HISPANIC STUDIES
review

L2 acquisition of Spanish stress in segmentally identical words

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Abstract

This study investigates whether second language (L2) Spanish learners at different points in a university curriculum, students enrolled in either a second- or fourth-semester required Spanish language course versus students enrolled in a sixth-semester elective Spanish course, use stress as a cue to distinguish between segmentally identical words (e.g., *término* 'end' or 'term', *termino* 'I finish', and *terminó* 'you (formal)/he/she finished') in both production and perception. In addition to level of Spanish instruction (second/fourth semester versus sixth semester), stress position (antepenultimate, penultimate, final) also had a significant effect on learners' production and perception accuracy. Given the effects of these factors, the L2 learners in the present study used stress as a cue to distinguish between segmentally identical words in production and perception to varying degrees. Finally, both groups of learners' higher perception accuracy suggests that they first acquire the ability to perceive Spanish stress.

1. Introduction

Acquisition of Spanish stress by second language (L2) learners is important because it is contrastive, as it distinguishes the meaning between two or more segmentally identical words (Hualde, 2005). For example, *término* ('end' or 'term'), *termino* ('I finish') and *terminó* ('you (formal)/he/she finished') share the same segments, but are crucially differentiated by the location of stress within each word, as the antepenultimate, penultimate, and final syllables, respectively, are stressed. Just as un-target-like pronunciation of certain Spanish sounds may impede comprehensibility, errors in stress assignment may also impede comprehensibility.[1] If a learner stresses the incorrect syllable in a word, his/her intended meaning may change. Moreover, if a learner perceives an incorrect syllable as stressed, he/she may have difficulty understanding the speaker's intended meaning. Therefore, it is important to investigate L2 learners' acquisition of Spanish stress because stress assignment affects and serves to disambiguate lexical meaning in certain contexts.

Despite this well-known fact of Spanish stress, previous studies have not fully investigated L2 learners' acquisition of stress in this context, examining either production or perception. The present study contributes to the extant literature on L2 acquisition of Spanish stress by examining learners' production and perception in segmentally identical words that are differentiated only by stress. In addition, the present study focuses on real and nonce segmentally identical words to investigate whether lexical familiarity affects L2 acquisition of Spanish stress in this

1 For example, producing an English alveolar flap [ɾ] for Spanish [ð] may impede comprehensibility because the English flap and Spanish tap /ɾ/ are perceptually similar.

context, as it has been found to affect L2 Spanish learners' acquisition of stress in real and nonce non-segmentally identical words. Specifically, this study answers the following research questions:

1. Do L2 Spanish learners at different points in a university curriculum, students enrolled in either a second- or fourth-semester required Spanish language course versus students enrolled in a sixth-semester elective Spanish course, distinguish between segmentally identical words that differ only in stress placement in a reading-based production task?

2. Do L2 Spanish learners at different points in a university curriculum, students enrolled in either a second- or fourth-semester required Spanish language course versus students enrolled in a sixth-semester elective Spanish course, aurally perceive a difference in segmentally identical words that differ only in stress placement?

3. Does word type (actual Spanish word versus nonce word) affect L2 Spanish learners' production and perception accuracy?

4. Does stress position (antepenultimate, penultimate, final) affect L2 Spanish learners' production and perception accuracy?

5. Are L2 Spanish learners' production and perception of stress correlated?

2. L2 Spanish Phonological Acquisition

Measuring L2 acquisition of Spanish stress in terms of both production and perception, the present study examines the relationship between the two in light of Flege's (1995) Speech Learning Model (SLM) because this model was designed to address production and perception of L2 speech by L2 learners. Although the SLM, like other models of L2 phonological acquisition (cf. Best & Tyler, 2007; Escudero, 2005), focuses on L2 acquisition at a segmental level, its underlying hypothesis can be extended to L2 acquisition of suprasegmental features such as stress. Flege (1995) claims that "a basic tenet of the model is that many, but not all, L2 production errors have a perceptual basis" (p. 238). In other words, the SLM proposes that accurate perception is a necessary precursor to accurate production in L2 phonological acquisition. Based on this claim, it can be hypothesized that the learners in the present study will have difficulty producing Spanish stress in segmentally identical words if they do not first perceive differences in stress placement among these words. Therefore, L2 acquisition of Spanish stress in the context of segmentally identical words necessarily requires learners to first aurally notice differences in stress placement in order to be able to produce them.

In addition, the role of the first language (L1) and the issue of similarity between the L1 and L2 are incorporated into the SLM to predict L2 learning difficulty. As stated in the third and fifth hypotheses of the model (cf. Flege, 1995), the SLM predicts that differences rather than similarities between the L1 and L2 facilitate acquisition. As Lord (2002) notes, one of the main similarities between English and Spanish stress is that any of the last three syllables of a word can be stressed. Another similarity is that stress can vary freely and convey lexical distinctions in both English (e.g., *address* /ˈædrɛs/ 'the name of the place where one lives' vs. *address* /əˈdrɛs/ 'to direct a speech to someone') and Spanish (e.g., *término* /ˈtɛɾmino/ 'end' or 'term' vs. *termino* /tɛɾˈmino/ 'I finish' vs. *terminó* /tɛɾmiˈno/ 'you (formal)/he/she finished'). Although any of the last three syllables of a word in English and Spanish can be stressed, Pons and Bosch (2010) note that "in contrast with Spanish, stress in English, although variable, falls primarily on the initial syllable of a word" (p. 227). Additionally, acoustically, lexical stress is realized differently in English and Spanish. According to Skoruppa, Cristià, Peperkamp, and Seidl (2011), "Spanish uses some

combination of suprasegmental cues (most importantly, pitch, duration, and amplitude), while English further recruits segmental cues, by introducing important changes in vowel quality in unstressed syllables" (p. 51). Based on these similarities and differences, it can be hypothesized that the SLM would predict that native English-speaking L2 Spanish learners would have difficulty acquiring Spanish stress because of the three-syllable window of stress placement in both languages. In other words, the fact that stress can fall on any of the last three syllables of a word in English and Spanish might cause learners to not attend to differences in the distribution of stress patterns between languages and to acoustic differences in how stress is realized.

While no previous study, to the best of my knowledge, has examined L2 acquisition of Spanish stress in light of the SLM, previous L2 studies on certain Spanish sounds, such as stops, have empirically tested its claims (e.g., González López & Counselman, 2013; Kissling, 2013; Reeder, 1998; Zampini, 1998). The results of González López and Counselman (2013) support Flege's hypothesis that L2 perception precedes L2 production because the learners in their study would not have been able to successfully form L2 categories for Spanish /p/ and /t/ without having first perceived the differences between these sounds in English and Spanish. Reeder's (1998) findings also support Flege's SLM since learners' production of Spanish voiceless stops, which initially showed L1 transfer from English in the form of long-lag voice onset time (VOT), began approximating more target-like norms through reduced VOT; thus, providing evidence that learners were in the process of establishing new phonetic categories for Spanish /p t k/. Reeder's findings also support the SLM's claim that dissimilar sounds are easier to acquire than similar sounds because the learners in his study acquired the trill, which does not have an American English counterpart, more completely and consistently than voiceless stops.

