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Mitigating negative transference in foreign language articulatory phonetics: Revisiting explicit instruction

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Abstract. The development of oral communication competence is acknowledged as generally overlooked or misunderstood in the literature. The aim of this article is to discuss results from an investigation into the use of explicit instruction as a pedagogical approach to mitigate pronunciation interference among third-year university students learning Spanish as a second-language. Two groups were formed: an experimental group, which received explicit phonetic instruction, and a second group, which served as the control group. Three raters independently evaluated phonetic accuracy in pretest and post-test sessions. Results suggest that pronunciation instruction leads to statistically significant improvement with regard to syllabification, prosodic stress, natural reading speed, intonation patterns, and the pronunciation of rhotic, voiced stop, approximant, and fricative consonants. Results also indicate that the assessment tools developed in this study are appropriate for measuring the overall enhancement of Spanish pronunciation accuracy, and could therefore be used in the foreign language classroom.
Keywords: Spanish phonetics; explicit instruction; language acquisition; negative transference; second language phonetics.

[es] Mitigación de la transferencia negativa en la fonética articulatoria de lengua extranjera: reconsiderando la instrucción explícita

Resumen. El tema de la competencia comunicativa oral del lenguaje por lo general se reconoce en la literatura como obviado (o malinterpretado). Este artículo pretende abordar los resultados de un estudio que evalúa la eficacia del método de enseñanza explícita como enfoque didáctico con el objetivo de mitigar la interferencia fonética en estudiantes universitarios del tercer año de español como lengua extranjera. Se formaron dos grupos: un grupo experimental, que recibió la enseñanza de fonética explícita, y un grupo de control. Tres evaluadores analizaron de forma independiente la pronunciación en fases pretest y post-test. Los resultados obtenidos sugieren que la enseñanza de la pronunciación conlleva a una mejora estadísticamente significativa en cuanto a la silabificación, el acento prosódico, la velocidad natural de lectura, la entonación y la pronunciación de consonantes vibrantes, oclusivas sonoras, aproximantes y fricativas. Los resultados también constatan que las herramientas evaluativas creadas para este estudio resultan apropiadas para medir el progreso realizado en comunicación oral durante la adquisición fonética articulatoria del español y por tanto se podrían incorporar en el aula de lengua extranjera.
Palabras clave: Fonética del español; enseñanza explícita; adquisición de la lengua; transferencia negativa; fonética de una segunda lengua.

[fr] Attenúet le transfert négatif dans la phonétique articulatoire des langues étrangères: une revisión de la méthode d'enseignement explicite

Résumé. La littérature reconnaît que le sujet de la compétence communicative orale a généralement été négligé (ou mal interprété). Cet article prétend aborder les résultats d'une étude qui évalue l'efficacité de la méthode d'enseignement explicite comme une approche didactique dans le but d'atténuer l'interférence phonétique chez des étudiants universitaires de troisième année d'espagnol comme langue étrangère. Deux groupes ont été formés: un groupe expérimental, qui a reçu une instruction phonétique explicite, et un groupe témoin. Trois évaluateurs ont indépendamment analysé la prononciation dans les phases pré-test et post-test. Les résultats obtenus suggèrent que l'enseignement de la prononciation conduit à une amélioration statistiquement significative en termes de la décomposition en syllabes, d'accent prosodique, de vitesse de lecture naturelle, d'intonation et de prononciation des consonnes vibrantes, d'occlusives sonores, d'approximations et de fricatives. Les résultats confirment également que les outils d'évaluation créés pour cette étude sont appropriés pour mesurer les progrès réalisés dans la communication orale pendant l'acquisition phonétique articulée de l'espagnol et sa disponibilité pour l'incorporation immédiate dans la classe d'espagnol pour étrangers.
Mots-clés: Phonétique de l'espagnol; enseignement explicite; acquisition de la langue; transfert négatif; phonétique d'une deuxième langue.

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1. INTRODUCTION

The teaching and learning of oral communication have been a highly debated topic in foreign language learning (Alrabadi, 2011, p. 16), with a perception that the development of such skills has been overlooked, ill-interpreted, or neglected in the curriculum. It could be argued that the development of oral skills has not been effectively addressed in the foreign language classroom (Alrabadi, 2011, p. 15). In light of new research, this study aims to revisit explicit instruction of articulatory phonetics as a pedagogical approach in order to mitigate pronunciation interference. This study focuses on the sounds and processes that pose the greatest difficulty for first-language English speakers (L1) while learning Spanish as a second language (hereafter L2). Particularly, the authors explore whether explicit instruction of articulatory phonetics contributes positively to the perceived overall pronunciation accuracy of the following targeted sounds: [r], [ɾ], h > ø, z > [s], [t], [d], [ð], [b], [β], [g], [ɣ], syllabification/re-syllabification, naturalness and prosody. Analysis of variance (ANOVA) is used to determine whether explicit instruction of articulatory phonetics is successful in improving pronunciation accuracy. If so, which specific sounds and processes have improved most significantly due to explicit instruction. The reliability of the raters in evaluating phonetic accuracy is also assessed. Since accurate pronunciation is a crucial component of effective oral communication, and since teachers acknowledge the need for instruction of articulatory phonetics in the L2 classroom (Delicado Cantero & Steed, 2015), results from this study aim to provide practical suggestions that can be incorporated into the Spanish L2 curriculum in conjunction with an assessment approach that is readily available to be applied to foreign language classroom settings. The authors consider near-native phonetic accuracy as the desired outcome for L2 programs. Near-native phonetic accuracy is equated with small amounts of negative transference (see also negative transfer, L2 interference and linguistic interference) from L1 to L2. Negative transference manifests itself in the erroneous application of linguistic features from L1 to L2 (Whitley, 2002, p. 358). The sounds and processes empirically investigated represent phonetic, phonemic, and suprasegmental phenomena which clearly differ between English and Spanish, and thus theoretically pose linguistic environments conducive to L2 negative transference. This study investigates some of the critical sounds in Spanish for L2 learners who are English native speakers and offers possible means of assessing L2 phonetic accuracy. This paper is organized as follows. Section 2 presents a brief literature review, focusing on the results and challenges posed by recent studies. Section 3 describes the method and design used to investigate the target Spanish sounds, while section 4 presents the main findings and section 5 offers concluding remarks. Possible pedagogical implications are discussed in section 6.

