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Teaching L2 Spanish Stress

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Abstract: *The present study investigated the effects of training on the perception of Spanish stress, an important feature in the Spanish verbal morphology system. Participants were two intact classes of native English speakers enrolled in a six-week session of second-semester Spanish, as well as native English and native Spanish control groups. During the instructional period, one class received short lessons and practice activities designed to improve their perception and production of Spanish stress; the other class received no specific instruction on Spanish stress and did not engage in any practice activities. Statistical tests revealed that both groups demonstrated significant improvement between pretest and posttest, but there were no differences between groups in terms of accuracy of response. While the evidence is inconclusive, it is possible that the lack of distracter items in the pretest promoted learner noticing or awareness, which was sufficient for both groups to improve in second language phonology.*

Key words: *Spanish, instructed SLA, L2 phonology, perception, stress*

Introduction

Various researchers (Arteaga, 2000; Crawford, 1996; Elliott, 1995; González-Bueno, 2001; Hurtado & Estrada, 2010; Lord, 2005; Pennington, 1989) have pointed to a lack of pronunciation instruction in the foreign language classroom in the last two decades. The reasons for this neglect are not clear and are undoubtedly numerous; for example, teachers have a limited amount of time and must decide which elements of instruction will be most beneficial to their students. In particular, they must decide which elements of language learning will best enable their students to communicate effectively in the second language (L2). With the pessimistic determinism (Derwing & Munro, 2009) that emerged in the years following Asher and Garcia's (1969) seminal study, which indicated that acquiring a target-like L2 pronunciation ability after puberty was rare if not impossible, it appears that many foreign language educators concluded that spending time teaching pronunciation was an exercise in futility and accordingly focused on areas of acquisition that appeared to result in more improvement based on the amount of time spent teaching.

However, since the Asher and Garcia study, there has been a considerable degree of controversy regarding whether it is possible to speak an L2 without a foreign accent, especially if the second language is acquired after puberty. Researchers such as Flege (1995), Best (1994), and Kuhl (2000) proposed that language learners have the ability to perceive new sounds that do not exist in the native language (L1) but acknowledged that learners who speak the L2 with no detectable foreign

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accent are extremely rare. Flege, Kuhl, Best, and others have contributed a great deal to knowledge of this area of language acquisition in recent years (Best, 1994, 1995; Best & McRoberts, 2003; Best, McRoberts, & Goodell, 2001; Flege, 1987, 1992, 1993, 1995; Flege, Bohn, & Jang, 1997; Flege & Liu, 2001; Flege & MacKay, 2004; Flege, MacKay, & Meador, 1999; Flege, MacKay, & Piske, 2002; Flege, Munro, & MacKay, 1995; Iverson et al., 2001; Kuhl, 2000; Kuhl, Conboy, Padden, Nelson, & Pruitt, 2005; Kuhl & Meltzoff, 1997; MacKay, Flege, Piske, & Schirru, 2001). In particular, research by Flege (1987, 1992, 1993, 1995; Flege & Liu, 2001; Flege & MacKay, 2004; Flege et al., 1995, 1997, 1999, 2002) has shown that a number of factors influence the amount of foreign accent in an L2, including age of arrival/length of residence in a country that speaks the target language and amount of L1 and L2 use. Moreover, the trends that emerge from Flege's many studies indicate that there is not a strict critical age after which learners may not acquire a target-like L2 phonology. Rather, there is a negative correlation between age and eventual attainment with a gradual slope, indicating that while increased age does seem to have a negative effect on the acquisition of L2 phonology, it is a complex process that includes many factors. The reasons for this decline are not clear based on the current body of research, but what is clear from the above-cited studies is that learners do maintain at least some ability to acquire a native-like L2 phonology system. However, even setting aside the question of attaining a native-like system, Derwing and Munro (2009) noted that improvement of accent, comprehensibility, and intelligibility are possible at any age with instruction and that this improvement is worthwhile even if it does not produce a native-like system.

Given this continued ability to acquire both segmental contrasts such as vowels and consonants, and suprasegmental features such as intonation, in L2 phonology, it appears that current pedagogical practice has not changed to reflect the conclusions drawn from research in this area. As noted in the review of the literature, additional research has not only shown that learners maintain the ability to learn L2 sounds, but also that this ability can be enhanced through instruction. The studies that have been carried out in this area, while encouraging, are few, and Derwing and Munro (2005) pointed out the need for additional research that considers the acquisition of L2 phonology within a classroom context. The present study seeks to expand the current body of knowledge in this area by exploring if there are limitations regarding which elements of L2 phonology may be acquired, and whether instruction is beneficial in the acquisition of certain features. In particular, most classroom studies investigating the acquisition of Spanish phonology (Elliott, 1995, 1997; González-Bueno, 1997; Lord, 2005; Zampini, 1994) have focused on the acquisition of discrete sounds such as vowels and consonants, rather than prosodic features such as stress or intonation; this study contributes to the field by examining the effects of instruction on the acquisition of a suprasegmental feature, namely Spanish word stress.

Background

English and Spanish Stress

By all classifications, English and Spanish stress fall into the same typology of languages that permits variable word stress. However, psycholinguistic research indicates a difference in the way native English and Spanish speakers perceive word stress. Thus an initial prediction might be that English speakers will exhibit levels of stress perception comparable to those of Spanish speakers. However, Dupoux, Peperkamp, and Sebastián-Gallés (2001) raised an interesting question regarding stress deafness in variable word stress languages: Is it possible that speakers of languages with variable word stress may also exhibit stress deafness if the

number of minimal stress pairs in the language is small?

Jensen (1993) noted that while English does have minimal pair stress differences, these differences are largely predictable and are almost always semantically related. Most minimal pair differences are between noun and verb pairs such as *ímport* and *impórt*, and typically the noun has stress one syllable further left than the corresponding verb. He noted: "Pairs of words that differ just in the position of primary stress are therefore to be distinguished from segmental differences such as the distinction between *pit* and *bit*, which demonstrates the phonemic value of voicing in obstruents. Such pairs are generally totally unrelated semantically" (p. 78).

In Spanish, however, minimal pair differences based on stress are widespread and do not necessarily have a semantic relationship, as in the following examples. The verb forms are, of course, semantically related, but the noun forms are often semantically unrelated to the verbs.