Kissling (2013) and Zampini (1998) tested the SLM's claim that learners' ability to produce L2 sounds is related to their ability to perceive them. Kissling's results partially support this hypothesis, as she found evidence of a positive relationship between perception and production of some sounds, /t/ and /k/, but not of all sounds under investigation. Zampini's (1998) results do not support Flege's hypothesis that accurate perception is a necessary precursor to accurate production because some learners with the longest perceptual boundaries also produced some of the shortest VOT values for /p/, suggesting that perhaps in this case L2 production precedes perception. On the other hand, Zampini's correlation data for Spanish /b/ do not support either hypothesis that production precedes perception or that perception precedes production.

Since some of the previous L2 Spanish phonology studies that have empirically tested the SLM's claims have provided support for the model while others have not, it is necessary to further investigate its claims. It is especially important to examine how the SLM bears on L2 acquisition of Spanish stress because the studies that have empirically tested its predictions have focused on certain Spanish sounds, such as stops, while no previous study, to the best of my knowledge, has examined L2 acquisition of Spanish stress in light of the SLM. Although the SLM was originally formulated to predict L2 phonological acquisition at a segmental level, it is also worth examining how its basic claim can extend to acquisition at a suprasegmental level.

2.1 L2 Acquisition of Spanish Stress

Previous research on L2 acquisition of Spanish stress by native English speakers has mostly focused on learners' production, with many studies examining the role of the lexicon in stress assignment (Bullock & Lord, 2003; Carlson, 2006; Lord, 2007; Tight, 2007). Fewer studies have investigated L2 learners' perception of Spanish stress (Face, 2005; Lord, 2002; Saalfeld, 2012), and

Lord (2002) is the only study to date to have investigated both production and perception.

Lord (2002) investigated L2 production and perception of Spanish stress in beginning-level learners enrolled in either a second- or third-semester Spanish course, intermediate learners enrolled in upper-level Spanish courses, and advanced learners who were Spanish teaching assistants or lecturers. On a reading-based production task, Lord found that learners' accuracy consistently increased across the three proficiency levels. She also found that learners' production accuracy differed according to the type of word (i.e., actual Spanish word or nonce word) and the location of stress. Beginning-level learners produced both types of words with nearly the same accuracy, while intermediate and advanced learners consistently produced real words more accurately than nonce words. Beginning-level learners were more accurate in producing penultimate stress, the most common pattern, than antepenultimate and final stress. Intermediate learners also produced penultimate stress more accurately than final stress, while advanced learners produced antepenultimate stress, the least common pattern, more accurately than final stress.

The results of Lord's experiment show that there was less variation in the participants' perception accuracy than in their production accuracy. Specifically, learners' perception accuracy did not differ according to stress position or word type. Moreover, there was very little variation across proficiency levels, as all learners' perception accuracy was similar and quite high. The biggest differences were found between the beginning and advanced learners, while beginning and intermediate learners' perception accuracy was very similar as was intermediate and advanced learners' perception accuracy. Based on the findings of the production and perception tasks, Lord (2002) concluded "participants are apparently able to perceive stress sooner than they are able to produce it, indicating that the receptive skills are acquired earlier than the productive skills" (p. 203).

In a follow-up study based on the methodology employed in the production experiment in Lord (2002), Bullock and Lord (2003) examined the role of analogy as it pertains to the processes L2 Spanish learners employ in producing stress patterns on real and nonce words. Learners employed analogy in producing both nonce words and to a lesser degree unfamiliar real Spanish words, such as *aceite* which they produced as *siete*, by mimicking the stress of phonetically similar words already in their lexicon. Bullock and Lord found that learners' accuracy increases across levels, and advanced speakers do not differ significantly from native speakers. They also found that learners at different proficiency levels use analogy as a tool in pronouncing unknown words, but to varying degrees. On average, beginners used analogy to produce stress on both real words and invented forms the most, followed by intermediate learners, while advanced and native speakers relied on analogy much less. Moreover, learners relied on analogy much more in producing stress on nonce words than real Spanish words, as of the 333 total cases of analogies, 274 were made on nonce words, while 59 were made on real words. Analogy was not however the only tool learners used in pronouncing unknown words, as they also tended to overgeneralize penultimate stress, which is the most common pattern in Spanish and the pattern they produced most accurately. Although the learners in Bullock and Lord's study used both overgeneralization and analogy to assign stress to unknown words, they relied more on analogy, searching for similar exemplars in Spanish first and then in English, resorting to the latter only if they are unable to find a similar Spanish exemplar.

Employing the same methodology used in her earlier studies, Lord (2007) further investigated the role of lexical familiarity in L2 acquisition of Spanish stress by native English speakers. Word type and proficiency level had a significant effect on participants' production accuracy,

as learners at different proficiency levels, except for advanced and native speakers, performed differently on real words and invented forms. According to Lord, the different accuracy rates for each word type suggest that lexical familiarity affects accurate stress production and that learners employ different processes in assigning stress to familiar and unfamiliar words. In addition to learners' accuracy, Lord examined the amount of time learners took to produce sentences containing real words and invented forms. Beginning and intermediate learners' production times were similar on sentences containing real words and those containing nonce words, likely due to their limited lexicon. According to Lord, differences, although not significant, found for advanced and native speakers between the two word types are likely attributable to their more extensive lexicon. Lord (2007) claims that "the performance of the participants shows that the lexicon plays a vital role in stress assignment: if a word is known, it is produced more quickly and accurately than a word that is unknown" (p. 10). Moreover, as reported in Bullock and Lord (2003), learners often relied on analogy to assign stress to unknown words.

Focusing on lexical subregularities identified by Aske (1990), Carlson (2006) and Tight (2007) similarly provide evidence that the lexicon has a prominent role in L2 acquisition of Spanish stress, as learners rely on analogy to assign stress to invented forms.[2] For further discussion of the role of lexical familiarity and analogy in stress assignment, see Carlson (2006) and Tight (2007).

