Linguistic Factors and the Spelling Ability of Spanish Heritage Language Learners

Amàlia Llombart-Huesca[1] and Eve Zyzik[2]*

[1] Department of English and Modern Languages, California State Polytechnic University Pomona, Pomona, CA, United States, [2] Department of Languages and Applied Linguistics, University of California, Santa Cruz, Santa Cruz, CA, United States

Spelling is an aspect of literacy that causes significant difficulties for Spanish heritage language learners (HLLs). Because little is known about how spelling skills are developed in this population, instructors often struggle when attempting to teach spelling rules, leading to frustration among both teachers and students in heritage language courses (Beaudrie, 2012). The current research study targets one of the most problematic areas of Spanish orthography: substitution of "s" and "c" letters to represent /s/. An experimental dictation task was designed in order to test two linguistic factors hypothesized to impact spelling accuracy: target letter ("s" vs. "c") and cognate status of the word (cognate vs. non-cognate). Participants ($n = 72$) were young adults, Spanish HL learners, who completed the dictation task in addition to a standardized measure of proficiency. The results indicate a main effect for cognate status (suggesting facilitative transfer from English), but no effect for letter. These results suggest that "s" is not the default letter for representing /s/, contrary to what had been found in a number of previous studies. We discuss the data in the broader context of pedagogical proposals for targeting spelling among college-aged HLLs.

Keywords: spelling, literacy, Spanish, heritage language, cognates, bilingualism, college education

INTRODUCTION

At first glance, spelling in Spanish seems to be a mechanical aspect of writing that requires learning and applying a series of rules governing the correspondences between graphemes and phonemes. However, learning to spell is a complex and lengthy process that involves much more than the application of spelling rules, even in a language with a relatively transparent orthographic system such as Spanish. In fact, Treiman and Bourassa (2000) correctly describe learning to spell as a "creative process" (p. 1), and recent research highlights the many component skills that underlie spelling ability, including phonological and morphological awareness, as well as sensitivity to the permissible letter patterns in the language (Westwood, 2018). Furthermore, spelling is not an isolated skill; it is reciprocally related to vocabulary knowledge (Ocal and Ehri, 2017a) and also contributes to reading ability. Snow et al. (2005, p. 86) explain that, "spelling and reading build and rely on the same mental representation of a word. Knowing the spelling of a word makes the representation of it sturdy and accessible for fluent reading." In short, spelling must be understood as a critical aspect of literacy.

Once spelling is situated as an important component of literacy, it becomes clear that it deserves serious attention in the context of heritage language learners (HLLs). As a result of childhood

exposure to the language in the home, HLLs have had opportunities to develop their oral/aural skills, but their experience with formal literacy instruction in the heritage language may be limited or non-existent. Later, as adults who elect to study the heritage language in a university setting, their difficulties with spelling become immediately noticeable in writing assignments, especially in comparison to second language (L2) learners. For example, Elola and Mikulski (2016) reported that spelling errors accounted for 27% of all errors in the compositions of Spanish HLLs, compared to <10% for the L2 group. Many HLLs make improving their spelling a top priority when enrolling in coursework. Mikulski (2006) reported that the HLLs in her study attached "great importance" (p. 669) to spelling rules, especially with respect to written accents in Spanish (Carreira (2002), Callahan (2010) also highlight the challenges associated with accent marks in particular). The personal importance that many HLLs of Spanish attach to spelling is arguably justified if they intend to use Spanish in a professional setting (e.g., advertising, journalism, copyediting, translation).

Spelling involves mastering the conventions of written language, and for this reason, proper spelling carries a certain amount of social prestige. We concur with Ocal and Ehri (2017a), who state that, "The value that society places on accurate spelling has not diminished" (p. 58). Our interest in spelling, however, is from a linguistic perspective. How do adult Spanish HLLs approach the difficult task of spelling words with inconsistent phoneme-grapheme correspondences? Spelling ability among monolingual children develops in elementary school through a combination of direct instruction and exposure to print (discussed below). However, for the typical HLL, spelling abilities in the minority language (Spanish) have developed incidentally, that is, without the benefit of systematic teaching about orthographic patterns and word formation. Although a strong foundation in phonological awareness may be sufficient to spell many words in Spanish, it does not help when the target words contain inconsistent phoneme-grapheme correspondences (PGCs). Our study was designed to address this issue by targeting words with /s/, which can be represented by three different graphemes: "c," "s," and "z." In what follows, we present the relevant details of Spanish orthography and review the existing research on spelling acquisition.