1a. *líbro* "book" / 1p present indicative "I liberate"
1b. *libró* 3p preterite indicative "he/she liberated"
2a. *ámo* "master" / 1p present indicative "I love"
2b. *amó* 3p preterite indicative "he/she loved"

Minimal pairs with differences in stress placement do not necessarily have a semantic relationship, but they are abundant in the verbal morphology system. These minimal pairs do not change the lexical meaning of the verb but do change person and tense, or tense and mood, as in the following examples:

3a. *háblo* 1p present indicative tense "I speak"
3b. *habló* 3p preterite indicative tense "he/she spoke"
4a. *háble* 2p present imperative tense "speak"
4b. *hablé* 1p preterite indicative tense "I spoke"

An important difference resulting from predictability arises between English and Spanish stress. Given the limited number of stress contrasts in English, the semantic relationship between the few minimal pairs that exist, and the different grammatical functions that these words fill, a word with mispronounced stress is unlikely to do more than result in temporary confusion for the listener, as shown in Cutler[1] (1986) below. For example, if a listener were to hear "The CEO must cónsult with the board of directors prior to taking action," the position of the word "consult" in the sentence informs the listener that the verb is intended, rather than the phonetically realized noun form.

However, in the Spanish verbal morphology system, cues other than stress that indicate person, tense, and mood may or may not be present. Because the use of a subject pronoun is not obligatory in most contexts in Spanish, the appropriate placement of stress is crucial to the interpretation of the meaning of a verb. In the sentence "*Hable con el director*," ("Speak-2p-present-imperative with the director"), if the speaker intends to say "*Hablé*" ("Spoke-1p-singular-past"), there are no additional cues that indicate that the speaker intended to use the first-person past tense form rather than the second-person command form. This is distinct from the above example in English, where a word is phonetically realized as the noun form but is occupying a verb position and must therefore be interpreted as a verb (Cutler, 1986).

Therefore, while English and Spanish both possess variable word stress and are typologically the same in this respect, the role of word stress is actually quite different between the two languages. Word-level stress placement is not a critical element necessary to distinguish between various possible lexical meanings or verbal inflections in English, but rather to distinguish between grammatical categories on a very limited basis. Research done by Cutler (1986) provides evidence that, in fact, listeners do not process word-level stress differences when accessing the lexicon.

Cutler (1986) performed a series of lexical priming experiments to test whether a word from a minimal stress pair in English would prime access for only itself or also for its pair with a stress contrast. In a lexical priming study, participants see or hear pairs of words. In some cases, the word pairs are related, whether in form (for example, *farm* and *form*) or in meaning (*farm* and *farmer*). The design of the study varies depending on its purpose, but in general participants are asked to do something involving the second word, which could include typing it, deciding if it has a similar meaning to the first word, or many other types of tasks. These tasks are computerized and are timed to 1/1000th of a second, and the time that elapses from the time the second word is shown (or heard) until the participant completes the task is recorded. If the two words are unrelated, the participant's response time is slower than if the words are related; this relationship between the two words is called priming.

Cutler (1986) noted that work previously done by Swinney (1979) indicated that homophones prime both lexical items (that is, that if a person hears "bear," it would speed up that person's response to a word like "cub," as well as to a word like "empty") and thus if a word from a minimal stress pair—such as "FOREbear" (meaning "ancestor") or "foreBEAR" (meaning "tolerate")—were to prime both words in the minimal pair, it would indicate that the words are functionally homophonous for English speakers. If the word primed only itself, it would indicate that the minimal pairs are distinct in the lexical representations of the speaker. Due to English stress shift, a third result is also a possibility: Words with pattern WS (weak strong) may prime both words because of the possibility of stress shift, but words with pattern SW (strong weak) should prime only themselves. After a series of experiments conducted to minimize word bias effects, Cutler included a final selection of eight minimal stress pairs in the priming experiment. Sentences containing the targeted priming words were recorded on two tapes and presented to two sets of participants in two separate administrations ($n = 48$, $n = 40$, respectively). Results from Cutler (1986) showed a main effect of relatedness but no interactions, indicating that minimal stress pairs in English are functionally homophonous; they exhibit the exact same behavior as homophones in the referenced study by Swinney (1979). This is anecdotally supported by Beckman's (1986) study; she noted that in the production task for English speakers, some data had to be thrown out because there were a few cases of systematic lack of distinction between minimal pairs and other cases of "slips of the tongue" in which the subject produced the minimal stress pair rather than the target word (p. 148).

The results from Cutler (1986), while relevant, do not directly constitute evidence that English and Spanish stress are processed differently by speakers of those respective languages. However, a series of experiments conducted by Soto-Faraco, Sebastián-Gallés, and Cutler (2001) investigated priming effects in Spanish for words with different stress patterns as well as priming effects for words with segmental differences. In the first experiment of the series, they selected 24 experimental word pairs that were three or four syllables long, segmentally identical until the onset of the third syllable, not semantically related, and containing a different stress pattern. An example of one such pair was "*príncipe*," with antepenultimate stress, and "*principio*," with penultimate stress. A list of carrier sentences with the priming words was recorded. The word pairs were then truncated after the second syllable and placed in carrier sentences in match, mismatch, and control conditions. In the match condition, the stress pattern of the truncated word matched the stress pattern of the target word (for example, participants would hear "prinCI" and would see "*principio*," which has a prosodic accent on the syllable "ci"); in the mismatch condition, the stress pattern of the truncated word did

not match the stress pattern of the target word (participants would hear "prinCI" but would see "*príncipe*," which has a prosodic accent on the syllable "prin"). The recordings were presented to 43 native speakers of Spanish enrolled at the University of Barcelona. Results from the stress priming study showed that reaction time for the match condition was faster than for the mismatch condition. A second experiment examined the effects of altering one segment using the same type of design; results were similar for this experiment. Reaction time was faster for the match condition (containing the segment that matched the target word) than for the mismatch condition (containing one segment that differed from the target word). These results indicate that in word processing and recognition in Spanish, lexical stress functions in a manner analogous to that of segmental contrasts.