Replicating an earlier study from 2000 based on native speaker data, Face (2005) examined whether elementary, intermediate, and advanced L2 Spanish learners rely on syllable weight to perceive unmarked Spanish stress patterns in synthesized nonce words neutral with regard to stress and acoustically-stressed nonce words.[3] Face found that learners' perception of the unmarked stress patterns in the synthesized nonce words consistently increased as their level of Spanish instruction increased. Although learners' perception of both unmarked stress patterns consistently increased across all levels of instruction, all learners perceived the unmarked pattern much more often in words with light final syllables than in words with heavy final syllables, which is similar to Face's (2000) findings for native speakers. Face (2005) also found that learners relied increasingly more on final syllable weight as a cue to stress perception as their level of instruction increased. While the weight of the final syllable was not a significant factor in perceiving either final or penultimate stress for elementary students, it was for intermediate students only for final stress and for advanced students for both final and penultimate stress. Similar to Face's (2000) findings for native speakers, the weight of the penultimate syllable was not a significant factor in perceiving it as stressed for any group of learners since penultimate stress is unmarked when the final syllable is light. Finally, Face (2005) also found that learners' perception of acoustically-stressed words consistently increased as their level of instruction increased, with the advanced students' accuracy approaching native speakers' accuracy. Since all learners perceived the unmarked penultimate stress pattern more often than the unmarked final stress pattern, as determined by the weight of the final syllable, Face (2005) concluded that "students first acquire the default stress pattern, which is penultimate stress, and later acquire the phonologically unmarked stress patterns" (p. 99). He also concluded that while L2 Spanish

2 For example, words ending in *–n* are commonly thought to be stressed on the penultimate syllable (Teschner, 2000); however, final stress, depending on the preceding vowel, is also possible, as Aske (1990) found that native speakers use analogy to assign final stress to these words.

3 As Face (2005) states, "in Spanish unmarked stress is determined by the final segment of the word. When the final segment is a vowel (i.e., the final syllable is light), unmarked stress falls on the penultimate syllable and when the final segment is a consonant (i.e., the final syllable is heavy), unmarked stress falls on the final syllable" (p. 92).

learners rely on syllable weight to some degree to perceive Spanish stress, they do not rely on it as much as native speakers.

The most recent study to investigate L2 acquisition of Spanish stress by native English speakers, Saalfeld (2012) examined the effect of explicit instruction on perception in students enrolled in a second-semester Spanish course, some of whom received targeted instruction while others did not. The results of the pretest indicated that learners in either group, experimental or control, were not more accurate in perceiving stress contrasts in Spanish on an ABX judgment task than a control group of native English speakers who had no knowledge of Spanish. Although both learner groups' perception accuracy increased from the pretest to the posttest, their gains were not significantly different. In addition, although both learner groups improved from the pretest to the posttest, neither was significantly different from the English control group with no knowledge of Spanish even at the posttest. These results suggest that while targeted instruction on Spanish stress may be beneficial, it does not provide learners an advantage in perceiving stress over those learners that do not receive such instruction or over non-Spanish speakers. In fact, Saalfeld (2012) concludes that "in the present study, the cause of learner improvement is not clear" (p. 297), and may not necessarily be the result of explicit instruction on Spanish stress. Saalfeld points to the need for future studies to further investigate the effect of explicit instruction on L2 learners' perception of Spanish stress, as it is possible that other factors such as differences in academic ability and motivation between learner groups in addition to a possible task effect resulting from a lack of distracter items affected these results, obfuscating the effect of instruction on acquisition.

While each of the studies reviewed here has made important contributions to the field of L2 Spanish phonology by shedding light on an understudied aspect of phonological acquisition, stress, there remains a need for more such studies. Research on L2 acquisition of Spanish stress has largely focused on learners' production, with perceptual studies lagging behind. The results of Lord (2002), Face (2005), and Saalfeld (2012) the only studies to date, to the best of my knowledge, to have investigated learners' perception, suggest that this area is particularly ripe for further research. Specifically, the relationship between L2 learners' production and perception of Spanish stress merits further attention. Based on mean accuracy percentages on production and perception tasks, Lord (2002) concluded that perception precedes production, but it is unknown whether they are significantly correlated. The present study aims to provide additional insight into the potential relationship between L2 learners' production and perception of Spanish stress through a correlation analysis of production and perception data that are based on the same stimuli, across learner levels and with all learner groups combined.

Another issue that has not yet been fully investigated is whether L2 Spanish learners use stress as a cue to distinguish between segmentally identical words that differ only in stress placement, such as *término* ('end' or 'term'), *termino* ('I finish') and *terminó* ('you (formal)/he/she finished'). While most previous studies reviewed here used these stimuli (i.e., segmentally identical words) in either a production or perception task, they did so to address other research questions pertaining to factors that may affect L2 acquisition of Spanish stress such as lexical subregularities and explicit pronunciation instruction. No previous study on this topic has used the same segmentally identical words as the stimuli for production and perception tasks completed by the same groups of learners to examine acquisition in this context, nor has any previous study addressed whether learners' production and perception of Spanish stress in segmentally identical words are correlated. The present study contributes to existing research on L2 acquisition of Spanish stress by directly investigating whether learners use stress as a cue to distinguish

between segmentally identical words in both production and perception.

Finally, studies such as Lord (2002, 2007) and Bullock and Lord (2003) that investigated L2 learners' production of Spanish stress in real and nonce non-segmentally identical words largely focused on the role of the lexicon, finding that it does indeed affect learners' acquisition. The present study includes real and nonce segmentally identical words to examine whether lexical familiarity may affect learners' acquisition of Spanish stress in this context, measured in terms of both production and perception. In other words, this study aims to determine whether learners are more accurate in producing and perceiving stress in segmentally identical real Spanish words, which should be familiar to learners since cognates such as *vómito* 'vomit'/*vomito* 'I vomit'/*vomitó* 'you (formal)/he/she vomited' and words commonly used in language classes such as *trabajo* 'work/job' and 'I work'/*trabajó* 'you (formal)/he/she worked' were used in the study, or in segmentally identical nonce words, which are unknown to learners because they do not exist in Spanish. Lexical familiarity may affect learners' acquisition of stress in the context examined in the present study because they need to rely on their lexicon to accurately produce and perceive stress in real Spanish words. Learners may not use stress as a cue to distinguish between segmentally identical real Spanish words in production and/or perception if they do not know that the words are different.

3. Methodology

3.1 Participants

The researcher recruited study participants by visiting, with the instructors' permission, two lower-level language courses and an upper-level content course in the Spanish program at a large public university in the United States to briefly describe the study and the tasks participants would be asked to perform. To avoid potentially compromising the results, the study was described in general terms as examining how native English speakers learn Spanish as a second language; students were therefore unaware of the specific objectives of the study. Students were informed that their course grade would not be affected in any way whether they chose to participate in the study.

Twenty-five L2 Spanish learners at this university participated in the present study. Thirteen students were enrolled in a second-semester language course, four students were enrolled in a fourth-semester language course, and eight students were enrolled in an Introduction to Hispanic Linguistics course, which may be taken as early as a student's sixth semester of Spanish study at this university. Some learner groups are larger than others, particularly the second- and sixth-semester groups, because participation in this study was voluntary. It is possible that the comparatively small fourth-semester group is due to differences in learner motivation. As indicated on a language background questionnaire, the second-semester learners were enrolled in their first university-level Spanish course and perhaps were more motivated, because they were just beginning their Spanish language study in the program, than the fourth-semester learners who were enrolled in the last course necessary to complete the language requirement for graduation. The sixth-semester learners were all completing a Spanish major or minor, so it is therefore likely that these students were highly motivated and interested in Spanish. Learner motivation was not included in the background questionnaire, but it would be worthwhile to examine in a future study, as it is possible that learners' acquisition of Spanish stress and other features would be affected by their motivation. All of the participants were native speakers of

American English and had studied Spanish to varying degrees prior to beginning their undergraduate studies. Learner background characteristics are summarized in Table 1.