2. EXPLICIT PRONUNCIATION INSTRUCTION IN FOREIGN LANGUAGE TEACHING

Current pedagogical practices in L2 teaching and learning in the United States favor communicative or task-based approaches, wherein little attention is generally paid to L2 articulatory phonetics (Foote et al., 2013; Lord & Fionda, 2014). In reviewing first-year Spanish textbooks, Arteaga (2000) found that only four out of ten include any pronunciation instructional content. Nevertheless, an important goal of L2 programs is that learners comprehend a wide variety of native speakers of said language, and be understood by them (Arteaga, 2000). Since very few L2 learners reach a level of near-native speech, L2 programs often identify mutual comprehensibility as a desirable outcome (Derwing & Munro, 2005). While not all heavily accented speech impedes communication, studies have shown that listeners form subjective opinions about speakers based on their accents (Lippi-Green, 1997; Piske, MacKay & Flege, 2001), and therefore the authors of the current investigation maintain that near-native phonetic accuracy is the preferred outcome.

Previous research indicates that students cite oral language ability as the skill area most valued in studying a L2 (Harlow & Muyskens, 1994). Many researchers, however, argue that most adult learners cannot achieve native-like pronunciation in L2 (Flege, Munro & MacKay, 1995; Scovel, 1969, 1988). Several scholars reject this claim and argue that with individualized practice, learners may improve their performance in L2 articulatory phonetics and approximate near native-like speech (Elliot, 1995a, 1995b; Lord, 2005). Although instruction differs widely, a common practice prevails: auditory modeling and repetition. This type of explicit instruction originated in recordings done in a language laboratory (audio-lingual approaches), including computer software that utilized voice recognition, such as Praat (Boersma & Weenink, 2011), along with CD-Roms, digital materials and websites that encourage learner interaction.

Studies into the effects of formal instruction on pronunciation have produced inconsistent and contradictory results. Sutter (1976) found a non-significant relationship between formal instruction and participants' pronun-

ciation of English as a Second Language (ESL). On the contrary, Murakawa (1981) reported that twelve weeks of phonetic instruction in ESL may be enough to improve the participants' articulatory accuracy of certain allophones. Gilbert (1980), Bot (1983) and McCandless and Winitz (1986) found significant improvement in prosodic feature perception and production in L2 learners with formal instruction. Particularly, Zampini (1994) focused on the phonetic accuracy of intermediate Spanish L2 learners in producing /b, d, g/ and their corresponding allophones in controlled and uncontrolled environments. Participants in this study were successful in producing the occlusive allophones of /b, d, g/, but had greater difficulty in producing their fricative counterparts, especially true for the fricative allophone [ð].

Elliot (1995a, 1995b) found that students who received explicit pronunciation instruction produced more accurate pronunciation than the students who received no explicit instruction. Elliot (1997) also demonstrated that students receiving phonetic instruction exhibited notable improvement in discrete word-level and sentence-level environments, but no statistical improvement in their Spanish pronunciation accuracy in free speech despite explicit instruction. Lord's (2005) results showed that students were able to produce native voice onset times for /p, t, k/, and improved /r/, diphthongs, and spirants. Bajuniemi (2013) compared the effect of explicit Spanish phonetic instruction with native Spanish-speaker instructional input on first-year students' ability to accurately pronounce intervocalic 'd' [ð]. Results demonstrate that first-year students can successfully learn to produce an accurate intervocalic [ð] in a controlled reading task.

Using spectrographic analysis, Menke & Face (2010) compared acoustic qualities of Spanish vowels produced by intermediate learners, advanced learners and native speakers of Spanish. They found that vowel accuracy increased with level of language study, as advanced learners produced vowels with properties similar to those of native speakers. All L2 Spanish speakers showed a tendency towards centralization/reduction of unstressed vowels and schwa reduction.

Scholarship on the teaching of L2 Spanish articulatory and acoustic phonetics offer empirical evidence, but such findings are solely based on qualitative data (Alley, 1991; Arroyo-Hernández, 2009). Differences in theoretical frameworks, research questions, and study designs also make direct comparisons of findings difficult at best. Some researchers argue against using human raters as instruments in evaluating phonetic accuracy, citing an inherent bias (Carey, Mannell & Dunn, 2010, p. 211). The authors found that interlanguage phonology familiarity resulted in evaluators being 2.6 to 4.6 times more likely to award the highest score on an Oral Proficiency Interview (OPI) exam when familiar with the speaker's accent. These results suggest that instructors may naturally rate their students' speech higher based on their experience with their interlanguage phonology and on their roles as sympathetic listeners.

Phoneticians advocate for empirical measurements of accuracy collected in a laboratory setting (Face, 2004; Menke & Face, 2010). While spectrographic analysis of target sound production would eliminate rater reliability by keeping the evaluation instrument constant, this approach presents a number of challenges for many language programs: 1) cost and maintenance of equipment; 2) training in how to operate the equipment and interpret the results; 3) space for a language laboratory, 4) the ability of the spectrograph to account for perceptual, social, and dialectal differences in pronunciation, and 5) alignment of results with realistic course and program outcomes (Kirschning & Aguas, 2000). Language is interactive and as such, the authors argue that it is important to measure phonetic accuracy as it relates to how other speakers and listeners of the target language perceive it in daily settings. While L2 negative phonetic transference could be measured with more sophisticated laboratory equipment, oral communication must be simulated and developed in a contextualized learning environment where the learner organizes phonetic production in real-life settings. Furthermore, preference has been given to using the human component (rater) for its convenience since it can be conducted in any type of classroom (not only laboratory setting).

In a nutshell, this study aims to answer the following research questions: Have students exhibited a mitigated negative transference effect from their L1 into the L2 for the pronunciation of the sounds [t], [d], [ĉ], [g], [b], [ß], [ɣ], [i], [e], [a], [o], [u], [ɾ], [r], h > [ø], z > [s] after explicit instruction of articulatory phonetics? Has accuracy of syllabification, prosodic accent, natural reading speed, and intonation improved after explicit instruction? The next section will describe the research design, participants, and the assessment approach performed in this study.