SPANISH ORTHOGRAPHY

Spanish is considered to have a shallow orthography because its phonemes and graphemes have a one-to-one correspondence in most cases. For example, contrary to English, the phoneme /f/ is always spelled as "f," and the letter "f" is always read as /f/. However, Spanish orthography contains a few complex PGCs that violate this transparency:

1) Some graphemes are associated with more than one phoneme; for example, "g"—/g/ and /x/ (gota, gente); "c"—/k/ and /s/ (cara, cesto), "r"—/r/ and /ɾ/ (rato, cara).

2) Some phonemes are associated with more than one grapheme; for example, /x/ - "j" and "g" (jarra, gente); /k/ - "c" and "qu" (casa, queso); /b/ - "b" and "v" (beso, vaso).

3) A grapheme is not associated with any phoneme, most notably, the case of "h" (hola, ahora).

In reading, all the correspondences between one grapheme and more than one phoneme are subject to consistent contextual rules. This makes reading in Spanish completely transparent (Medrano et al., 2004). For example, "g" is always read as /x/ before "e" and "i" (gesto, girar, magia), and as /g/ before a consonant or "a," "o," "u" (gracias, gato, gota, gustar, lago).

However, for writing, within complex PGC rules we need to distinguish between consistent PGCs, and inconsistent PGCs (Defior et al., 2009). In consistent complex PGCs, there is a context-dependent rule to inform the choice between graphemes. For example, represent /k/ with "c" before consonant or "a," "o," "u" (crema, cara, cosa, cuando, tocar) and with "qu" before "e," "i" (queso, quitar, máquina). On the other hand, in inconsistent complex PGCs, there are no contextual rules that inform which of the possible graphemes to use. For example, /ʝ/ is represented as "y" or as "ll" in the same contexts (llorar, llave, lluvia, malla, yate, yunque, maya). Therefore, in consistent (context-dependent) PGCs, writers can accurately spell a new word even if they have never seen it before just by applying a rule, while this option is not possible when they need to write a word with an inconsistent PGC, such as calló or cayó.

In Peninsular Spanish, the /s/ phoneme is represented by only one grapheme: "s." The graphemes "c' and "z" represent the /θ/ phoneme, which is absent from Latin American varieties. Thus, in Latin America, the /s/ phoneme can be represented by three graphemes ("s," "z," and "c"), which results in a particularly complex set of mappings when learning to spell. While "s" can appear in all contexts (followed by a consonant or any vowel, as well as in final position), the "c" grapheme is only associated with /s/ when preceding "e" or "i," and with /k/ in all other contexts. Finally, "z" can appear in word-final contexts and when preceding a consonant or "a," "o," "u." The "ze" and "zi" sequences are not allowed by Spanish orthographic conventions[1]. These PGCs are illustrated in **Table 1**:

From the different grapheme correspondences for the /s/ phoneme it follows that the grapheme choices correspond to two different types of rules: while the choice between "z" and "c" responds to a contextual rule (write "z" before "a," "o," or "u"; write "c" before "e" or "i"), the choice between "s" and "c" (and between "s" and "z") does not, and learners simply need to know the spelling of a certain word. More specifically, the choice for which writers have no phonological or contextual help is that between "ce" and "se," and between "ci" and "si." With the other three vowels ("a," "o," "u"), the wrong letter would cause a different pronunciation, since "c" is associated with /k/ in those contexts, as shown in **Table 1**.

---

[1]Only a few exceptions of "z" preceding "e" or "i" exist for some foreign-origin words, such as zen, zenit, nazi, or zinc.