Table 1. *Learner background characteristics*

Level of Spanish instruction	No. of subjects	Age		Gender		Years of L2 study		Time spent abroad (in weeks)[4]	
		Range	Mean	Male	Female	Range	Mean	Range	Mean
Second-semester	13	17-36	21.7	2	11	1-6	3.4	0-12	2.3
Fourth-semester	4	18-25	21.3	3	1	1.5-5.5	3.1	0-1	.25
Sixth-semester	8	18-22	19.8	0	8	1-15	6.5	0-20	3.5

As indicated by the data reported in Table 1, second- and fourth-semester learners, who were enrolled in required language courses, do not differ in prior experience. Therefore, these two groups were collapsed in the data analysis, resulting in a comparison of L2 acquisition of Spanish stress by students enrolled in a required language course, either second semester or fourth semester, and students enrolled in an elective Introduction to Hispanic Linguistics course, which may be taken as early as a student's sixth semester of Spanish study at this university. The difference between these two groups is prior experience, as language students have an average of just over three years of L2 study and linguistics students have an average of six and a half years of L2 study.

3.2 Materials

The same three lists of segmentally identical trisyllabic words were used for the production and perception tasks. The first word list was comprised of eight triplets in which one of the last three syllables in each word was stressed, e.g., *término* ('end' or 'term'), *termino* ('I finish') and *terminó* ('you (formal)/he/she finished'). The second word list was comprised of eight pairs in which one of the last two syllables in each word was stressed, e.g., *trabajo* ('work/job' or 'I work') and *trabajó* ('you (formal)/he/she worked'). Although each syllable could potentially be stressed in the words included in word list 2, there are only two real Spanish words per pair differentiated by stress because these words do not exist with stress on the antepenultimate syllable, e.g., **trábajo.* The third word list was comprised of eight triplets in which one of the last three syllables in each word was stressed, e.g., *grábedo, grabedo, grabedó*. All of the words in the first and second lists were real Spanish words, while all of the words in the third list were nonce words in order to examine whether lexical familiarity affects learners' acquisition of stress in segmentally identical words. The words from each list were combined and randomized when they were presented

4 As reported in Table 1, second- and sixth-semester students spent on average the most time abroad; however, the purpose of their stays abroad was different. The majority of second-semester students that spent time abroad, six of eight, were abroad for leisure and reported using little to no Spanish, while the majority of sixth-semester students that spent time abroad, three of five, were abroad for either study or missionary work and reported using Spanish during much of their stay.

to the learners so that no effects of priming for the same stress patterns would skew the results. Since word lists 1 and 3 were comprised of eight triplets (3 x 8 = 24 + 3 x 8 = 48 words) and word list 2 contained eight pairs of words with differing stress (2 x 8 = 16), there were a total of 64 target tokens.

3.3 Tasks

Subjects first completed a production task followed by a perception task in order to prevent a potential priming effect. For the production task, learners read a list of segmentally identical trisyllabic words that differed only in stress position while being audio-recorded. For the perception task, subjects heard a recording of the same words used in the production task and circled the number (1, 2, or 3) that corresponded to the syllable they perceived as stressed (i.e., 1 if they perceived the first syllable as stressed, 2 if they perceived the second syllable as stressed, and 3 if they perceived the third syllable as stressed). The written representation of each word was intentionally not included on the answer sheet so that orthography would not influence the learners' responses. A female native speaker from Puerto Rico recorded the words for the perception task. Upon completion of both tasks, learners completed a brief background questionnaire about their experience studying Spanish.

As previously mentioned, the present study investigates L2 learners' acquisition of Spanish stress in segmentally identical words differentiated only by stress placement (antepenultimate, penultimate, final) to determine whether they use stress as a cue to distinguish between such words in both production and perception. If a learner produces three segmentally identical words such as *término* ('end' or 'term'), *termino* ('I finish') and *terminó* ('you (formal)/he/she finished') with stress on the same syllable, his/her production would indicate that he/she does not recognize three different words, each with a different meaning. Likewise, upon hearing these three words, if a learner indicates that the same syllable is stressed in each word, this would suggest that he/she does not perceive a difference between the words. However, if a learner produces each word with stress on a different syllable and perceives stress on a different syllable in each word, this would suggest that he/she thinks each word is different rather than the same word repeated. In addition, it is theoretically possible that a learner may perceive stress on a different syllable in each word but produce each word with stress on the same syllable. This would suggest that while the learner aurally recognizes each word is different, he/she does not know how or is at the moment unable to produce this difference, and that perception alone is not sufficient to successfully acquire Spanish stress in segmentally identical words. Finally, it is also theoretically possible that a learner may perceive stress on the same syllable in each word but produce each word with stress on a different syllable, suggesting that even though the difference in stress placement is not perceptually salient to the learner, it does not impede his/her ability to differentiate the words in production.

3.4 Data Analysis

Following Lord (2002), Bullock and Lord (2003), and Lord (2007), three judges - all of whom were doctoral students in Hispanic Linguistics and graduate instructors of Spanish with native or near-native fluency in Spanish - listened to and rated the learners' productions for accuracy of stress placement. In rare cases of disagreement among judges, the majority answer was chosen. Judges determined the correct or target production for the nonce words based on the native

speaker's production in the recording used for the perception task. The native speaker's production was also considered the target for real Spanish words.

Learners' production and perception data were coded following the same method. Correct productions and correct responses on the perception task were assigned 1 point, while incorrect productions and incorrect responses on the perception task were assigned 0 points. Since there were 64 total target tokens, each learner could receive a maximum score of 64 points each for the production and perception tasks. Separate production and perception accuracy scores were then calculated for each word type (real and nonce) at each level of stress (antepenultimate, penultimate, final) by participant.

Statistical analysis was performed on the data using SPSS (Statistical Package for the Social Sciences, 2013) in order to determine whether learners' production and perception accuracy varied according to level of Spanish instruction (second/fourth semester versus sixth semester), stress position (antepenultimate, penultimate, final), and word type (real Spanish word versus nonce word). Following Lord (2002), Bullock and Lord (2003), and Lord (2007), analysis of variance (ANOVA) was performed on the mean accuracy percentages.[5] Specifically, separate three-factor (one between-subjects factor: instruction level and two within-subjects factors: stress and word type) ANOVAs were performed on the production and perception mean accuracy percentages. Post-hoc Tukey HSD tests were subsequently carried out to determine the nature of significant findings revealed by the ANOVAs. Finally, in order to determine whether L2 learners' production and perception of Spanish stress in segmentally identical words are related, correlation analyses were performed for subsets of the production and perception data in addition to the entire data set overall. Specifically, learners' mean production and perception accuracy for each word type at each level of stress were correlated by instruction level in addition to their overall mean production and perception accuracy. The level of significance was preset at 0.05 for all statistical analyses.