3. RESEARCH METHOD

3.1. Participants

Two groups of 300-level Spanish language students enrolled in a public university in the United States were recruited to participate in this study. All participants had completed a minimum of two years of college-level Spanish, and had a competency that is equivalent to B1 in the Common European Framework of Reference for Languages (CEFR). All participating students were native speakers of English, Spanish was their L2 and no heritage Spanish speakers were involved in this study. The experimental group consisted of twenty-four undergraduate students enrolled in the explicit pronunciation course, and the control group consisted of twenty undergraduate students in a Spanish

conversation class who did not receive pronunciation instruction. All students completed the same reading task (see *Appendix 1*) in a laboratory setting. The raters were not present at the time of the recordings.

Cohen's *d* has been used to quantify the difference between two independent population samples (Tavakoli, 2013, p. 76), and to determine whether the sample size used to compare the two populations is adequate (Larsen et al., 2012, p. 140). The Cohen's *d* values calculated for the data collected in this study range from 0.8 to 1.2, indicating that the sample size obtained is adequate (Bresciani et al., 2004; Nunnally, 1978).

3.2. Target Sounds

In this section we provide a brief description of the target sounds evaluated in this study. The following sounds were selected because of the potential problems they may pose to native English speakers of L2 Spanish, particularly with regard to differences in place of articulation, mismatches between sound and orthographic representation, and the production of sounds that are not part of the native linguistic inventory of the speakers under study.

3.2.1. [t]

The voiceless stop [t] presents a problem for native English speakers of L2 Spanish since it has a dental place of articulation in Spanish, while in English it has an alveolar place of articulation and is produced with aspiration as [t^h] in stressed position word-initially (as in *tag*) and word-medially between vowels (as in *attack*). With regard to orthography, <t> corresponds to [t] in Spanish, while the English graphemes <t> and <tt> correspond to the alveolar flap [ɾ] in many dialects, including American English, particularly in intervocalic position, within a word (e.g., *better*) or across words (e.g., *at a*). Native speakers of L2 Spanish may, then, apply these rules from English to their L2 production in Spanish.

3.2.2. [d]

Like [t], the voiced stop [d] in Spanish has a dental place of articulation rather than an alveolar one, as it does in English. Spanish [d] corresponds to the grapheme <d> after a pause, a nasal or a lateral consonant, while English <d, dd>, like English <t, tt>, may correspond to the alveolar flap [ɾ] in many dialects, as in the word *ladder*. Native speakers of L2 Spanish may apply these rules from English to their L2 Spanish.

3.2.3. [b]

The bilabial stop [b] does not tend to pose major difficulties in production for native English speakers of L2 Spanish. However, like [d], these learners must apply the rules of allophonic distribution correctly to produce [b] in Spanish, that is, after a pause or a nasal consonant. In addition to the sound [b] corresponding to the grapheme <b>, it also corresponds to the grapheme <v> in the same contexts, i.e. after a pause or a nasal consonant. In English, however, the graphemes <b> and <v> correspond to different sounds and contrast at the phonemic level, i.e. <b> refers to the voiced bilabial stop /b/ (as in the word *ban*), while <v> corresponds to a labiodental fricative /v/ (as in *van*). Native English speakers of L2 Spanish, particularly at early stages, tend to pronounce Spanish <v> as [v] due to negative transference from English phonology and orthography.

3.2.4. [g]

The voiced velar stop [g] does not tend to pose major difficulties for native English speakers of L2 Spanish beyond the correct application of its allophonic rules of distribution. Like [b], Spanish [g] occurs after a pause (e.g., *Gato*) or a nasal consonant (e.g., *un gato*).

3.2.5. [ð]

The voiced dental fricative [ð] occurs everywhere in Spanish (e.g., *codo*, *arder*), except after a pause (e.g., *Doy*), nasal (e.g., *un día*), or lateral consonant (e.g., *caldo*). English speakers of L2 Spanish are capable of producing [ð] without difficulty, since it constitutes not only a sound but also a phoneme in English. Nevertheless, [ð] corresponds to the grapheme <d> in Spanish, while in English, the grapheme is usually <th>, although <th> can also correspond to a voiceless interdental fricative [θ] in some cases.

3.2.6. [β]

The voiced bilabial fricative [β] is a difficult sound for English speakers of L2 Spanish, since it does not exist in English and its production is novel to those speakers. When one applies the allophonic rules of distribution to show that it occurs in all contexts (e.g., *quedo, cerveza*) except after a pause (e.g., *Voy*) or a nasal consonant (e.g., *un barco*), and it corresponds to the graphemes <b> and <v> in Spanish, the potential for direct transfer from L1 English to L2 Spanish is high.

3.2.7. [ɣ]

The voiced velar fricative [ɣ] is another difficult sound for English speakers of L2 Spanish since it does not exist in English. The allophonic rules of distribution show that Spanish [ɣ] appears in all contexts (e.g., *la guerra*) except after a pause (e.g., *Guerra*) or a nasal consonant (e.g., *un gato*). Thus, there is a high level of potential use of English [g] in all contexts in which an orthographic <g> (or <gu> before <e> and <i>) is present in Spanish.

3.2.8. [z]

Most beginning students fail to realize that sounds and graphemes are not always represented with the same symbol. All words with the letter <z> in English are pronounced with a voiced alveolar fricative [z]. In Spanish, however, <z> may be pronounced as the voiceless alveolar fricative [s] in American Spanish or as the voiceless interdental fricative [θ] in central and northern varieties of Peninsular Spanish. A <z> is only pronounced as a voiced alveolar fricative in Spanish in cases of voicing assimilation, as in *hazme reír* [ázmereír]. English speakers of L2 Spanish, however, often incorrectly pronounce <z> as [z], a direct transfer from English.

3.2.9. [h]

The grapheme <h> is silent in Spanish (e.g., *hora*), while it is pronounced as a voiceless glottal fricative [h] in many English words (e.g., *hot*). Beginning Spanish students may pronounce this segment a result of a direct transfer from English.