A later study by Cooper, Cutler, and Wales (2002) indicated that English speakers do use lexical stress for lexical access, but they still differ in important ways from speakers of other languages with lexical stress. They employed a design similar to the one used in Soto-Faraco et al. (2001), truncating words that were identical except for stress placement in the first two syllables of a word, such as "Admiral" and "admiRAtion." They found that native English speakers did attend to stress cues in order to access the appropriate word in the lexicon. However, the authors noted that reaction times were not different between matched and mismatched primes; rather, the stress mismatch condition resulted in faster reaction times than a control prime, indicating a facilitative effect. As the authors noted, this was not consistent with the results found in the Soto-Faraco et al. (2001) study:

> We consider that the most likely explanation of this pattern is that in English—as much previous work has indicated—there is a difference in the strength of segmental versus suprasegmental information. Segmental information weighs more strongly in lexical activation. This is exactly the conclusion that was reached by other authors who found, for instance, that mis-stressing English words has little effect on recognition unless a segmental alteration also results. (p. 223)

Another factor that affects perception of a stressed syllable is syllable weight; syllables are considered to have more weight if they contain a long vowel or a syllable-final consonant cluster, and less weight if they contain a short vowel and a syllable-final single consonant. Face (2005) investigated the effects of syllable weight on stress perception in native English speakers learning Spanish at differing levels of proficiency. While the primary acoustic indicators of stress are frequency, duration, and intensity, previous experiments have indicated that syllable weight affects perception of stress by native speakers, even when no syllable has a higher acoustic prominence than another syllable within a given word. In Face (2005), a series of 100 nonce words were generated without an acoustic prominence using a speech synthesis program. The stimuli were presented to learners in order to determine if syllable weight "attracts" stress, and the results indicated that learners did make use of syllable weight in order to perceive stress in words with no acoustic prominence, although not to the same extent as native speakers. Moreover, the learners improved in accuracy in their stress perception from the beginning to the intermediate to the advanced level.

Lord (2007) investigated stress production in L1 English speakers learning Spanish and found that, as in the Face (2005) experiment, learners improved in accuracy of stress production from the beginning to advanced levels. While this particular study looked at stress production, not perception, and did not investigate any instructional interventions, it is worth noting that the learners in this study showed improvement in their ability to produce Spanish stress at all levels of instruction. These results, taken together with the results of other studies, indicate that although this may be an area of difficulty for L2 Spanish learners who are

native English speakers, it is an area that improves with increased linguistic proficiency. The question that remains for the present study is whether targeted instruction in Spanish stress perception would improve perception of stress contrasts in learners in a classroom setting.

Teaching L2 Pronunciation: Spanish

There is a growing body of evidence that suggests that instruction in L2 pronunciation is beneficial to L2 learners. Elliott (1997) examined the effects of pronunciation instruction within a communicative context. Statistical analyses showed that instruction resulted in improved pronunciation on three of the four pretest/posttest measures, although the instruction was not beneficial for all types of sounds (there were only positive results for two sound classes: liquids and stops). However, the gains exhibited by participants in the group receiving instruction demonstrated that pronunciation instruction may be beneficial.

González-Bueno (1997) examined the effects of instruction on the production of Spanish stop consonants by Spanish students enrolled in a fourth-semester conversation class at the university level. The specific aim of the study was to see if voice onset time could be improved by instruction, and results demonstrated that participants did show significant improvement on two of the six stop consonants tested. These results are encouraging in that participants did show some improvement in an area of pronunciation that is relatively difficult to teach; however, they are discouraging because the production of only two of the six targeted phonemes improved after a semester of instruction.

Lord (2005) investigated the effects of instruction on the pronunciation of students enrolled in a Spanish phonetics course. There were 17 learners enrolled in an upper-division Spanish phonetics course, as well as 10 native Spanish speakers that served as a control group. While the study targeted phonemic contrasts, not suprasegmental features, the results are encouraging for pronunciation instruction given that learners displayed improvement on all targeted sounds after a semester of instruction.

The literature on instructional effects on the acquisition of Spanish pronunciation is sparse: Of the handful of studies that do exist, only half investigated specific pronunciation instruction; the rest examined other factors such as context of learning or developmental progress in instructed contexts (Díaz-Campos, 2004; Hurtado & Estrada, 2010; Lord, 2002; Stevens, 2001). Thus, there is a continued need for research in this area.

Teaching L2 Pronunciation: Suprasegmental Features

Only one previous study dealing with the acquisition of Spanish suprasegmental features has addressed instructional effects (Lord, 2008). Because this one study does not provide adequate background to understand current research on the acquisition of L2 suprasegmentals, studies investigating the acquisition of suprasegmental features in languages other than Spanish are presented.

Lord (2008) reported on the effects of using podcasting as a means of improving pronunciation in a Spanish phonetics course. A total of 16 learners participated in the experiment, which took place over the course of a semester. All learners made six recordings, based on the theme covered in class at a particular time. In addition, over the course of the semester, learners listened to other students' recordings and provided feedback. For the first and last recordings, students read the same short text, and these recordings served as the pretest and posttest, which were then evaluated by three raters. The raters were instructed to listen to recordings and provide an overall rating of their impression of the speaker's pronunciation, ranging from five ("native or native-like") to one

("extremely foreign sounding"). Statistical analysis indicated that the class as a whole improved in pronunciation accuracy, although the amount of improvement made varied by student. On an individual level, some students demonstrated a great deal of improvement, while others exhibited no improvement.

Derwing, Munro, and Wiebe (1997) examined the effects of pronunciation on "fossilized" learners and found that instruction resulted in significant gains in pronunciation, even for learners who had resided in the target language country for more than 10 years. Their experimental group consisted of 13 learners who had lived in an English-speaking country for an average of 10 years. There was no control group, as any change in pronunciation in learners with such extensive exposure to the target language would not be expected to occur without instruction. The researchers recorded a series of statements from each learner in a pre- and posttest design, and students in a beginning linguistics course rated the recordings for intelligibility, comprehensibility and accent. Participants received pronunciation instruction during a 12-week period between the pre- and posttest. The instruction was not well defined, except to note that the instructors focused on "general speaking improvement" (p. 220), not on individual segments.

Derwing, Munro, and Wiebe (1998) investigated the effects of different approaches to teaching pronunciation. Participants were divided into three groups: no specific pronunciation instruction, segmental instruction, and global instruction. Participants in the first group participated in normal class activities but did not receive specific pronunciation instruction. Participants in the other two groups received the same normal class activities but also received pronunciation instruction. The segmental instruction focused on the improvement of individual sounds, while the global instruction consisted of instruction on stress, intonation, rhythm, speaking rate, and other factors. They found that a global approach to teaching pronunciation was more beneficial than a segmental approach, but both approaches resulted in some gains in pronunciation.