4. Results

4.1 Production Results

First, learners' mean production accuracy for each word type (real and nonce) at each level of stress (antepenultimate, penultimate, final) is reported by instruction level in Table 2. The results of the ANOVA on learners' mean production accuracy are then reported in Table 3.

5 The assumptions of ANOVA were met.

Table 2. *Learners' mean production accuracy*

Group	Stress position	Word type	Mean	Std. Deviation
language course	antepenultimate	real word	.7306	.20852
		nonce word	.5829	.26473
		Total	.6568	.24633
	penultimate	real word	.6035	.12242
		nonce word	.8694	.13498
		Total	.7365	.18523
	final	real word	.4088	.33130
		nonce word	.3553	.35437
		Total	.3821	.33888
	Total	real word	.5810	.26776
		nonce word	.6025	.33700
		Total	.5918	.30304
linguistics course	antepenultimate	real word	.9388	.13163
		nonce word	.8288	.27446
		Total	.8838	.21556
	penultimate	real word	.4075	.11937
		nonce word	.5188	.19335
		Total	.4631	.16552
	final	real word	.8363	.12397
		nonce word	.8763	.17679
		Total	.8563	.14895
	Total	real word	.7275	.26371
		nonce word	.7413	.26465
		Total	.7344	.26144

As observed in Table 2, sixth-semester students enrolled in an elective linguistics course expectedly had a higher mean production accuracy (73.4%) on all tokens than second- and fourth-semester students enrolled in required language courses (59.2%). Bullock and Lord (2003) and Lord (2002, 2007) similarly found that learners' overall production accuracy increased as their level of Spanish instruction increased. While sixth-semester learners outperformed second- and fourth-semester learners on real words and nonce words, respectively, it is interesting to note that both groups had a slightly higher mean accuracy on nonce words than real words. This finding will be further discussed in the Discussion section. In addition, sixth-semester students had a higher mean accuracy on antepenultimate and final stress for both word types than second- and fourth-semester students, while second- and fourth-semester students had a higher mean accuracy on penultimate stress for both word types than sixth-semester students. Finally, sixth-semester learners were most accurate in producing antepenultimate stress overall and least accurate in producing penultimate stress overall, while second- and fourth-semester learners were most accurate in producing penultimate stress overall and least accurate in producing final stress overall. These results are generally in agreement with Lord's (2002) findings that beginning-level learners were more accurate in producing penultimate than antepenultimate and final stress, while intermediate learners were more accurate in producing penultimate than final stress and advanced learners were more accurate in producing antepenultimate than final stress.

The results of the three-factor (one between-subjects factor: instruction level and two within-subjects factors: stress and word type) ANOVA on learners' production mean accuracy percentages are reported in Table 3.

Table 3. *Results of the ANOVA on the production data*

Source of Variation	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Instruction level	.664	1	.664	12.296	.001*	.082
Stress position	.758	2	.379	7.022	.001*	.092
Word type	.010	1	.010	.189	.665	.001
Instruction level x Stress position	3.156	2	1.578	29.231	.000*	.298
Instruction level x Word type	.000	1	.000	.009	.924	.000
Stress position x Word type	.558	2	.279	5.166	.007*	.070
Instruction level x Stress position x Word type	.092	2	.046	.854	.428	.012
Error	7.450	138	.054			

*$p < 0.05$

The ANOVA revealed that instruction level (F (1, 138) = 12.296, $p < .001$, $h^2 = .082$) was a significant factor, as sixth-semester students' production accuracy was significantly higher than second- and fourth-semester students' production accuracy.[6] In addition, stress position (F (2, 138) = 7.022, $p < .001$, $h^2 = .092$) was also a significant factor and the interactions between instruction level and stress position (F (2, 138) = 29.231, $p < .000$, $h^2 = .298$) and between stress position and word type (F (2, 138) = 5.166, $p < .007$, $h^2 = .070$) were significant. The significant interaction between instruction level and stress position suggests that learners' accuracy in producing different stress patterns depends on their level of instruction. Post-hoc Tukey HSD tests indicated that learners' overall accuracy in producing antepenultimate stress was significantly different from their accuracy in producing penultimate ($p < .002$) and final ($p < .009$) stress, as they produced antepenultimate stress significantly more accurately than penultimate and final stress, respectively.

Post-hoc Tukey HSD tests were also performed to determine whether there were significant differences in learners' production of different stress patterns in real and nonce words at different instruction levels. Sixth-semester students produced antepenultimate stress in both real words ($p < .038$) and nonce words ($p < .015$) significantly more accurately than second- and fourth-semester students. Sixth-semester students also produced final stress in both real words ($p < .000$) and nonce words ($p < .000$) significantly more accurately than second- and fourth-semester students. However, second- and fourth-semester learners produced penultimate stress

6 Citing Cohen (1988), Eddington (2015) states that "for ANOVA, partial eta^2 values around .01 show a weak effect, those around .06, a medium effect, and values of about .14 and larger, a large effect" (p. 66). Based on this, the value of .082 indicates a medium effect size.

in nonce words significantly more accurately than sixth-semester learners ($p < .001$).

Finally, the significant interaction between stress position and word type suggests that learners' production accuracy depends on both the type of word and stress position even though the variable word type alone does not significantly affect learners' production. Since word type alone does not significantly affect learners' production, this significant interaction is likely driven by stress position because that variable alone was significant. Therefore, word type only has an effect on learners' production when it interacts with stress position. Even though there were not significant differences in learners' production according to word type, both groups of learners were slightly more accurate in producing stress in nonce words.

4.2 Perception Results

First, learners' mean perception accuracy for each word type (real and nonce) at each level of stress (antepenultimate, penultimate, final) is reported by instruction level in Table 4. The results of the ANOVA on learners' mean perception accuracy are then reported in Table 5.