Phoneme	Grapheme	Contexts	Examples
/s/	z	Before a, o, u	zapato, zorro, azul
		Before consonant	liderazgo, Cuzco, brizna
		Word-final	haz, pez, voz
	c	Before e, i	cena, ciruela, hacer, medicina
	s	All contexts	sano, sol, suelo, seco, signo, mes, asco
/k/	c	Before a, o, u	cara, copa, cuerpo, loco
		Before consonant	acto, acné, anécdota
	qu	Before e, i	quemar, quitar, raqueta, máquina

ACQUISITION AND DEVELOPMENT OF ORTHOGRAPHY

The Acquisition of Orthography Among Child (Monolingual) Spanish Speakers

For monolingual children, learning how to spell is a skill that develops gradually over time during the elementary-school years as a result of direct instruction and experience with literacy. Extensive research on this topic has been carried out in Spain by Defior et al. (e.g., Defior and Serrano, 2005; Defior et al., 2006, 2009). Their research points to several trends in terms of the trajectory of learning and common spelling difficulties. First, certain types of words are spelled with high levels of accuracy by first- and second-graders; these include words that follow consistent phonological rules, including digraphs ('ch', 'll' etc.). Defior et al. (2006) explain that this high level of performance is a result of children's rapid acquisition of the Spanish phonological code. Nevertheless, not all aspects of orthography are acquired in the same manner. The data from slightly older children (i.e., fourth grade) show persistent difficulties with spelling in the following categories: inconsistency, silent letter, and written accent marks (Defior et al., 2009). For complex inconsistent PGCs such as /b/ ('b' or 'v') development happens much more gradually as children broaden their lexical knowledge. Defior et al. (2006) conclude that spelling words with inconsistencies "is affected by literacy experience and orthographic knowledge that increases with age, exposure to print, and schooling" (p. 296).

Although the research with monolingual children in Spain provides key insights into the developmental processes involved in learning to spell, we must keep in mind that the phoneme inventory in Peninsular Spanish is different than that of Latin American Spanish. Recall that the /s/ can only be spelled with "s" in Peninsular varieties whereas "c" and "z" are used to represent a distinct phoneme: /θ/. As a result, the studies conducted in Spain ignore the /s/ phoneme as a type of inconsistency. For the purposes of the current investigation, it is imperative to consider research done in the Latin American context. One such study is that of Diuk et al. (2009), who tested primary school children in the first, second, and third grades in Argentina. Their study is particularly relevant to ours because it included words spelled with "s" and "c" to represent /s/. In relation to inconsistent

phoneme-grapheme correspondences, the researchers explain that "s" is the dominant or more frequent grapheme for /s/ and that "b" is the dominant grapheme for /b/. This assumption led them to compare words that contain the dominant grapheme (e.g., words with "s" such as *rosa*) to words with the non-dominant grapheme (e.g., words with "c" such as *cine*). The results indicate that children performed significantly better on the words with the dominant grapheme. Conversely, their error rate on words spelled with "c" was very high (75% for the first-graders) due to participants writing "s" in place of "c." The opposite error (writing "c" instead of "s") was very infrequent (14%). We note, however, that three of the four words with "s" in their experiment (*rosa, aviso,* and *suma*) could not be spelled with "c" due to the subsequent vowel (i.e., *rosa* spelled with "c" would be pronounced /ró-ka/). In any case, this study provides some preliminary evidence that monolingual children resort to a default letter ("s") in the process of learning to spell.

The studies presented above investigate spelling acquisition considering the intrinsic difficulty of the spelling of certain phonemes, which arises from the characteristics of their specific PCG, i.e., how many grapheme choices there are, or whether the PGC is consistent or inconsistent. Graphemes in complex inconsistent PGCs have been shown to be more difficult (i.e., acquired later) than graphemes in complex consistent PGCs. Spelling of /s/ has shown to be the most difficult to spell in Latin American Spanish varieties, with the grapheme "s" appearing to be some sort of default grapheme.

The Acquisition of Orthography Among Child (Bilingual) Spanish Speakers

There is consensus in the fields of bilingualism and biliteracy that bilingual and monolingual children differ in terms of access to written language, for two reasons: differences in their linguistic knowledge prior to learning how to read and write, and possible cross-linguistic transfer of skills (Laurent and Martinot, 2010). In comparison to the large amount of research on the acquisition of English spelling, the research on Spanish is arguably more limited. Nevertheless, there are a few key studies on bilingual children in the United States who have received literacy instruction in Spanish. Ford et al. (2018) present a detailed analysis of students' spelling accuracy in grades 1–3 in order to determine if there is a developmental hierarchy in learning to spell in Spanish. They recruited a large number of Spanish/English bilingual children in dual language, transitional bilingual or Spanish immersion programs. The target words were divided into three sets based on feature complexity. Specifically, the first set contained words that can be spelled using knowledge of sound-letter correspondences; the second set was expected to be more difficult as it contained three different types of complexities: inconsistent phoneme-grapheme correspondences, silent "h" and context-dependent spelling rules. Finally, the last set was hypothesized to be the most difficult in that spelling these words requires awareness of morphological units. The results largely confirmed the expected levels of difficulty that had been established a priori. Surprisingly, these bilingual children were less accurate on words with context-dependent spelling