Hahn (2004) investigated the effects of incorrect stress placement in English by nonnative speakers on intelligibility and found that correct stress placement caused native-speaker listeners to rate the speaker as more intelligible. The study focused on primary stress at the sentence level, which is used to signal new information or indicate contrasts. A native Korean speaker whose L2 was English recorded three versions of a five-minute lecture to represent correct stress placement, incorrect stress placement, and the absence of primary stress. Thirty different listeners, all L1 English speakers, listened to each recording and completed a series of tasks, including a written summary of the mini-lecture, as well as an instrument rating the instructor. Listeners who heard the native-like version of the lecture scored the highest on the summary of information presented in the mini-lecture, whereas listeners who heard the incorrectly accented version of the lecture scored the lowest. Not surprisingly, the speaker ratings for the mini-lecture with the correct accent pattern were higher than for the other two versions. As Hahn (2004) indicated, these findings underscore the need for teaching suprasegmental features.

As noted, the few studies that have investigated instructional effects on the acquisition of L2 Spanish phonology so far have dealt with segmental features. There are a few studies investigating acquisition of suprasegmentals in Spanish, such as Lord (2002); however, extensive database searches revealed only one study investigating instructional effects on the acquisition of suprasegmental features in Spanish. A great deal of research remains to be done in this area in order to determine whether instruction in pronunciation results in improved perception and production of Spanish suprasegmental features.

Research Questions and Hypotheses

The current study addresses the acquisition of suprasegmental features in Spanish at the beginning of the second language acquisition (SLA) spectrum; specifically, I investigate whether instruction facilitates the acquisition of Spanish stress, measured in terms of perception. The research questions and hypotheses are the following:

1. Does targeted instruction result in significant gains in the accuracy of perception of Spanish stress?
2. Are learners enrolled in a second-semester Spanish course able to better perceive stress contrasts than native English speakers with no experience in Spanish?

   Hypothesis 1. Learners who receive instruction about Spanish stress will demonstrate significant gains in the accurate perception of Spanish stress.

   Hypothesis 2. Learners enrolled in Spanish courses will perceive stress contrasts in Spanish better than native English speakers with no experience in Spanish.

Method

Participants

Data were collected from 48 participants; 32 were students enrolled in Spanish 102 at a community college in the Midwest; eight were native English speakers from the community, and eight were native Spanish speakers enrolled as graduate students at a large university in the Midwest. Spanish 102 is a second-semester introductory Spanish course. The 32 student participants comprised two intact classes; the researcher was the instructor for both classes. No demographic data were collected from individual participants, but the general demographics of this particular institution are quite diverse. A number of students enrolled in the classes were traditional full-time students at a selective public university in the same town and were taking Spanish at the community college because of its reduced cost. Others were first-generation college students (both traditional and nontraditional) who only intended to complete the two-year degree offered by the community college, and others were working professionals from the community taking Spanish for personal enrichment. No participants had registered learning disabilities. Students enrolled in the second-semester course had to have taken a first-semester Spanish course at the college level or have taken two years of high school Spanish. However, a placement exam was not required, so many students chose to enroll in second-semester Spanish if they had the prerequisites, even if a considerable amount of time had elapsed between their previous study of Spanish and their enrollment in second-semester Spanish. Due to attrition, the final number of participants was 42; the number of participants in each group were as follows: experimental group (E), $n = 15$; control group (C), $n = 11$; native English control (NE), $n = 8$; and native Spanish control (NS), $n = 8$. Participants enrolled in Spanish 102 received extra credit for participating in the study; native English and Spanish control participants received $5.00 for participating in the study.

Materials

The materials employed in the study consisted of a computerized reaction time judgment task for the stress perception task. The materials were developed during two previous pilots of the same study. A transcription of some of the items presented in the computerized reaction time judgment task is presented in the Appendix.

Design

There was one perception task in both the pretest and posttest. For the perception task analyzed in the study, a mixed-model repeated-measures ANOVA was used to evaluate the results. The dependent variable was Response. A measurement of reaction time was also recorded, but I have not included those results here.[2] In addition to measuring for effects of time (pretest and

posttest) and group membership (control and experimental), the independent variables Word Position, Vowel Height, Tongue Position, and Stress Position were also measured to see if differences in vowels, position of the stressed syllable in the word, and position of the target word within the sentence resulted in increased or decreased ability to perceive stress contrasts. However, I do not report these results here.[3] Course grade was later added as a covariate in order to control for effects of ability and motivation, which appeared to be influential in pretest results. This is discussed in more detail in the Results section.

On both the perception pretest and posttest tasks, participants were awarded one point for each correct answer in all tasks, and 0 points for each incorrect answer.

Procedure

For both the pretest and posttest, participants in both groups completed a task that examined their ability to judge stress placement. The task examined participants' ability to perceive stress differences in words in varying positions within a sentence (initial, medial, and final). Participants heard 30 items consisting of three sentences each (a total of 90 sentences). The recording was made by the researcher, a near-native Spanish speaker,[4] on a Sony ICD-ST10 digital voice recorder in a soundproof room. The recordings were not altered (including normalizing the amplitude) because the same speaker made all of the recordings in one recording session. Each item consisted of three sentences, which were labeled A, B, and X, respectively; sentences A and B differed only in the location of verbal stress ("partiCIpo" versus "particiPO"), and sentence X was identical to either sentence A or sentence B. A total of 10 verbs were used for the task. Possible effects of position of the verb within the sentence were controlled for by varying the location of the verb within the sentence. Each verb was presented in initial, medial, and final position, for a total of 30 sets of stimuli; that is, each of the 10 verbs was presented in a sentence at the beginning of the sentence, in the middle of the sentence, and at the end of the sentence, for a total of 30 items. The following are examples of 3 of the 30 items that participants heard, with the same verb ("*participo*") presented at the beginning of the sentence, in the middle of the sentence, and at the end of the sentence:

1. A. *Participo en clase para sacar una buena nota.*
   Participate-1p-s-present in class in order to receive a good grade.
   B. *Participó en clase para sacar una buena nota.*
   Participate-3p-s-past in class in order to receive a good grade.
   X. *Participo en clase para sacar una buena nota.*
   Participate-1p-s-present in class in order to receive a good grade.
2. A. *Para sacar una buena nota, participo en clase.*
   In order to receive a good grade, participate-1p-s-present in class.
   B. *Para sacar una buena nota, participó en clase.*
   In order to receive a good grade, participate-3p-s-past in class.
   X. *Para sacar una buena nota, participó en clase.*
   In order to receive a good grade, participate-3p-s-past in class.
3. A. *Para sacar una buena nota en la clase, participó.*
   In order to receive a good grade in class, participate-3p-s-past.
   B. *Para sacar una buena nota en la clase, participo.*
   In order to receive a good grade in class, participate-1p-s-present.
   X. *Para sacar una buena nota en la clase, participo.*
   In order to receive a good grade in class, participate-1p-s-present.