Table 4. *Learners' mean perception accuracy*

Group	Stress position	Word type	Mean	Std. Deviation
language course	antepenultimate	real word	.7518	.19346
		nonce word	.8618	.17583
		Total	.8068	.19040
	penultimate	real word	.5747	.25050
		nonce word	.5829	.29223
		Total	.5788	.26804
	final	real word	.7588	.17762
		nonce word	.7006	.27887
		Total	.7297	.23211
	Total	real word	.6951	.22261
		nonce word	.7151	.27464
		Total	.7051	.24895
linguistics course	antepenultimate	real word	.9238	.09195
		nonce word	.9688	.08839
		Total	.9463	.09018
	penultimate	real word	.8850	.11711
		nonce word	.8925	.10403
		Total	.8888	.10707
	final	real word	.9225	.11424
		nonce word	.9550	.06211
		Total	.9388	.09040
	Total	real word	.9104	.10515
		nonce word	.9388	.08941
		Total	.9246	.09761

As observed in Table 4, sixth-semester students enrolled in an elective linguistics course expectedly had a higher mean perception accuracy (92.5%) on all tokens than second- and fourth-semester students enrolled in required language courses (70.5%). Face (2005) and Lord (2002) similarly found that learners' overall perception accuracy increased as their level of Spanish instruction increased. While sixth-semester learners outperformed second- and fourth-semester learners on real words and nonce words, respectively, it is interesting to note that both

groups had a slightly higher mean perception accuracy on nonce words than real words, a pattern previously observed in the production data. This finding will be further discussed in the Discussion section. In addition, sixth-semester students had a higher mean perception accuracy on antepenultimate, penultimate, and final stress for both word types than second- and fourth-semester students. This finding will be further discussed in the Discussion section. Finally, sixth-semester learners were most accurate in perceiving antepenultimate stress overall and least accurate in perceiving penultimate stress overall, a pattern previously observed in their production data. Second- and fourth-semester learners were similarly most accurate in perceiving antepenultimate stress overall and least accurate in perceiving penultimate stress overall, while they were most accurate in producing penultimate stress overall and least accurate in producing final stress overall.

The results of the three-factor (one between-subjects factor: instruction level and two within-subjects factors: stress and word type) ANOVA on learners' perception mean accuracy percentages are reported in Table 5.

Table 5. *Results of the ANOVA on the perception data*

Source of Variation	Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Instruction level	1.572	1	1.572	38.632	.000*	.219
Stress position	.468	2	.234	5.746	.004*	.077
Word type	.019	1	.019	.468	.495	.003
Instruction level x Stress position	.160	2	.080	1.963	.144	.028
Instruction level x Word type	.001	1	.001	.014	.906	.000
Stress position x Word type	.049	2	.024	.599	.551	.009
Instruction level x Stress position x Word type	.033	2	.017	.409	.665	.006
Error	5.617	138	.041			

*$p < 0.05$

Similar to the ANOVA on the production data, the ANOVA on the perception data revealed that instruction level (F (1, 138) = 38.632, p < .000, h^2 = .219) was a significant factor, as sixth-semester students' perception accuracy was significantly higher than second- and fourth-semester students' perception accuracy.[7] Stress position (F (2, 138) = 5.746, p < .004, h^2 = .077) was also a

7 Citing Cohen (1988), Eddington (2015) states that "for ANOVA, partial eta^2 values around .01 show a weak

significant factor in perception. Post-hoc Tukey HSD tests indicated that learners' overall accuracy in perceiving antepenultimate stress was significantly higher than their overall accuracy in perceiving penultimate ($p < .004$) but not final ($p = .990$) stress. In addition, learners' overall accuracy in perceiving penultimate stress was not significantly different from their overall accuracy in perceiving final stress ($p = .065$). Post-hoc Tukey HSD tests were also performed to determine whether there were significant differences in learners' perception of different stress patterns in real and nonce words at different instruction levels. Sixth-semester students perceived antepenultimate stress in real words ($p < .049$) significantly more accurately than second- and fourth-semester students, but not in nonce words ($p = .218$). Sixth-semester students also perceived penultimate stress in both real words ($p < .000$) and nonce words ($p < .000$) significantly more accurately than second- and fourth-semester students, while sixth-semester learners perceived final stress in nonce words ($p < .004$) significantly more accurately than second- and fourth-semester learners, but not in real words ($p = .061$). Finally, as indicated in Table 5, word type was not a significant factor and no interactions were significant.

4.3 Correlation of Production and Perception Results

Learners' mean production and perception accuracy for each word type at each level of stress were correlated by instruction level in addition to their overall mean production and perception accuracy. First, the results of the correlation analyses by instruction level are presented in Tables 6 through 11, followed by the results of the correlation analysis on the entire data set overall.

Table 6. *Results of the correlation analyses for real words with antepenultimate stress*

Level of instruction	Pearson Correlation	N	Sig.
Second/fourth semester	.374	17	.139
Sixth semester	-.271	8	.516

*$p < 0.05$

Table 7. *Results of the correlation analyses for real words with penultimate stress*

Level of instruction	Pearson Correlation	N	Sig.
Second/fourth semester	.036	17	.891
Sixth semester	.603	8	.114

*$p < 0.05$

Table 8. *Results of the correlation analyses for real words with final stress*

Level of instruction	Pearson Correlation	N	Sig.
Second/fourth semester	.477	17	.053
Sixth semester	.309	8	.456

*$p < 0.05$

As observed in Tables 6 through 8, neither second- and fourth-semester learners' nor sixth-semester learners' production and perception accuracy for real words regardless of stress

effect, those around .06, a medium effect, and values of about .14 and larger, a large effect" (p. 66). Based on this, the value of .219 indicates a large effect size.

position were correlated, as indicated by the *p* values over .05. The results of the correlation analyses for nonce words are presented in Tables 9 through 11.

Table 9. *Results of the correlation analyses for nonce words with antepenultimate stress*

Level of instruction	Pearson Correlation	N	Sig.
Second/fourth semester	-.159	17	.541
Sixth semester	-.252	8	.547

*$p < 0.05$

Table 10. *Results of the correlation analyses for nonce words with penultimate stress*

Level of instruction	Pearson Correlation	N	Sig.
Second/fourth semester	-.542	17	.025*
Sixth semester	-.800	8	.017*

*$p < 0.05$

Table 11. *Results of the correlation analyses for nonce words with final stress*

Level of instruction	Pearson Correlation	N	Sig.
Second/fourth semester	.423	17	.091
Sixth semester	.185	8	.660

*$p < 0.05$

As reported in Tables 9 through 11, neither second- and fourth-semester learners' nor sixth-semester learners' production and perception accuracy for nonce words with antepenultimate and final stress, respectively, were correlated, as indicated by the *p* values over .05. However, second- and fourth-semester learners' production and perception accuracy for nonce words with penultimate stress were negatively and strongly correlated (r (15) = -.542, $p < .025$, two-tailed). Sixth-semester learners' production and perception accuracy for nonce words with penultimate stress were similarly negatively and strongly correlated (r (6) = -.800, $p < .017$, two-tailed).[8]

Just as the correlation analyses for word type at each level of stress by instruction level yielded few significant findings, the correlation analysis performed on the entire data set revealed that learners' overall production and perception of Spanish stress in segmentally identical words are not correlated, (r (148) = .136, $p = .096$, two-tailed). The results of the correlation analyses are further discussed in the following section in light of Flege's SLM and of previous L2 Spanish acquisition production/perception interface research.