rules than on words with inconsistent PGCs. This is somewhat counterintuitive because the context-dependent spelling rules are entirely consistent. For example, deciding whether to write *seguir* with "g" or "gu" is established by the subsequent vowel: "gu" followed by "i" / "e" represents /g/. Ford et al. (2018) speculate that it may be particularly difficult "to keep a rule in mind while considering multiple spelling alternatives" (p. 1076), but this interpretation assumes that children explicitly know the spelling rule but have trouble applying it. The results of Ford et al. do not align with those of Defior et al. (2009) with respect to context-dependent spelling rules. Recall that monolingual children in Spain were more accurate with context-dependent spelling rules at an earlier age, whereas words with inconsistent PGCs caused persistent problems through grade four.

Despite the importance of Ford et al.'s (2018) research in the bilingual context, their study does not shed light on the specific problem of learning to spell words with /s/. Included in the category of "inconsistent consonants" was *corazón*, which presumably some students may have spelled with 's'. Likewise, in the category of "rule-based" consonants, the researchers included *veces,* the plural form of *vez*. The authors do not provide an item analysis but rather present the aggregate data for various categories mentioned previously.

A crucial issue at the core of research in bilingual literacy is that of transfer. While the cognitive-linguistic skills underlying the development of literacy—such as phonological and morphological awareness skills—seem to be language-general (i.e., their benefits transfer across languages), orthographic patterns are specific to a language. Using the spelling patterns of one language when writing in another is likely to produce misspellings. This has been demonstrated empirically by a number of studies that examine Spanish-influenced spelling in English. Sun-Alperin and Wang (2008), focusing on vowels in real words and pseudowords, documented spellings that are phonologically appropriate in Spanish such as *mit* for the English word "meat." Spanish-speaking children with at least 1 year of literacy instruction in their native language made significantly more errors of this type than native-English-speaking children. Their findings are consistent with those of Rolla San Francisco et al. (2006), who also found Spanish-influenced diphthongs among bilingual children (first-graders) enrolled in a Spanish literacy program. For example, in spelling pseudowords with long vowels in English ("nade"), a Spanish-influenced spelling might be "nayd." Of the errors made by bilingual children from the Spanish-literacy group, 29% were Spanish-influenced. Linan-Thompson et al. (2018) found an even higher rate of Spanish-influenced spelling errors in second grade students' bilingual journals (naturalistic writing). They note that over half of the children's spelling errors involved vowels, such as "geyme" for "game."

The studies discussed thus far provide evidence of negative transfer from Spanish to English in the realm of spelling. Conversely, knowledge of the spelling of one language can also facilitate accurate spelling of the other language in some cases (see Figueredo, 2006) for a review of both negative and positive transfer in ESL learners' spelling). One case of positive transfer is found in some cognate words, which are defined here as words with form and meaning overlap (cf. Helms-Park and Dronjic, 2013). Focusing on words with similar spellings and meanings is a proven strategy widely used in early bilingual education (Delbridge and Helman, 2016). For example, noticing the grapheme used for /s/ in the following pairs of cognates, should facilitate its spelling in the second language of literacy: *sopa / soup; celebrar / celebrate*, not only for spelling but for vocabulary development. Psycholinguistic studies have shown that bilinguals activate word representations in both languages, which results in a processing advantage for cognates given their shared orthographic and phonological representations (cf. Dijkstra et al., 2010). However, most of these studies have been based on visual word recognition, a condition under which joint activation of orthographic representations is likely. However, in an auditory task, it cannot be assumed that shared orthographic information will be activated. Accordingly, we investigate whether adult bilingual students take full advantage of knowledge of English spelling when listening (and then writing) Spanish cognates.