Participants heard the series of three sentences and were asked to determine whether sentence X was the same as sentence A or sentence B. Stimuli were presented in a

randomized order using E-Prime reaction time software (a program that records the time it takes for participants to record their answers) on a Gateway M305 laptop computer, and participants listened to the stimuli on headphones and were asked to respond by touching preprogrammed keys. Prior to beginning the task, participants completed three practice items in order to become familiarized with the task. Responses were not recorded for these items.

The pretest and posttest were administered approximately four weeks apart. All sections of 102 met four times a week for two and a half hours per class period, for a total of 10 hours per week. During the four-week interval, participants in the experimental group received a brief period of instruction (10–15 minutes per day) regarding Spanish stress during each class period, for a total of approximately four hours of specific instruction about Spanish stress during the semester, or one hour of pronunciation instruction per week. During the remaining class time, learners received instruction on other topics, such as vocabulary, grammar, and relevant cultural themes, in addition to participating in speaking, listening, reading, and writing activities. During the first training session, learners received a brief explanation of the differences between lexical access in English and Spanish; namely, the researcher informed them that native English speakers do not process stress contrasts when deciding what word they are hearing, while native Spanish speakers do. Learners were informed that it is essential to listen for stress contrasts in Spanish because improperly perceived stress can result in a misinterpretation of the intended meaning. Several minimal pairs were presented as examples. In later sessions, the type of instruction was varied; some sessions focused on perceptual practice, others focused on practice producing the target stress patterns, and others focused on meaning differences resulting from stress contrasts—specifically, these were meaning differences arising in Spanish verbal morphology (first person present vs. third person past, and first person past vs. second person imperative [formal]).

Participants in the control group received no specific instruction about Spanish stress; they completed regular classroom activities, which included a variety of interactive activities, as well as reading comprehension and listening comprehension based on the vocabulary presented in the textbook. None of the regular activities involved pronunciation instruction, although segmental errors were corrected as they occurred. The experimental group completed the same activities but also received the above-described instruction in Spanish stress. The time difference between the two groups was accommodated by removing one regular classroom activity from the lesson or by shortening the planned activities to allow for pronunciation instruction in the experimental group.

The researcher, a native English speaker who acquired Spanish post-puberty, was the instructor for both groups. While it may be argued that an instructor who is a native speaker of the target language is the best model for nonnative speakers, it is worthwhile to note that many instructors at all levels of L2 instruction are not native speakers of the language they teach. If instructional effects are found even in the acquisition of L2 phonology by students taught by a nonnative speaker of the target language, it is much more likely that the results will be generalizable to other classes also taught by nonnative instructors.

Results and Discussion

Pretest Comparison

The pretest ANOVA showed a significant difference among the four groups ($F(3,1256) = 33.716$, $p < .000$), and a post-hoc Scheffé test indicated that at the beginning of the study, learners were not able to distinguish stress contrasts in Spanish better than an English speaker with no knowledge of Spanish. The only significant difference among groups, as shown in Table 1, was between the native Spanish

TABLE 1

Pretest Response Means by Group

Group	*N*	Mean	*SD*	*SE*	Min.	Max.
Experimental	450	.52	.500	.024	.367	.733
Control	330	.54	.499	.027	.433	.667
Native English	240	.59	.493	.032	.533	.667
Native Spanish	240	.88*	.331	.014	.800	.933

*$p < .000$

control group and all other groups ($p < .000$). This result suggests that the prediction based on the studies done by Cutler (1986) and Soto-Faraco et al. (2001) was accurate.

It is worth noting that in most Spanish programs, including the program at this institution, the preterit tense is taught in first-semester Spanish (in this particular program, it is taught in the middle of the first semester). The program used the book *Vistazos* (VanPatten, Lee, & Ballman, 2002), which presents an explanation of Spanish stress patterns. (The paper workbook for *Vistazos* was also used in the course, but only writing assignments were assigned because of the availability of answers in the language laboratory, which made it easy for students to copy answers without actually doing any of the listening activities.) Therefore, the lack of ability to discern different stress patterns is not due to a lack of exposure, though it may be due to a limited amount of exposure in some cases. Rather, in addition to the above-documented difficulty that learners experience simply in perceiving the differences in stress placement as native speakers of English, it appears that learners may not pay attention to the contrast when it is taught because they may not perceive it to be important. That is, previous studies, some of which are mentioned above, have indicated that learners are able to form new phonetic categories and perceive new contrasts throughout their lifetime, at various levels of proficiency, and that this ability is often aided or enhanced by instruction. For example, in two studies (Wang, Jongman, & Sereno, 2003; Wang, Spence, Jongman, & Sereno, 1999) investigating acquisition of perception and production of Chinese tones, participants with no prior exposure to Chinese tones were able to perceive and produce tones better after only two weeks of instruction, although English does not use tones to distinguish lexical items. Therefore, it appears that the learners in the present study were not paying attention to the crucial role that stress plays in Spanish verbal morphology.[5]

To reiterate, pretest results showed that learners were only able to perceive stress contrasts within sentences at a chance level, the same as the native English control group with no exposure to Spanish and similar to the French speakers studied in Dupoux et al. (2001). I now turn to the results of the posttest of both learner groups to determine if instruction improved their ability to perceive stress contrasts.