3.2.10. [ɾ]

The Spanish voiced alveolar flap [ɾ] corresponds most closely to the alveolar tap in American English that is represented orthographically by <t, tt> and <d, dd>, especially in onset position of unstressed syllables. However, the rhotic sound corresponding to the letter <r> is retroflex in English and not a tap as in Spanish. The problem with Spanish [ɾ] for native English speakers of L2 Spanish is, thus, similar in nature to the problem they encounter with Spanish [ð]: the graphemes do not correspond to the same sounds in both languages. Therefore, one often expects a negative transference from English in the production of L2 Spanish in the form of <r> as a retroflex sound.

3.2.11. [r]

The alveolar trill does not exist in general American English. In most varieties of Spanish, it exists on both the phonemic and allophonic levels: it is phonemic in intervocalic position, when it is written as <rr>, as in *perro* 'dog' (cf. *pero* 'but'), while in other contexts, it is allophonic, i.e. after [l], [n], and word-initially, when it is written as <r>, cf. *alrededor* [alreðeðóɾ] 'around', *enriquecer* [enrikeθéɾ] 'to enrich', *rico* [ríko] 'rich'. Because this sound is represented orthographically, in Spanish, with the same grapheme as the retroflex sound in English, i.e. with <r>, English speakers of L2 Spanish often pronounce Spanish <r, rr> as they would in English.

3.2.12. [a, e, i, o, u]

Whereas Spanish has 5 phonemic vowels, most dialects of American English have 11 vowel phonemes. Spanish vowels are shorter and tenser than their English counterparts, which tend to diphthongize in stressed syllables. In American English, unstressed vowels become centralized and reduced to the mid central lax allophone [ə] (schwa). In order to achieve more native-like pronunciation in Spanish, native speakers of American English must retain the brevity and tension of their vowels in stressed and unstressed syllables.

3.3. Additional Features and Processes

3.3.1. Prosody

Spanish syllable length is uniformly short compared with English syllable length. This is closely related to the nature of vowels (nuclei) in both languages, with English having many more diphthongs and a larger vowel inventory than Spanish. In addition to prosodic stress, Spanish has orthographic stress, or written accent marks/tildes, which may indicate phonemic contrast, as in *hablo* 'I speak, I do speak, I am speaking' versus *habló* 'he/she spoke'. When they are not phonemic, they alert the speaker that the prosodic rules do not apply and serve to mark word stress elsewhere. Speakers of L2 Spanish must learn both prosodic and orthographic rules regarding stress placement. Because many native English speakers find the rules of prosodic stress in Spanish complicated and abstract, it should be no surprise that they fail to accurately apply them. In sum, prosodic features are crucial characteristics of foreign accents and yet remain the most complex to teach (Cortés Moreno, 2002, pp. 103-109).

3.3.2. Syllabification/re-syllabification

There are numerous phonological processes affecting the syllable which native Spanish speakers have acquired. In coda position, many consonants undergo neutralization when they assimilate to neighboring sounds in the attack position of the following syllable. These processes include the various sub-types of assimilation (in point of articulation, nasal assimilation, and lateral assimilation). Syllabification rules also differ from English to Spanish. Syllabic delineation produces open vs. closed syllables and greatly affects the sound quality of the nucleus. A well-formed syllable in the students' native English tongue is often not permitted in Spanish. Spanish prefers a consonant in onset syllabic position, while English prefers a consonant in coda syllabic position. Spanish restricts certain consonant clusters in onset position, requiring that the first consonant of the cluster remain in the coda of the preceding syllable if the consonant cluster cannot begin a word (e.g., 'los trámites' > [los.trá.mi.tes] and not [*lo.strá.mi.tes]). Resyllabification occurs at the phrase level and above. Consonants in coda position at the word level move to the onset position when re-syllabification applies, provided they constitute a well-formed consonant cluster (e.g., 'unas uvas' [u.na.sú.ßas], but 'unas mesas' [u.naz.mé.sas]). Since we rarely utter words as lists, failure to apply phrase-level rules complicates the relationship between the syllable and intonational pattern. Thus, speakers who do not syllabify and re-syllabify correctly will demonstrate heavily accented and choppy speech respectfully.

3.3.3 Naturalness

Reading slowly or quickly in an unnatural manner affects the naturalness of speech. The authors of the current study hypothesize that speakers often perceive students who read and pronounce L2 Spanish very slowly as less fluent, while they may perceive students who read and pronounce L2 Spanish very quickly as having heavy accents in L2. This latter perceptual response on the part of native speakers results from L2 students' inability to articulate individual sounds and to correctly apply the rules of allophonic distribution as they attempt to achieve greater fluency at the expense of phonetic accuracy.

3.4. Treatment, Tasks and Procedure

Both groups were required to participate in two reading sessions during a 15-week semester. The first session (or pre-test) was administered during the second week of classes, prior to the initial instruction of phonetic content, while the second session (or post-test) took place during the final week of the semester (*Appendix 2*). Students read the same text in both sessions, and the actual reading task consisted of an excerpt of the Spanish short story *Los tres cerditos* that contained 162 words (*Appendix 1*). The average reading time was approximately 4 minutes. The targeted sounds are as follows: [t], [d], [ð], [g], [ɣ], [b], [β], [i], [e], [a], [o], [u], [ɾ], [r], h > ø, z > [s]. The raters assessed the phonetic accuracy for these allophones.

The intervention period lasted one semester and consisted of two class sessions per week (75 minutes each) and 15 weeks of class instruction. Explicit instruction included a plethora of activities that focused on phonetic perception, phonetic articulation, descriptive phonetic analysis, Spanish/English contrastive analysis and metalinguistic awareness. Each session focused on a specific sound or a group of sounds or processes (see *Appendix 2*).