Spelling Difficulties Among Spanish HLLs

Spelling difficulties among Spanish HLLs are addressed by a wide range of research, including studies on task-based interaction between HLLs and L2 learners. For example, Bowles (2011) found that 37% of the language-related episodes in a written task were focused on spelling, and that these were generally initiated by HLLs. Given their experience with written Spanish, L2 learners tend to resolve spelling issues for their HLL partners. Henshaw (2015) reported that half of the form-focused episodes that were correctly resolved by L2 learners were related to orthography. Fernández Dobao (2019) also documented spelling and accentuation difficulties in her study on collaborative writing tasks, although these were infrequent compared to lexical and grammatical language-related episodes. Interestingly, these mechanical episodes were almost always triggered by the partner who was actually in charge of writing (the scribe). These studies on task-based interaction address HLLs' spelling difficulties indirectly (i.e., the research questions are not focused on spelling *per se*). Nevertheless, the results confirm that spelling constitutes a major obstacle for HLLs and that L2 learners can help resolve spelling issues that arise during collaborative writing tasks. Whether or not such interactions entail any long-term gains for the HLL is inconclusive because the results of post-tests have been mixed.

We now turn to studies that present specific analyses of HLLs' spelling errors. Beaudrie (2012) analyzed the compositions (free writing) of 100 HLLs enrolled in their first university-level course, none of whom had lived in a Spanish-speaking country. Although errors involving written accent marks were by far the most frequent in Beaudrie's corpus, the results also highlight errors in relation to the graphemic representation of /s/. Substitution errors involving "s," "c," and "z" graphemes were common, accounting for over one-third of errors in the category of "inconsistent or complex phoneme-to-grapheme" correspondences. The realization of /s/ favored by HLLs was the grapheme "s," which yielded misspelled words such as *empesar* ("s" for "z") and *hise* ("s" for "c"). The opposite pattern

(writing "c" or "z" in place of "s") was less frequent overall. Finally, English-influenced spellings were evident in cognates such as *differente, where English conventions require a double consonant. Similar patterns of spelling errors are found in the corpus of student essays in Belpoliti and Bermejo (2019). These authors found 271 cases of "s" substitution for either "c" or "z" compared with fewer cases (71) of "c" in place of "z" or "s."

In a more recent study, Beaudrie (2018) studied spelling in addition to the reading and writing performance of a large number of HLLs enrolled in several levels of coursework for heritage speakers at the university level. One goal of the cross-sectional study was to determine the relationship between performance and students' self-concept. We focus here on the results of the spelling test, which included a 60-item dictation that included "commonly misspelled words from SHL learners' writing" (Beaudrie, 2018, p. 151) as well as the least frequent words from Davies (2006) frequency dictionary. The results indicate modest gains in spelling performance as students advance in their coursework. For example, the elementary level group had a mean score of 27.54 (out of 60) whereas students in the most advanced course registered a mean score of 39.64. No group reached the advanced level in spelling, for which the threshold was a mean score of 48. Finally, self-perceptions of spelling competence were positively correlated with spelling performance ($r = 0.57$) as well as with writing performance ($r = 0.46$). Beaudrie's study shows that HLLs continue to struggle with spelling even after a sequence of four courses with a heavy focus on literacy development. However, given the nature of the data (mean scores on the spelling test as a whole), we do not know which graphemes proved particularly difficult for students.

It is worthwhile to compare Beaudrie (2012, 2018) because the two studies indicate very different levels of performance. Using a naturalistic methodology (free writing), we observe students' ability to spell words that they are familiar with, at least orally. In that study (Beaudrie, 2012), the overall error rate was 11.7%. In contrast, the dictation task in Beaudrie (2018) yields much higher error rates, ranging from over 50% in the least advanced group to 33% among the most advanced group of HLLs. This suggests that an experimental methodology such as a dictation task, which allows the researcher to target particular graphemes and/or types of words, is likely to produce lower accuracy scores than free writing.