Results of Instruction Between Experimental and Control Groups

A repeated-measures ANOVA indicated that there was a main effect for Time ($F(1,751) = 6.154$, $p = .013$), but no effect for Group. As shown in Tables 2 and 3 and Figure 1, the means for both groups increased approximately the same amount from pretest to posttest. I hypothesized that learners who received instruction about Spanish stress would demonstrate significant gains in the accurate perception of Spanish stress. While this was true, it was

TABLE 2

Pretest Response Means by Group

Group	*N*	Mean	*SD*	*SE*	Min.	Max.
Experimental	450	.52	.500	.024	.367	.733
Control	330	.54	.499	.027	.433	.667
Aggregate	780	.53	.500	.018	.367	.733

TABLE 3

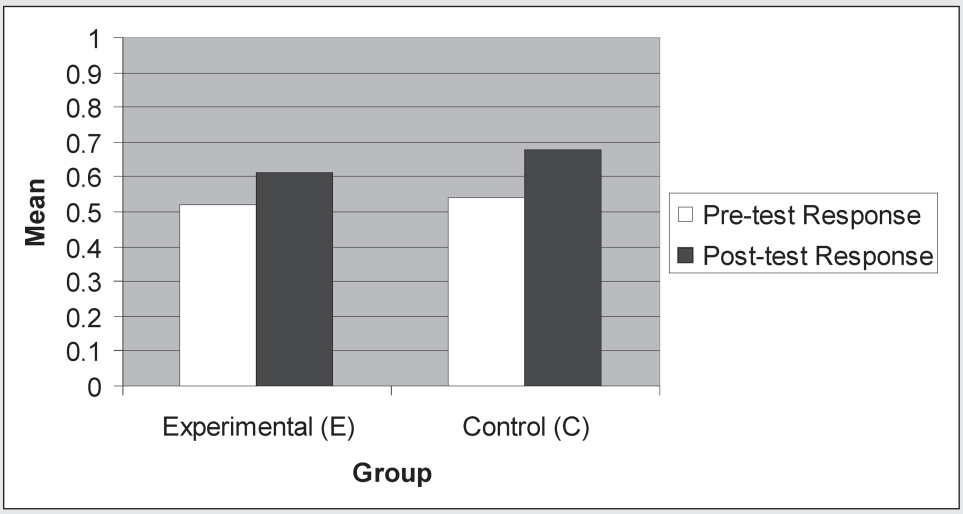
Posttest Response Means by Group

Group	*N*	Mean	*SD*	*SE*	Min.	Max.
Experimental	450	.61*	.488	.023	.367	.867
Control	330	.68*	.466	.026	.500	.833
Aggregate	780	.64*	.480	.017	.367	.867

*Posttest means differed from pretest means at $p = .013$.

FIGURE 1

Graph of Pretest and Posttest Response Means



also true that listeners who received no instruction about Spanish stress demonstrated the same improvement in perception over the course of the study. In fact, the mean response for the control group on the posttest was higher than that of the experimental group, and the difference approached significance ($F(1,752) = 3.72$, $p = .055$). This difference appeared to be due to different ability level in Spanish, not group membership, especially given a 15% mean difference in final course grades between the two classes (the control group had the higher average). Hence, the

covariate Course Grade was added to the model in order to control for the effects of academic ability and motivation, or the lack thereof. When the covariate Course Grade was added, the groups were statistically indistinguishable during the posttest, although both groups displayed improvement that was statistically significant from pretest to posttest, as stated earlier.

There are several possible interpretations for this result. It is possible that the improvement was merely a product of additional exposure to the language; that is, that if other second-semester Spanish learners were examined, they would display the same developmental trends in stress perception that these two learner groups displayed. Very little research has been done on the developmental sequence of L2 Spanish phonology, so it is difficult to determine whether this is the case without a follow-up study.

It is also possible that the different ability/motivation level that was displayed in the mean course grade differences had a leveling effect on the outcome of the study. That is, the students in the control group were largely self-motivated, and the majority of them indicated during the course that they were taking the course for personal enrichment or enjoyment. The majority of learners in the experimental group, by contrast, indicated during the course that they were taking Spanish to fulfill a requirement.

It is possible, then, that although the experimental group received training throughout the four-week period, the lack of academic ability and/or self-efficacy meant that this training resulted in modest, though significant, gains in perception accuracy that happened in the control group even without instruction.

However, this explanation does not account for the improvement in the control group, unless the improvement was part of a natural development in ability to perceive L2 sounds that occurs during the second semester or equivalent time period of instruction.

There may be a third possibility at work concerning the task itself. In addition to the ABX judgment task presented in the study, there was a meaning-discernment task that relied on the perception of stress placement and accompanying assignment of meaning to each sentence.[6] For this task, learners heard 10 of the sentences from the ABX task and were asked to select the correct interpretation from two possible options, as shown in the following sample item:

> Participants heard: "*Estudié mucho para salir bien en la clase de matemáticas*." ("I studied a lot to do well in math class.")
>
> Participants saw:
> A. Study a lot to do well in math class.
> B. I studied a lot to do well in math class.

Furthermore, learners completed two production tasks for both the pretest and posttest that focused on production of stress contrasts. In one of those tasks, they were asked to read 15 sample sentence pairs taken from the ABX decision task. In the other, they had a visual prompt of a list of 15 sentence pairs, also taken from the ABX decision task, but the verb was removed and replaced with a blank. The researcher read each pair of sentences and asked them to repeat the missing word. There were no distracter items in any of these tasks. Even if learners were not able to distinguish the stress contrasts during the perception portion of the experiment, it seems likely that they could not have completed the production tasks without noticing the stress contrasts. This suggests that future studies would benefit from including distracter items in order to avoid a task effect.

Given the lack of distracters in the tasks that comprised the present experiment, it appears probable that the task itself forced learners to notice the stress contrasts and accompanying meaning differences. Schmidt (1990) discussed the role of noticing or consciousness in SLA and claimed that intake is what learners consciously notice. This is consistent with the pattern of results in the current study: While learners may hear all of the information in the

acoustic signal, they cannot attend to all of it due to processing limitations. However, the nature of the experimental tasks and the lack of distracter items appear to have focused learners' attention on the stress contrasts, which may have caused learners in both groups to attend to those features during the course of the semester, even without the benefit of targeted instruction. Moreover, Schmidt asserted that learners do not need to be intentional to notice a feature of the target language; incidental learning may arise when task demands direct learners' attention to particular features of the target language. Schmidt (1990) stated: "In such cases, it really does not matter whether someone intends to learn or not; what matters is how the task forces the material to be processed" (p. 143).

In his discussion of the relationship between developmental sequences that occur in SLA and noticing, Schmidt (1990) made two other observations that are relevant to the present study. First, he stated: "For second language learning, innate universals and expectancies based on both the native and target language may all act as unconscious contextual constraints on what is noticed. *It also seems plausible that instruction may have a priming effect, increasing the likelihood of noticing features in input through the establishment of expectations*" (p. 143; emphasis added). In the present case, what I am proposing is that the "instruction" that had a priming effect was the experimental task itself, rather than any explicit explanation of differences in processing stress in Spanish and in English. If true, this would be encouraging from a pedagogical standpoint, because it would suggest that one well-designed task that encourages noticing and takes comparatively little time to complete may be all that is needed to prompt improvement in ability to perceive phonetic contrasts that result in meaning differences. For contrasts that are redundant or do not result in meaning differences, Schmidt observed that explicit instruction may be facilitative. This interpretation is consistent with findings in research on the acquisition of morphosyntactic features; specifically, Sanz and Morgan-Short (2004) found that learners in all four conditions made the same significant gains in interpretation and production of direct object pronouns in Spanish. They concluded that a task designed to direct learners' attention to the feature under investigation may be sufficient, without explicit instruction and/or feedback, to result in acquisition of that feature. Similarly, VanPatten and Oikkenon (1996) found that structured input activities, not the explanation of processing strategies, were probably responsible for improvement in learner comprehension and production. While the task in the present study was not designed with the goal of directing learner attention to Spanish stress, the lack of distracter items may have resulted in this outcome.