3.5. Assessment and Rater Reliability

Three raters evaluated randomized recordings from each participant's pronunciation of the targeted sound in order to mitigate any sympathetic listening effect (Carey, Mannell & Dunn, 2010). The raters did not model the pronunciation of any sound that was measured for the test. Even though some studies on phonetic instruction ask L2 participants to rate themselves (Ausín & Sutton, 2010), this study does not consider L2 Spanish students enrolled in 300-level coursework at the undergraduate level to be accurate evaluators of their own pronunciation since they lack the necessary knowledge and expertise, and since this is the first time they are exposed to the topic.

Inter- and intra-rater reliability have been carefully considered in this study, with three raters working independently to assess pronunciation performance of the reading task. The three raters represent a balance between native speakers of the L1 and the L2. The first rater is a linguist with experience teaching Spanish phonetics (L1 English, L2 Spanish), the second rater is an expert in Spanish articulatory phonetics (L1 Spanish, L2 English), and the third rater is an applied linguist with no expertise in phonetics, a native speaker of Spanish, and an experienced instructor in Spanish as a foreign language. Krippendorff's alpha (α) coefficient is used to correlate the profile of the three raters and their assessment. Krippendorff's α can be used to incorporate ordinal, interval and ratio as well as nominal data (Lombard, Snyder-Duch & Bracken, 2002) for interrater/intercoder reliability and is preferred for its flexibility in measurement (O'Connor & Joffe, 2020). Therefore, Krippendorff's α is deemed appropriate for this study, and the calculated values range from 0.71 to 0.82, indicating that there is a substantial agreement between the three raters.

McNamara (1996), Alderson, Clapham, and Wall (2002), and Elder, Iwashita and McNamara (2002) argue that inter- and intra-rater reliability can be reached via rater training. Jacobs et al. (1981) assert that rater training is beneficial to reduce extreme differences in scoring and to reinforce a rater's consistency in applying the criteria. In

addition, Delattre (1965) suggests that targeting specific pronunciation features in short sentences designed to elicit those features can assist in training raters in their actual rating of L2 speech. In fact, the three raters have participated in rater training targeting short sentences in order to comprehend the intended scoring criteria in the rubric and to ensure high levels of consistency. The degree of agreement among the three raters is evaluated by calculating the Intraclass Correlation Coefficient (ICC) (Griffin & Gonzalez, 1995; Shrout & Fleiss, 1979), which is used to determine the degree to which data points resemble each other in terms of a quantitative trait. This coefficient was used to investigate consistency among the three raters and the ICC values for this study range between 0.788 and 0.912, indicating a high level of agreement between the three raters. Additionally, in this study rater training has been used to enhance rater reliability, as suggested by Alderson, Clapham, and Wall (2002) and Brown (2003).

3.6. Instrument

All three raters used the rubric shown in *Appendix 3* to assess each targeted sound individually, together with syllabification, naturalness and prosody. The rubric was created for the purposes of this study and has been extensively used by the instructor in the classroom setting. The rubric uses a 1-5 point scale (Likert Scale) that ranges from the highest level (1) of negative transfer from the L1 (English) sound into the L2 (Spanish) sound pronunciation, to the closest level (5) of near-native pronunciation in L2. No groupings or categories of sounds are adopted in this study since multiple perceptual processes may be occurring simultaneously in one sound, and some limitations have been reported in the literature (cf. Bailey and Brandl, 2013 for an example of grouping vibrants). Therefore, a simplistic and user-friendly approach has been adopted in this study in order to enable an effective application of the instrument under the constraints of the classroom setting.

3.7. Data Analysis

Data was postprocessed using a 2 x 2 ANOVA in order to comprehend the influence of two independent variables: *intervention* of instruction as well as *time* (pretest/post-test) between the experimental group and the control group. Pretest and post-test designs are very commonly used (Dimitrov & Rumrill, 2003), particularly in foreign language acquisition research (Blom & Unsworth 2010), in applied linguistics (Dörnyei, 2007; Lazaraton, 1995) and in L2 pronunciation instruction (Bailey & Brandl, 2013; Goswami & Chen, 2010; Sturm, 2013). ANOVA is a commonly used statistical technique (Lazaraton, 1995; Dörnyei, 2007) and is used in this study to understand variability in the designed experiment as well as the significance of differences between the two groups of interest (Dörnyei, 2007, p. 218). The reported results from ANOVA include sum of squares, degrees of freedom (DF), mean square, *F* values, and significance (*p* value).

4. RESULTS AND DISCUSSION

Table 1 presents the ANOVA results that have been used to evaluate the effect of the two variables: *intervention* and *time*, as well as the interaction effect of *intervention* and *time*. This design enables an investigation of the effects of *time* and *intervention* simultaneously by comparing the main and interaction effects. ANOVA results have been calculated for the 2 x 2 matrix consisting of two groups (control and experimental) at two levels of time (pretest and post-test). All effects are reported with their varying (*p)* levels of significance. Table 1 illustrates the results that have shown a high level of significance and thus suggest that explicit instruction as the chosen pedagogical approach has contributed to interference mitigation of negative transfer in such sounds and processes. Additional results that were found to be statistically insignificant are included in *Appendix 4*.

For sounds [t] and [d], the main effect of *intervention* is found to be significant with $F(1, 56) = 2.07$, $p = 0.25$, and $F(1, 56) = 2.61$, $p = 0.25$ respectively. As reported in Table 1, no significant effect is reported in the ANOVA results for the main effect of *time* as well as the interaction effect of *intervention x time*. The findings for [t] and [d] sounds confirm a reasonable improvement in place of articulation (dental vs. alveolar) indicating that the pronunciation course itself has moderately enhanced student pronunciation performance. The results for [t] and [d] in this study suggest trends that are similar to previously published studies (Goswami & Chen, 2010). The post hoc results for these sounds indicate that multiple mean values from the ANOVA results significantly differ from each other.

The ANOVA results indicate a very high degree of improvement for sound [ð] as a result of intervention with $F(1, 56) = 5.16$, $p = 0.05$. In fact, a statistically significant effect for [ð] has also been confirmed in other studies such as Bailey & Brandl (2013), Goswami & Chen (2010) and Ausín & Sutton (2010) and Lord (2005). Goswami & Chen (2010) also reported that [ð] demonstrated a high degree of improvement in their experiment. These results indicate the success of the selected tasks or activities in mitigating L2 interference of the voiced dental fricative.