Along these lines, Llombart-Huesca (2018) underscores the need for more experimental research in order to reveal the root causes that underlie the spelling errors of HLLs. Working within a cognitive-linguistic framework, Llombart-Huesca argues that poor spelling performance may be due to underdeveloped phonological and morphological awareness. In the case of errors representing the /s/ phoneme, Llombart-Huesca emphasizes that we must distinguish between consistent phoneme-grapheme correspondences (these affect the choice between "c" and "z" only) and inconsistent correspondences such as the choice of "s" vs. "c"/"z." Furthermore, these inconsistent correspondences often involve inflectional and derivational suffixes, which means that morphological knowledge could aid learners in determining which grapheme to use. For example, if learners recognized –eza

as a productive morpheme, they would be less likely to misspell complex words like *tristeza* (*tristesa*) (sad*ness*).

From previous research, it is clear that the /s/ causes persistent problems in spelling for HLLs. The error analyses of Beaudrie (2012) and Belpoliti and Bermejo (2019) indicate that the grapheme "s" tends to be used instead of "c" and "z," which is consistent with the idea that "s" is the default spelling for monolingual children (cf. Diuk et al., 2009). If "s" is indeed the default spelling of /s/ among HLLs, does this occur for all word types, including cognates? It is likely that cognates are spelled more accurately than non-cognates given that HLLs can rely on their knowledge of English orthography when writing them. The current study was designed to examine these linguistic factors and their possible interaction by eliciting spelling of words with /s/ in a dictation task. In what follows, we present the specific research questions and hypotheses that guided the study.

CURRENT STUDY

Research Questions

The study was designed in order to answer the two primary research questions:

1. Are words with "s" spelled more accurately than words with "c"? In other words, is "s" the default grapheme for /s/?

We hypothesize that "s" will be the default grapheme because it combines with all vowels and consonants to represent /s/. In addition, unlike "c," the grapheme "s" can represent only one phoneme. These two factors might make the "s" grapheme as the most likely letter to represent /s/ in the student's mind. Our hypothesis is also based on previous research (e.g., Diuk et al., 2009; Beaudrie, 2012), which suggests that monolingual children and HLLs tend to write "s" in place of "c" and "z," at least in naturalistic writing. If this tendency is seen it our data, then we can expect HLLs to be more accurate in spelling words with "s" than words spelled with "c."

2. Are Spanish-English cognates with "s" and "c" spelled more accurately than non-cognates? In other words, does transfer have a facilitative effect?

Transfer of spelling patterns from one language to another in bilingual speakers has been noted as a cause of spelling error in cases in which cognate words differ in orthography. One such case is that of consonant doubling in English, which is wrongly transferred into Spanish by bilingual children (Durgunoglu, 2002) and college Spanish HLLs (Beaudrie, 2012). In our study, however, since cognate pairs share the same target letter (either "s" or "c"), transfer should have a facilitative effect, with greater accuracy for cognates than non-cognates.

Only the graphemes "s" and "c" were selected for this study because choosing one over the other does not involve a contextual rule. The grapheme "z" is also used to represent /s/, but it is involved in a contextual phoneme-grapheme correspondence (see **Table 1**). In addition, since "ze" and "zi" are forbidden sequences in Spanish (expect for some words of foreign origin), it would require including words with the vowels "a" "o" and "u," which would introduce additional confounding variables, since

Participants (*n* = 72)	Mean	Range	SD
Age	19.9	18–33	3.3
Proficiency (DELE) score	34.5	16–50	6
Years of Spanish classes in secondary school	1.7	0–4	1.1

Means, range, and standard deviations (SD) on participants' data.

the sequences "ca," "co," and "cu" produce the phoneme /k/ for the "c" grapheme. Finally, while many cognates with the "ce," "ci," "se," and "si" share the same consonant in English and Spanish, cognates involving "z" do not (*dozen – docena*).

METHODOLOGY

Participants

The participants were 72 HLLs (37 females, 35 males; age range 18–33, mean age 19.9), who were enrolled in a Spanish for Spanish Speakers (I) course at the time of data collection, and had not taken any other Spanish course at a college level. Demographic information about participants was collected through a linguistic background questionnaire. Most participants came from Mexican families, and the rest were from other Latin American countries, such as El Salvador, Honduras, Guatemala, Perú, Colombia, and Argentina. No participant was from Spain or had parents from Spain. All participants reported either being born in the US or living in the US since age 3 or earlier. They had all been schooled in the United States, had been exposed to Spanish at home from birth, and they reported having Spanish as the first language they learned at home. In addition, they had selected *Only Spanish, Mostly Spanish,* or *Spanish and English* as the language they speak now with their parents, and *Only Spanish* or *Mostly Spanish* as the language they speak with their grandparents. All participants were productive speakers (Since the course is called Spanish for Spanish Speakers, no receptive heritage speakers enroll in it). The average time participants had studied Spanish in secondary school was 1.7 academic years with a range of zero to 4 years.