The second observation that Schmidt (1990) made deals with learner skill level; specifically, he noted that learners with higher skill levels may notice features in the target language more readily. This also appears to be the case in the present experiment; the control group exhibited a higher skill level than the experimental group (as measured by final course grade), which may have enabled learners in this group to notice the stress contrasts without explicit instruction, together with the nature of the experimental task.

VanPatten's (1996) principles of input processing are also relevant to the current discussion. Principle 1(C) states: "Learners prefer processing 'more meaningful' morphology before 'less or nonmeaningful' morphology" (p. 24). Although this principle refers to morphology, not phonology, the principle can easily be extended. Native speakers of any given language are aware of sound contrasts that produce differences in meaning and largely unaware of sound contrasts that do not produce differences in meaning. For example, Hualde, Olarrea, and Escobar (2001) gave the example of the Spanish phoneme /d/, which has two allophones: [d] and [ð], and stated that in the word /dédo/, although the two /d/ sounds

are different, native speakers perceive them to be the same. Thus it appears that in phonology, as well as in morphology, learners prefer to process more meaningful structures before less meaningful structures.

In terms of instruction, VanPatten (1996) noted that learners should become aware of processing strategies that are different in the L2 that might lead them to misinterpret the meaning of an utterance. This is the type of instruction that was provided to the experimental group in the present study; in addition to practicing discerning stress contrasts and associating them with verb meanings, learners were explicitly told that English speakers process stress differently than Spanish speakers and that perceiving stress contrasts is crucial to listening comprehension in Spanish.

However, as VanPatten (1996) noted, "One thing is to tell learners to do this; another thing is to provide them opportunities to do so" (p. 63). VanPatten proposed that learners be exposed to "structured input"; that is, input that has been manipulated to draw attention to the target form and its meaning, and to encourage noticing of inappropriate processing strategies. While the experimental tasks presented in the current study were not designed with the purpose of serving as structured input, it seems probable that they fulfilled this role.

In summary, then, both groups of learners improved in their ability to perceive Spanish stress, but there were no differences between groups. While it remains unclear whether the gains in perceptual ability resulted from the experimental task or as a result of a natural developmental progression, it is encouraging that gains in accuracy were made in the control group without any instructional intervention.

Posttest Comparisons Among All Groups

One remaining question is whether learners' improvement was sufficient to make them statistically distinguishable from native English speakers with no experience in Spanish. To compare the posttest results of the learner groups with the native English and Spanish control groups, a one-way ANOVA was carried out comparing learners' posttest results with those of the native controls. The native speakers completed the perception task once because there was no instructional period involved, so the same data from the native speakers were used to compare learners' pretest results (reported earlier) and posttest results.

Results from the posttest ANOVA comparing learner groups to the native speaker groups were not as encouraging as the results comparing only the two learner groups. A Scheffé posthoc test again revealed a significant difference between the native Spanish control groups and all other groups ($p < .000$ for all comparisons), with no other differences among other groups, indicating that although the learner groups improved relative to their own pretest performance, they were still not significantly different from the English control group in terms of their ability to accurately perceive Spanish stress. Group means from pretest and posttest are presented in Table 4 and Figure 2.

Thus, although learners improved over the course of the experiment even without instruction, this improvement was not enough to make them statistically distinguishable from English speakers with no experience in Spanish in terms of their ability to perceive Spanish stress. The second hypothesis, then, was not supported.

The results of the study in general coincide with the results of other studies on the acquisition of L2 phonology; regardless of the reason for improvement, learners at all levels of acquisition displayed the ability to improve in the perception and production of L2 sounds. However, in the present study, the cause of learner improvement is not clear. In order to determine whether their improvement resulted from the experimental task or merely from the course of normal development, it will be necessary to conduct follow-up studies with distracter

TABLE 4

Pretest and Posttest Response Means by Group

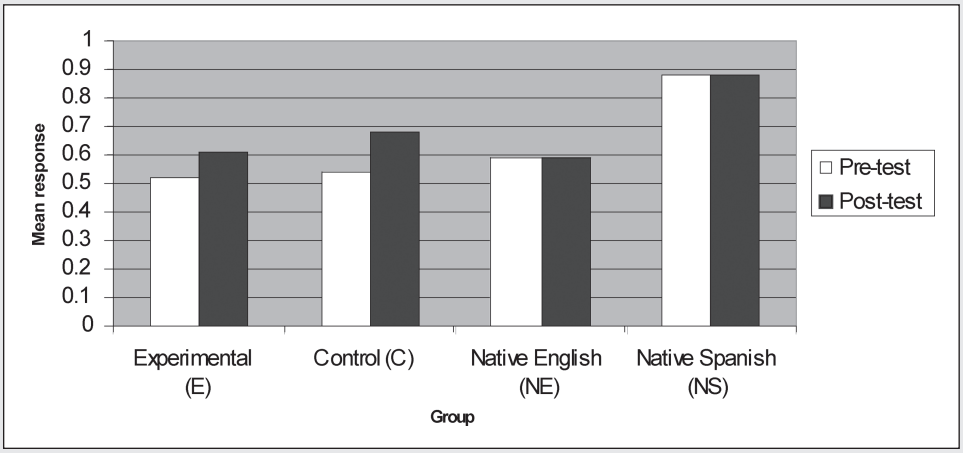
		Pretest		Posttest	
Group	*N*	Mean	*SD*	Mean	*SD*
Experimental (E)	450	.52	.500	.61	.488
Control (C)	330	.54	.499	.68	.466
Native English (NE)	240	.59	.493	.59	.493
Native Spanish (NS)	240	.88†*	.331	.88†*	.331

*$p < .000$

†Native control groups only participated in one round of data collection, so the same data are presented for comparison with learner pretest and posttest results.