Other sounds that show significant degrees of improvement as a result of intervention are [ɣ̟] and [r]. A high significance level of significance, $p = 0.10$, is reported for both these sounds in conjunction with the main effect of

intervention being $F(1, 56) = 3.50$ and $F(1, 56) = 2.90$ respectively. As shown in Table 1, the main effect of *time* and the interaction effect for both these sounds are not significant. These results are interesting because instructors widely regard both of these sounds as very challenging for L2 learners of Spanish. An improvement in the pronunciation accuracy of Spanish trilled [r] shows the effectiveness of pronunciation instruction for a sound that does not exist in the student's L1.

Table 1. *ANOVA results – intervention and time*

Dependent Variable	Source	Sum of Squares	DF	Mean Square	F	Significance
[t]	INTERVENTION	14.645	1	14.645	2.0726	0.25
	TIME	0.0926	1	0.0926	0.0131	
	INTERVENTION & TIME	0.3704	1	0.3704	0.0524	
	Error	395.688	56	7.0658		
[d]	INTERVENTION	14.0167	1	14.0167	2.6126	0.25
	TIME	0.6685	1	0.6685	0.1246	
	INTERVENTION & TIME	0.5352	1	0.5352	0.0997	
	Error	300.432	56	5.364		
[ð]	INTERVENTION	19.6463	1	19.6463	5.1649	0.05
	TIME	0.5351	1	0.5351	0.1407	
	INTERVENTION & TIME	0.5351	1	0.5351	0.1407	
	Error	213.013	56	3.8037		
[g]	INTERVENTION	8.9817	1	8.9817	0.9108	0.35
	TIME	5.0764	1	5.0764	0.5148	
	INTERVENTION & TIME	0.4531	1	0.4531	0.0459	
	Error	552.219	56	9.861		
[ɣ]	INTERVENTION	17.63	1	17.63	3.50	0.10
	TIME	0.7728	1	0.7728	0.1534	
	INTERVENTION & TIME	0.1315	1	0.1315	0.0261	
	Error	282.017	56	5.036		
[b]	INTERVENTION	9.8685	1	9.8685	0.9937	0.35
	TIME	5.6018	1	5.6018	0.564	
	INTERVENTION & TIME	0.224	1	0.224	0.0225	
	Error	556.142	56	9.9311		
[β]	INTERVENTION	13.8331	1	13.8331	2.7739	0.25
	TIME	0.0045	1	0.0045	0.0009	
	INTERVENTION & TIME	1.2109	1	1.2109	0.2428	
	Error	279.26	56	4.9868		
[ɾ]	INTERVENTION	9.074	1	9.074	1.4753	0.25
	TIME	2.674	1	2.674	0.4347	
	INTERVENTION & TIME	1.2518	1	1.2518	0.2035	
	Error	344.431	56	6.1505		
[r]	INTERVENTION	16.0167	1	16.0167	2.9084	0.10
	TIME	3.1129	1	3.1129	0.5652	
	INTERVENTION & TIME	0.8166	1	0.8166	0.1483	
	Error	308.384	56	5.5068		
z > [s]	INTERVENTION	18.0977	1	18.0977	1.0554	0.30
	TIME	0.9918	1	0.9918	0.0578	
	INTERVENTION & TIME	0.6786	1	0.6786	0.0395	
	Error	960.226	56	17.1468		
Naturalness	INTERVENTION	0.4998	1	0.4998	0.0670	
	TIME	7.9622	1	7.9622	1.0683	0.30
	INTERVENTION & TIME	2.8998	1	2.8998	0.3890	
	Error	417.36	56	7.4528		

The ANOVA results indicate moderate improvements of sounds [ɡ] and [b] due to intervention with significance of $p = 0.35$ and with the main effect of *intervention* being $F(1, 56) = 0.91$ and $F(1, 56) = 0.99$ respectively. The effect of *time* and interaction effect of *intervention x time*, as listed in Table 1, are not found to be significant. The perceived improvement in the pronunciation of [ɡ] is consistent with similar trends reported by Bailey & Brandl (2013), who also found a significant improvement in pronunciation as a result of intervention in these targeted sounds. The literature suggests that sounds [g] and [b] do not tend to pose major difficulties for native English speakers of L2 Spanish, so observing moderate improvements in mitigating negative transfer of non-challenging sounds is additional supporting evidence for the effective implementation of explicit instruction.

The analysis of targeted sounds [β] and [ɾ] also reveals a moderate improvement for the main of effect of *intervention* $F(1, 56) = 2.77$, $p = 0.25$ and $F(1, 56) = 1.47$, $p = 0.25$ respectively. These results are comparable to trends reported by Ausín & Sutton (2010), and Bailey & Brandl (2013) for [β], and also statistical significance in a t-test for [β] that Lord (2005, p. 564) reported. ANOVA shows a non-significant main effect of *time* and non-significant interaction effect of *intervention* x *time* in this study. A moderate improvement is also found in the pronunciation of z > [s] since a significant effect for *intervention* with $F(1, 56) = 1.05$, $p = 0.30$ is found from the ANOVA results. This indicates perceived improvement in student pronunciation at the end of the semester for pronouncing z > [s] directly as a result of intervention. The post hoc results for this sound indicate that three of the mean values differ significantly from each other.

By contrast, the results indicate that pronunciation instruction did not help naturalness. Results listed in Table 1 suggest that there is no significant effect of *intervention* for naturalness, but there is a main effect of *time*, $F(1, 56) = 1.06$, $p = 0.30$. This result suggests that pronunciation instruction did not help students to enhance their natural reading speed. A possible explanation for this result may be that the in-class activities were not adequate, and/or that the students tend to improve their speed of reading as they spend more time with the language, regardless of explicit instruction. However, this relationship merits further investigation.

