **paβo** pavo (2) nuebe ‘nine’ **nueβe** nueve (3) favor ‘favor’ **faβor** favor	(1) adios ‘goodbye’ **aðios** (2) puedo ‘I can’ **pueðo** (3) nadar ‘to swim’ **naðar**	(1) agua ‘water’ **aɣua** (2) paga ‘pay’ **paɣa** (3) lago ‘lake’ **laɣo**
Post Nasal	(1) **ambas** ‘both’ amβas amvas (2) **tambor** ‘drum’ tamβor tamvor	(1) **tienda** ‘store’ tienða (2) **cuando** ‘when’ cuanðo	(1) **tengo** ‘I have’ tenɣo (2) **lengua** ‘tongue’ lenɣua
Post Liquid	(1) alba ‘dawn’ **alβa** alva (2) salbar ‘to save’ **salβar** salvar	(1) **aldea** ‘village’ alðea (2) **saldar** ‘to sell’ salðar	(1) salgo ‘I leave’ **salɣo** (2) mielga ‘alfalfa’ **mielɣa**

bold = phonologically correct item