To assess and establish their proficiency in Spanish, participants completed a proficiency test adapted from the *Diploma de Español como Lengua Extranjera* (DELE), which has been used in several other studies involving HHLs of Spanish (Montrul, 2005; Montrul and Perpiñán, 2011; Montrul and Ionin, 2012). The test consists of a cloze passage and a multiple-choice vocabulary test, and the maximum possible score is 50.

Participants obtained scores in a range of 16–50, with a mean score of 34.5 and a median score of 35. **Table 2** presents a summary of the participant background information.

Dictation Task

An 80-item dictation task was designed to test the two linguistic factors described earlier: target letter ("s" or "c") and cognate status (cognate vs. non-cognate). The combination of these variables yields four experimental conditions, which are illustrated with examples in **Table 3**.

Target letter "s"	Target letter "c"
SC (S; cognate): *símbolo, desierto*	CC (C; cognate): *cerámica, inocente*
SN (S; non-cognate): *semejante, cosecha*	CN (C; non-cognate): *cejas, bocina*

There were 20 items in each condition, and thus 80 items total. The position of the target letter in the word (initial or medial) and the letter following "s" or "c" ("e" or "i") were balanced [A complete list of words used in the dictation task is given in Appendix (**Supplementary Material**)]. In addition to the 80 target items, 60 additional items were included as distractors.

Although the selection of words did not consider word frequency according to a frequency database, an effort was made to select only words that were expected to be known by the students. Pilot testing had been conducted after which students were asked whether or not they knew each of the words that had been read. The words chosen for this study had been recognized by the participants in the pilot study. However, we are aware that some words are more frequent than others.

The words were read as follows: *Word. Sentence including the word in context. Word.* The sentence was added to help participants to recognize the words, but they only had to write the target word. Sentences had been recorded as they were read by a female native speaker from Mexico who had arrived in the US in her twenties, a few years earlier. Sentences were recorded in sets of twenty. After each set, participants were able to rest for a minute. This was done because pilot testing had shown that students' attention to task weakened after several sentences.

Reliability coefficients for the task, computed with Cronbach's alpha, were: 0.603 for S-Cognate items, 0.631 for S-non-cognates, 0.660 for C-Cognates, and 0.696 for C-non- cognates. The reliability coefficient for the task as a whole was 0.703.

Procedure

Participants completed the tasks on their second day of their *Spanish for Spanish Speakers* (I) class, which most students take as part of their General Education requirement. The first day of class had been devoted to an introduction to the course (syllabus, course procedures, etc.). Therefore, no instruction had been offered before the day students completed the experimental tasks. Participants completed the linguistic background questionnaire first. The dictation task was administered next. Finally, the DELE was administered at the end, to avoid the possibility that seeing printed words in Spanish would interfere with the dictation task. All the tasks were administered in a group setting ranging between 25 and 30 students. For the dictation task, two practice items were given before starting the actual dictation, so that students would feel comfortable with the structure (*Word. Sentence. Word*) and the pace. The practice items also served to establish that the recording could be heard clearly by everyone.

Data Analysis

The data from the dictation task were coded for accuracy. All responses were scored 0 (inaccurate) or 1 (accurate) based on the
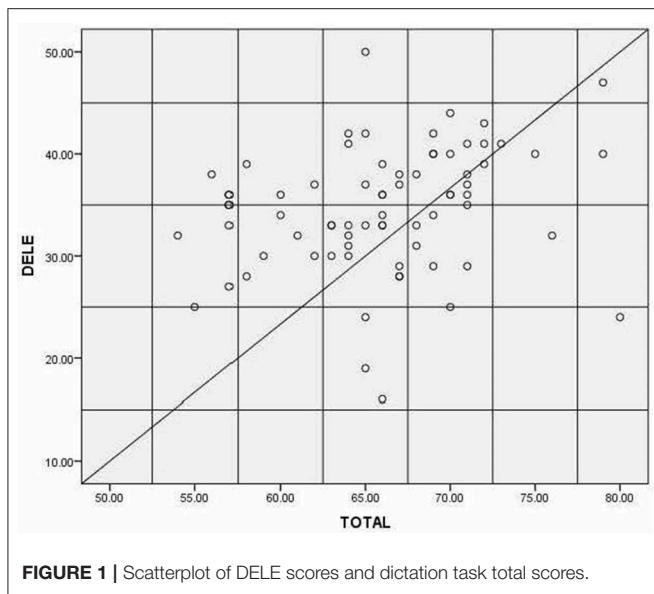
FIGURE 1 | Scatterplot of DELE scores and dictation task total scores.