Lastly, a one-to-one comparison of the means suggests a marginal amount of improvement between pre and post-instruction sessions for h > ø, syllabification, prosody and all five vowels ([a], [e], [i], [o], [u]), although the results do not reveal any significant differences. As shown in *Appendix 4*, main effects of *intervention* and *time* for all five vowels are not significant. These averages have only slightly improved to values ranging from 3.6 to 3.8. A possible explanation for the minimal improvement may center on the nature of vowels as difficult sounds that routinely cause problems for native English speakers of L2 Spanish. Thus, it is possible that students may demonstrate improvement in their pronunciation of vowels only with a longer period of explicit instruction.

Additionally, results do not show a significant effect of *intervention*, *time* or interaction for h > ø, syllabification and prosody. However, an analysis of pretest averages reveals that the perceived pronunciation of h > ø (average of 4.46) is already very accurate. This could be attributed to the fact that students participating in this study have already undergone two years of Spanish learning, having been exposed to many common words containing this sound, and therefore are able to incorporate the binary nature of this rule in applying contrastive analysis to their language learning (the grapheme 'h' is pronounced in English, but not in Spanish). A similar observation is made about syllabification and prosody with the pretest averages ranging from 3.1 to 3.4.

Overall, the results indicate the effectiveness of mitigating interference through explicit phonetic instruction in the Spanish L2 classroom for many sounds analyzed in this study. Likewise, post hoc results have also been gathered and reveal multiple effects for many sounds that demonstrate significant differences, therefore confirming the findings of the ANOVA results about the significance of intervention.

5. CONCLUDING REMARKS

Based on the perception of three independent raters, explicit pronunciation instruction is seen to result in statistically significant improvement in the following sounds: [t], [d], [ɡ], [b], [ɾ] and [β]. Additionally, students demonstrate high levels of improvement in the accurate pronunciation of [ð], [ɣ] and [r] after intervention, and modest improvement in the pronunciation of z > [s]. However, no significant differences are found in h > ø, syllabification, prosody and the five vowels. This finding could be expected since the pretest data shows a moderate level of pronunciation accuracy for incoming students and an implication that additional pronunciation improvements for these sounds may require in-depth instruction and more time.

Although the findings of this study offer relevant information and assessment materials on the potential benefits of explicit instruction of articulatory phonetics in the L2 Spanish classroom, there are some limitations that should be considered for future studies. Participants were recruited from two separate 300-level courses that emphasized oral skill development, but the sample size was relatively small. Even though this limitation is mitigated by performing analysis of variance, there may be unknown inherent differences between the groups that merit special attention in future research. In addition to the possible bias that may be introduced by using human raters, one must recognize that the pronunciation enhancements shown by the participants in this study may not necessarily transfer to communicative contexts. When students attend to both L2 linguistic form and function, one

may reasonably expect a breakdown in phonetic accuracy, particularly if their holistic learning experiences did not include them simultaneously from the beginning. Thus, it is important to cultivate a perceptive and productive focus on form while engaging students in directed discursive practice. Evidence from the current study and previous research on L2 articulatory phonetics suggests that an alignment of the course objectives and goals of articulatory phonetics within L2 programs is crucial.

6. PEDAGOGICAL IMPLICATIONS AND FUTURE RESEARCH

The findings of this study substantiate the importance of incorporating explicit phonetic instruction at an early stage of L2 acquisition to avoid fossilization of incorrect forms and providing remedial instruction of problematic sounds and processes throughout a contextualized learning experience. More importantly, the assessment tools developed in this study are readily available to measure Spanish pronunciation accuracy in the foreign language classroom. The findings confirm that intonation remains a crucial element of pronunciation (Cortés Moreno, 2002, p. 65) and hence specific attention must be paid to syllabification, prosodic stress, natural reading speed, intonation patterns, and the pronunciation of rhotic, voiced stop, approximant, and fricative consonants.

The results of this study provide noteworthy pedagogical implications for L2 Spanish instruction. One could argue that explicit instruction of articulatory phonetics has contributed to the pronunciation accuracy in oral communication development among Spanish language learners. Including tasks that offer hands-on practice of [ð], [ɣ] and [r] have proven to be crucial in the process of mitigating negative transference in L2 pronunciation. Acknowledging that such sounds as [t], [d], [g], [b], [ɾ] and [β] present difficulties for native English-speaking students of L2 Spanish allow instructors to develop new assessment tools and new lesson plans that incorporate a holistic approach wherein instructors provide constant student-centered feedback in the L2 classroom. Furthermore, the results have evidenced that vowels present unique difficulties for L2 Spanish learners, and additional longitudinal assessment tools and tasks may be necessary for a more comprehensive evaluation of vowels as learners progress through the foreign language curriculum. Ideally, such tasks could also be incorporated earlier on in the foreign language curriculum. Hands-on tasks could be progressively scaffolded or blended in existing oral activities in 1000-level and 2000-level elementary- and intermediate-level Spanish courses and to raise student awareness of these pronunciation challenges earlier on in their curriculum learning path.

Although mitigating negative transference at the 300-level seems appropriate, learners showing a fossilization of forms at the 400-level coursework is arguably too late for remediation of problematic pronunciation forms. Therefore, the assessment approach suggested in this study is preferred for its simplicity and can be applied in early intervention plans (e.g., early alerts, mid-term assessments, etc.). Such an intervention would allow the instructor or program coordinator to provide additional guidance during the advising sessions while establishing a learning path that allows for strengthening of oral development early in the academic experience. The assessment approach used in this study is relatively simple and can be easily used with minimal instructor training, therefore it could be used to facilitate students transitioning from first to second year (or second to third year). This assessment approach coupled with early intervention could potentially benefit a vertically-integrated curriculum that fosters a gradual development of oral skill acquisition.

Results from this investigation could lead to a number of potential research directions. As discussed above, the unique composite makeup of the student profile calls for an in-depth exploration of additional variables that may influence phonetic accuracy: amount and type of target language experience and practice, multiple factors involving students' language placement, and student perception toward negative transference. As future scope of this project, it would be necessary to replicate the design using not only human raters, but also speech analysis software, such as Praat and Wavesurfer (cf. Olson, 2014). Similar future studies could prove valuable for enhancing our understanding of the potential of oral skill development through explicit instruction and the emergence of novel approaches to rigorous L2 pedagogical and assessment practices in the foreign language classroom.