5. Discussion

The first research question asked whether L2 Spanish learners at different points in a university curriculum (students enrolled in either a second- or fourth-semester required Spanish language course versus students enrolled in a sixth-semester elective Spanish course) distinguish between segmentally identical words that differ only in stress placement in a reading-based

8 Citing Cohen (1988), Eddington (2015) states "if *r* is around .1 (or .-1), the correlation is weak. Correlations around .3 (or -.3) are considered moderate, and those around .5 and greater (or -.5 and smaller) are considered to indicate a strong relationship between the two variables" (p. 29).

production task. An examination of learners' accuracy and their errors indicates that, in production, they distinguish between segmentally identical words that differ only in stress placement to varying degrees. Second- and fourth-semester learners accurately produced stress in these words 59.2% of the time, while sixth-semester learners accurately produced stress 73.4% of the time, with this difference being significant. Moreover, the second- and fourth-semester students, enrolled in required language courses, more often produced stress on the same syllable in all three words in a triplet (e.g., producing *término* three times rather than *término*, *termino*, and *terminó* with stress on the antepenultimate, penultimate, and final syllables, respectively) than the sixth-semester students enrolled in an elective introductory Hispanic Linguistics course, indicating that they did not know these were in fact three different words differentiated only by stress. It is not unexpected that sixth-semester learners' production accuracy was higher than second- and fourth-semester learners' production accuracy since they have studied Spanish twice as long. In addition to differences in prior experience, this result may be attributed to the nature of the courses in which the two groups of learners were enrolled at the time of the study. As indicated in learners' responses on the language background questionnaire, the students enrolled in the upper-level Introduction to Hispanic Linguistics course received some, albeit very little (two class periods), explicit instruction on the rules governing Spanish stress assignment and accent marks, while the students enrolled in lower-level language courses did not receive any such instruction in class. On the language background questionnaire, some second- (three out of thirteen) and fourth-semester (two out of four) students indicated they were previously taught in high school to stress the syllable with the accent mark; however, they reported receiving no instruction on the rules governing stress in their current courses. While this generalization is not inaccurate, it does not fully account for Spanish stress assignment, as penultimate and final stress are not always marked orthographically.

In comparison to production, both groups of L2 Spanish learners more often perceived a difference in segmentally identical words that differ only in stress placement. Learners' perception was generally quite high, as even the students in the second-/fourth-semester group accurately perceived stress 70.5% of the time, while those in the sixth-semester group accurately perceived stress 92.5% of the time. Similar to production, it is likely that this difference in perception accuracy, which was significant, may be attributed to differences in prior experience and to the nature of the courses in which learners were enrolled at the time of the study. Furthermore, it is also possible that second-/fourth-semester students' perception accuracy differed significantly from sixth-semester students' perception accuracy due in part to the effects of lexical knowledge. Learners in the second-/fourth-semester group more often perceived stress on the same syllable in all target words in a triplet or pair than those in the sixth-semester group, suggesting that they thought the word was repeated rather than a different word with a different meaning.

The third research question asked whether word type (real Spanish word or nonce word) affects L2 Spanish learners' production and perception accuracy. Although the differences in learners' production and perception accuracy between real and nonce words were very small and therefore not significant, it is nevertheless unexpected, and in opposition to Lord's (2002), Bullock and Lord's (2003), and Lord's (2007) findings, that learners at all levels were slightly more accurate in producing and perceiving stress on nonce words. Since the nonce words were created based on real Spanish words, perhaps learners were more accurate in producing and perceiving them because they were more familiar with the words on which the nonce words were based (e.g., the nonce word *canbado* was created from the Spanish word *cantado* 'sung') than some of the actual Spanish words (e.g., *ayuno* 'fast' or 'I fast' and *desmayó* 'you (formal)/he/she became

demoralized') used in the study and assigned stress to the nonce words using analogy, as did the learners in Bullock and Lord's (2003) and Lord's (2007) studies. In addition, it is possible that word type did not significantly affect learners' production and perception of stress in segmentally identical words due to lexical knowledge. Even some of the real Spanish words were unfamiliar to learners, as indicated by their production and perception of stress on the same syllable in all target words in a pair or triplet. If many of the words used in the study, whether real Spanish words or nonce words, were unfamiliar to learners, it would therefore not be unexpected that word type would not be a significant factor.

Although word type did not have a significant effect on L2 Spanish learners' production and perception accuracy, stress position did. It is not surprising that the lower-level learners, students enrolled in either a second- or fourth-semester language course, were most accurate in producing penultimate stress, as indicated by the data in Table 2, because it is the most common stress pattern in Spanish (Face, 2000, 2005; Quilis, 1982). Conversely, learners' success with antepenultimate stress in both production and perception, as indicated by the data in Tables 2 and 4, may be unexpected since it is the least common stress pattern in Spanish (Face, 2005; Quilis, 1982), but perhaps may be due to L1 influence. Face (2005) found that regardless of syllable weight learners were quite accurate in perceiving antepenultimate stress, claiming that it may be attributed to "influence of the English tendency for stress early in a word" (p. 98). Pons and Bosch (2010) similarly note that "in contrast with Spanish, stress in English, although variable, falls primarily on the initial syllable of a word" (p. 227). It is plausible, as Face (2005) proposed, that learners rely on their L1 to fill in gaps in their developing L2; in this case, positively transferring linguistic knowledge from their L1 to perceive and produce Spanish stress.

Finally, the fifth research question asked whether L2 Spanish learners' production and perception of stress are correlated. A comparison of both groups of learners' overall mean production and perception accuracy, as reported in Table 12, suggests that learners first acquire the ability to perceive stress, as both groups' mean perception accuracy is higher than their mean production accuracy. This finding therefore supports Lord's (2002) conclusion that L2 stress perception precedes stress production, as "receptive skills are acquired earlier than productive skills" (p. 203). Correlation analyses were performed on subsets of the data and the entire data set to provide further insight into the relationship between L2 Spanish learners' production and perception of stress.

Table 12. *Learners' overall mean production and perception accuracy on all words*

Level of Spanish instruction	Mean production accuracy	Mean perception accuracy
Second-/fourth-semester	59.2%	70.5%
Sixth-semester	73.4%	92.5%

As reported in Section 4.3, neither second- and fourth-semester learners' nor sixth-semester learners' production and perception accuracy for real words regardless of stress position were correlated. In fact, only two correlations were significant, both of which were negative and strong: second- and fourth-semester learners' production and perception accuracy for nonce words with penultimate stress (r (15) = -.542, p < .025, two-tailed) and sixth-semester learners' production and perception accuracy for nonce words with penultimate stress (r (6) = -.800, p < .017, two-tailed). Based on the data in Tables 2 and 4, the negative correlation for second- and fourth-semester students' production and perception accuracy for nonce words with penultimate stress suggests that as their production accuracy increases, their perception accuracy

decreases. Conversely, the sixth-semester students' negative correlation suggests that as their perception accuracy increases, their production accuracy decreases on nonce words with penultimate stress.