FIGURE 2

Comparison of Pretest and Posttest Response Means by Group



Native control groups only participated in one round of data collection, so the same data are presented for comparison with learner pretest and posttest results.

items. However, the improvement shown by both learner groups is encouraging for eventual attainment in L2 phonology, although, as noted, there is still a great deal of research to be done in this area.

Conclusions and Implications

Researchers in this area rightly continue to call for more research and integration of findings into the classroom; however, this area of research is relatively new and thus does not currently have any systematic basis for researchers to decide what features of L2 phonology should be taught. In terms of research, we are currently in the phase of discovering what *can* be taught. This is an important first step, and this study was designed with the intention of adding to the body of research in this area. The results are inconclusive, but improvements in study design will probably provide greater insight as to whether the stress processing strategy is altered by explicit instruction. The

body of research as a whole shows favorable results for instruction, and while the findings of the current study do not support this, neither do they negate or call into question previous findings.

As the next step in this field of research, this study was also designed with the intention of questioning what *should* be taught, once we have established what can be taught. More specifically, what aspects of L2 phonology should be taught at each level of instruction? Although studies investigating instructional effects on acquisition of L2 phonology have indicated that learning is possible for virtually all segments at all levels of instruction, it is important to consider pragmatic variables as well. The most important of these considerations is time: Our time as instructors is limited, and there are a number of different aspects of the language that we can choose to teach or not teach. In terms of teaching pronunciation, a logical proposal is that we begin by teaching meaningful contrasts (that are shown to be teachable through experimental research), whether segmental or suprasegmental. Once these meaningful contrasts are firmly established, we can appropriately spend time on teaching contrasts that are not meaningful (such as the allophones [β, ð, and ɣ] in Spanish).

As with any study, a number of limitations need to be addressed in future research on this topic. First and foremost, the experimental task needs to include distracter items in order to determine whether improvement in stress perception was the result of normal developmental progression or an artifact of the experimental task. Furthermore, as the experimental task involved working memory, it would be extremely beneficial to include some measure of working memory as a covariate.

A further extension of this line of research, though not related to the development of stress perception, is to investigate the interaction between L1 and L2 systems at different levels of instruction. This could be a longitudinal study or cross-sectional study and could examine perception, production, or both. Research by Flege (1987) and MacKay et al. (2001) has indicated that acquisition of the L2 system results in nonnative-like production of L1 sounds at advanced stages of acquisition. It would be very interesting to investigate these results in terms of speech perception, and with a focus on language development, to see at what stage of acquisition these changes begin to occur. As others have noted, this is a relatively underdeveloped area of research, and future research could take a number of directions. The ideas presented here represent only a small portion of the future projects that researchers could undertake in order to develop our understanding of the acquisition of L2 phonology.

The results of this study have important implications for language teachers wishing to include pronunciation instruction in their classes. While more research is needed, it appears that a small amount of instruction designed to make learners aware of the importance of a contrastive feature in the target language, such as stress contrasts in Spanish, may be sufficient to help learners improve in their perception of that feature. This type of instruction could be applied to perception of any feature that proves problematic in a given language, such as French vowels, Italian geminates, and other phonetic features that are difficult for L2 learners to perceive. Furthermore, this type of instruction could be easily automatized and assigned as homework, potentially leading to greater gains in listening comprehension without any sacrifice of class time.

Notes

1. Note, however, that systematic mispronunciation of English stress patterns would likely be equally or possibly more incomprehensible to a listener due to foot-level stress, which English has but Spanish does not. That is, because English has foot-level stress, it allows secondary stress, and with it, a comparably greater number of ways to mispronounce a word at the suprasegmental level.

Research in L2 phonology indicates that errors in pronunciation at the suprasegmental level are much more likely to interfere with comprehension in any language than errors at the segmental level (cf. Field, 2005; Hahn, 2004; Derwing et al., 1997, 1998).

2. Reviewers have noted that the use of reaction time measures for this design is problematic. Due to the nature of ABX judgment task and the placing of target words in initial, medial, and final position, the reaction time was measured from the onset of each recording, resulting in very long reaction times. Reviewers rightly noted that the long lag in response time makes any kind of conclusions about automatization dubious at best. For follow-up studies, a Likert-scale certainty judgment would be a better measure of learning.
3. These variables were included to control for the phonetic salience of the stressed syllable in each sentence, and results are not directly relevant to the research questions proposed in this study. For this reason and for space considerations, these results are not presented.
4. While the researcher is a nonnative Spanish speaker, it is worth noting that this is the case in a number of classrooms, perhaps the majority. In terms of a controlled experimental design, it can be perceived as a design flaw, but because the objective of the research was to investigate, in a real classroom, whether the instruction was effective, the researcher/instructor's voice was used for the recordings.
5. It is also possible that learners are not developmentally ready to begin perceiving stress contrasts in the first semester of instruction. However, given the varying amount of linguistic experience of students enrolled in these classes, and the fact that both classes improved in their perception of Spanish stress contrasts during a short summer course, this does not seem likely. A follow-up study investigating the same question at different levels of instruction (including the first semester) would be ideal to determine if learners are developmentally ready to perceive stress contrasts as novices, or if they require some linguistic exposure in order to begin perceiving these contrasts.
6. Unfortunately, the results of this task were not recorded, so they are not reported here.

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APPENDIX

Transcription and Gloss of Sample Pretest and Posttest Items in Stress Discrimination Task

Learners heard, but did not see, the items in Spanish below. (Learners did not hear or see the English gloss of the items.)

1. A. *Participo en clase para sacar una buena nota.*
   I participate in class in order to receive a good grade.
   B. *Participó en clase para sacar una buena nota.*
   S/he participated in class in order to receive a good grade.
   X. *Participo en clase para sacar una buena nota.*
   I participate in class in order to receive a good grade.
2. A. *Para sacar una buena nota, participo en clase.*
   In order to receive a good grade, I participate in class.
   B. *Para sacar una buena nota, participó en clase.*
   In order to receive a good grade, s/he participated in class.
   X. *Para sacar una buena nota, participó en clase.*
   In order to receive a good grade, s/he participated in class.
3. A. *Para sacar una buena nota en la clase, participó.*
   In order to receive a good grade in the class, s/he participated.
   B. *Para sacar una buena nota en la clase, participo.*
   In order to receive a good grade in the class, I participate.
   X. *Para sacar una buena nota en la clase, participo.*
   In order to receive a good grade in the class, I participate.