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APPENDICES

Appendix 1. Reading Text. *Los tres cerditos. Primera parte*

Érase una vez tres cerditos que iban a construirse una casa para así estar a salvo de las garras del lobo, quien últimamente acechaba los alrededores de aquel lugar y derribaba casas para comerse a los cerditos que habitaban dentro de ellas. Los tres cerditos pensaban de forma distinta, así que cada uno se hizo su casa de la forma que pensaba que era la mejor. Tocinete, que era el más pequeño de los tres, decidió hacerse la casa con paja para así terminar antes e irse a jugar con el resto de los cerditos. Jamoncín, el mediano de los tres, se hizo la casa con madera, pues no le llevaría mucho tiempo y podría ir a jugar pronto. Cochinín, el mayor de los tres, decidió hacerse la casa con ladrillos, porque aunque iba a tardar más en construirla y poderse ir a jugar con el resto de los cerditos, sería una casa muy resistente y estaría a salvo del lobo feroz.

Appendix 2. Pretest, post-test, and weekly in-class activities

Week	Theme	In-class activities
1.	Phonetic symbols and descriptions	– Pronunciation isolated sounds, symbol; – Vocabulary: point, manner of articulation and sonority – Natural classes – Sample words containing sounds/phonetic symbols
2.		Pretest closed reading
3.	Review of phonetic symbols Vowel practice	– Whole class guided practice phonetic description, symbols – Mechanics of vowel production – Repetition words and phrases target vowel sounds – English / Spanish contrastive analysis – Perception exercises to identify schwa – Perception exercises to identify brevity, purity
4.	Descriptive practice of sounds Vowel practice /p, t, k/ English / Spanish contrastive analysis Review for exam	– Pair work, written exercises – Repetition practice – Conversation(communicative), questions – Textbook exercises
5.	Exam 1 /b, d, g/ Rules of allophonic distribution	– Perception exercises between allophones – Exercises to produce correct allophone
6.	z > [s] Syllabification Resyllabification	– Conversation – Lecture syllabification – Practice rules of syllabification – Pronouncing words correctly, emphasis on vowels / learned segments – Lecture on rules of resyllabification – Pair and whole-class reading aloud at paragraph level
7.	h > Ø Nasals /nasal assimilation Laterals / lateral assimilation	– Words/cognates with 'h' oral practice – Lecture nasal assimilation and symbols – Guided oral practice – Lecture lateral assimilation and symbols – Guided oral practice – Perceptual differences rules of assimilation
8.	Intonation /r/ vs. /ɾ/	– Rules of distribution – Guided practice, words, sentences – Reading practice – Conversation – Perception exercises negative transference – Cognates
9.	Prosodic vs. orthographic stress Review Test 2	– Lecture – Common words – Invented words – Perception exercises – Review Test 2
10.	Test 2 Individual meetings with instructor/ reading	– Test 2 – Identify strengths / weaknesses – Causes for negative transference (e.g., point of articulation; allophonic rules of distribution; schwa, vowels, etc.
11.	Native and non-native input: music, film e-advertising, e-videos	– Perception exercises – Discussion questions
12.	Intensive review of vowels, syllabification.	– Repetition drills – Reading aloud – Activities / vocabulary building
13.	Intensive Review of /b, d, g/, resyllabification	– Repetition drills – Reading aloud – Conversation – Vocabulary building
14.	Intensive review of /r/ and /ɾ/ Intonation Prosody	– Repetition drills – Reading aloud – Conversation – Vocabulary building – *Tongue twisters*
15.		– Post-test

Appendix 3. Rubric

Acento no nativo → Acento nativo
Impide comunicación → Facilita comunicación

VARIABLES	1	2	3	4	5
[t]					
[d]					
[ð]					
[g]					
[ɣ]					
[b]					
[β]					
[i]					
[e]					
[a]					
[o]					
[u]					
[ɾ]					
[r]					
h > ø					
z > [s]					
Prosody					
Naturalness / Speed					
Syllabification/ Resyllabification					

Appendix 4. ANOVA results (cont.). Intervention and time

Dependent Variable	Source	Sum of Squares	DF	Mean Square	F	Significance
[i]	INTERVENTION	0.0296	1	0.0296	0.0019	–
	TIME	0.0666	1	0.0666	0.0044	
	INTERVENTION & TIME	0.1185	1	0.1185	0.0078	
	Error	842.475	56	15.0441		
[e]	INTERVENTION	2.9629	1	2.9629	0.2288	–
	TIME	0.0296	1	0.0296	0.0022	
	INTERVENTION & TIME	0.0666	1	0.0666	0.0051	
	Error	725.144	56	12.9489		
[a]	INTERVENTION	1.7796	1	1.7796	0.1232	–
	TIME	0.4166	1	0.4166	0.0288	
	INTERVENTION & TIME	0.15	1	0.15	0.0103	
	Error	808.799	56	14.4428		
[o]	INTERVENTION	0.474	1	0.474	0.0323	–
	TIME	0.474	1	0.474	0.0323	
	INTERVENTION & TIME	0.6	1	0.6	0.0408	
	Error	821.833	56	14.675		
[u]	INTERVENTION	0.6	1	0.6	0.0399	–
	TIME	0.2666	1	0.2666	0.0177	
	INTERVENTION & TIME	0.474	1	0.474	0.0315	
	Error	841.14	56	15.0204		
h > ø	INTERVENTION	1.2449	1	1.2449	0.0530	–
	TIME	0.9021	1	0.9021	0.0384	
	INTERVENTION & TIME	0.1878	1	0.1878	0.008	
	Error	556.142	56	9.9311		
Syllabification	INTERVENTION	0.2666	1	0.2666	0.0228	–
	TIME	2.9629	1	2.9629	0.2543	
	INTERVENTION & TIME	0.8963	1	0.8963	0.0769	
	Error	652.49	56	11.6516		
Prosody	INTERVENTION	0.0296	1	0.0296	0.0025	–
	TIME	3.2666	1	3.2666	0.2821	
	INTERVENTION & TIME	0.6	1	0.6	0.0518	
	Error	648.328	56	11.5772		