While the results of the present study suggest that learners first acquire the ability to perceive Spanish stress in segmentally identical words, they also indicate that accurate perception does not always immediately lead to accurate production, as learners' production tended to lag behind their perception despite their success in perceiving differences in stress placement. Future studies should continue examining the relationship between L2 Spanish learners' production and perception at both a segmental and a suprasegmental level because the results remain inconclusive. Similar to Kissling's (2013) study, which found evidence of a positive relationship between perception and production of some but not all sounds under investigation, it may be concluded that the results of the present study partially support Flege's hypothesis since few significant correlations were found. However, the results of the present study are in opposition to Zampini (1998) whose results on L2 production and perception of Spanish /p/ and /b/ do not support Flege's hypothesis.

Since Flege's model is predicated on the role of the L1, it is important to also consider the results of the present study in light of what the model might predict given the similarities and differences between English and Spanish stress presented in Section 2. Based on the similarities and differences between English and Spanish stress presented earlier, it was hypothesized that the SLM would predict that native English-speaking L2 Spanish learners would have difficulty acquiring Spanish stress because of the three-syllable window of stress placement in both languages. The results of the present study appear to partially confirm this hypothesis, as both groups of learners experienced greater difficulty producing rather than perceiving stress in segmentally identical words. However, based on the facts of English and Spanish stress presented earlier, it can be posited that there is not an aspect of how stress is realized in the learners' L1 (English) that might cause them to struggle more in production than perception of Spanish stress. Learners' production difficulty may therefore be attributed to the finding that receptive skills are acquired earlier than productive skills (Lord, 2002) rather than to the role of the L1.

Finally, it is important to acknowledge that our understanding of the present findings may be limited given the limited number of participants. Our understanding of the present findings may also be limited by the way in which learners were grouped because although second-/fourth-semester learners and sixth-semester learners differ in terms of years of L2 study completed and the nature of the courses in which they were enrolled at the time of the study, these background data may not be considered objective measures of L2 experience, as they were self-reported. In addition, the background data and the course in which learners were enrolled at the time of the study are not intended to be measures of L2 proficiency, but rather of L2 experience. However, a future study should use a proficiency measure, such as an oral proficiency interview (OPI), to group learners because it would more clearly show meaningful and objective differences between learner groups than level of instruction and self-reported background data. A proficiency measure would also help to better ensure more homogeneity among learners within groups, as learners of differing abilities are often enrolled in the same level language course.

6. Conclusion

The present study investigated L2 learners' acquisition of Spanish stress in segmentally identical words in order to determine whether they use stress as a cue to distinguish between

such words in both production and perception. The results of this study suggest that L2 learners at different points in a university curriculum, students enrolled in either a second- or fourth-semester required Spanish language course versus students enrolled in a sixth-semester elective Spanish course, use stress as a cue to distinguish between segmentally identical words in production and perception to varying degrees. Moreover, the results of the correlation analyses suggest that the relationship between learners' production and perception of Spanish stress in segmentally identical words depends on the type of word and stress position, as only the correlations for nonce words with penultimate stress were significant, which provided support for Flege's hypothesis that accurate perception is a necessary precursor to accurate production.

The results of the present study contribute to existing research on an understudied aspect of L2 Spanish phonological acquisition by focusing on acquisition of Spanish stress in an important context not fully investigated in previous studies and suggest that there remains a need for similar studies. A future study should further examine the effect of explicit instruction on learners' production and perception of Spanish stress given Saalfeld's (2012) inconclusive results. In addition, as previously stated, it is possible that sixth-semester learners' greater production and perception accuracy could be attributed, at least in part, to the explicit instruction, albeit limited, they received at the time of the study. In order to gain further insight into the potential effect of explicit instruction on learners' production and perception of Spanish stress, a future study should examine acquisition by one group of students enrolled in a Spanish phonetics/phonology course in which they receive considerable explicit instruction on Spanish sounds and suprasegmental features and by another group of students enrolled in a course at the same level in which they do not receive any such instruction. Previous studies have found that L2 learners make gains in their pronunciation of certain Spanish sounds such as voiceless stops (e.g., Elliott, 1997; González-Bueno, 1994; González López & Counselman, 2013) and voiced approximants (e.g., Castino, 1996; Elliott, 1997; Lord, 2005) as a result of explicit instruction, so it is certainly plausible that similar gains may be made in acquisition of suprasegmental features such as stress.

Another direction for future research that derives from the results of the present study is an examination of the effect of cognate status on acquisition of Spanish stress. Learners in both groups produced and perceived stress on the same syllable, many times the antepenultimate syllable, in all of the target words in a triplet. As previously mentioned, this overgeneralization of antepenultimate stress is likely due to L1 influence, as stress usually appears early in a word in English (Face, 2005). Since some of the target words in the present study are cognates (e.g., *vomito* 'I vomit') and others are non-cognates (e.g., *trabajo* 'work/job' or 'I work'), it would be interesting to consider whether more transfer could be predicted in cognates as opposed to non-cognates. A future study should also investigate whether learners are more accurate in producing and perceiving stress in cognates as opposed to non-cognates, as previous studies on bilingual speakers have found that phonological acquisition at a segmental level is affected by cognate status (Amengual, 2012; Brown & Harper, 2009; Mora & Nadeu, 2012).

In conclusion, the present study provides further insight into L2 acquisition of Spanish stress by learners at different points in a university curriculum. While learners distinguish between segmentally identical words differentiated only by stress to varying degrees in both production and perception, there may be other factors that affect their acquisition such as explicit instruction, transfer, and cognate status that merit further investigation in future studies.

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Appendix

Word lists used for the production and perception tasks

Word list 1
Trisyllabic Spanish words with three different possibilities for stress placement

1. vómito	vomito	vomitó
2. cómputo	computo	computó
3. hábito	habito	habitó
4. límite	limite	limité
5. célebre	celebre	celebré
6. diálogo	dialogo	dialogó
7. práctico	practico	practicó
8. término	termino	terminó

Word list 2
Trisyllabic Spanish words with two differing stress positions

1. trabajo	trabajó
2. apoyo	apoyó
3. regalo	regaló
4. aviso	avisó
5. ensayo	ensayó
6. desmayo	desmayó
7. cultivo	cultivó
8. ayuno	ayunó

Word list 3
Trisyllabic nonce words with three different possibilities for stress placement

1. grábedo	grabedo	grabedó
2. rásgono	rasgono	rasgonó
3. mástito	mastito	mastitó
4. cínara	cinara	cinará
5. cánbado	canbado	canbadó
6. páchara	pachara	pachará
7. técado	tecado	tecadó
8. fárfula	farfula	farfulá