TABLE 4 | Mean scores on each experimental condition.

	N	Mean	Std. Deviation
C Cognates	72	17.51	2.04
S Cognates	72	17.31	2.18
S Non-cognates	72	15.83	2.73
C Non-cognates	72	15.06	3.11

Mean scores and Std. Deviation on each experimental condition of dictation task.
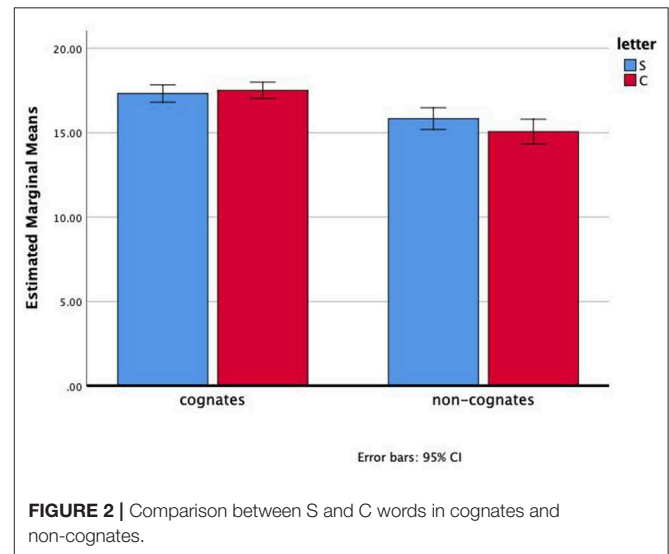

FIGURE 2 | Comparison between S and C words in cognates and non-cognates.

spelling of the target letter. Other spelling errors were ignored. For example, the target word *cincuenta* (target letter "c"; non-cognate) was scored based on the participants' spelling of the first letter only. If the participant wrote *cinquenta*, this was coded as an accurate spelling because the letter "c" representing /s/ is correct. The accuracy data were used to calculate mean scores in each condition (the maximum score per condition is 20). This is a 2X2 repeated-measures design with two within-subjects variables: letter and cognate status.

RESULTS

The mean score on the dictation task was 65.73 out of a maximum score of 80 (standard deviation = 5.72; range 54–80). The data were examined visually for the normality assumption, which was also confirmed with the Shapiro-Wilk test of normality ($p = 0.174$). The DELE scores were related to participants' total score on the dictation task, albeit at a relatively low level ($r = 0.24$, $p = 0.046$). The scatterplot in **Figure 1** shows the total on the dictation task and the DELE scores.

From **Table 4** we can see that the conditions with cognate words had the highest mean scores. A repeated-measures analysis of variance (ANOVA) was carried out with two within-subjects variables (letter and cognate status). There was no main effect for letter, $F_{(1, 71)} = 0.52$, $p = 0.47$. There was a main effect for cognate status $F_{(1, 71)} = 98.88$, $p < 0.001$, partial eta-squared = 0.58. Cognate words were spelled more accurately ($M = 17.41$) than non-cognates ($M = 15.45$). The interaction between the two variables is statistically significant, but the effect size is minimal: $F_{(1, 71)} = 4.05$; $p = 0.048$, partial eta-squared = 0.054. These results are shown in **Figure 2**.

The interaction was examined further with pairwise comparisons and the *p*-value was adjusted to 0.025 to account for multiple comparisons (Bonferroni correction). The comparison between "s" cognates and "c" cognates was not significant: $t_{(71)} = 0.520$, $p = 0.60$. Similarly, the comparison between "s" non-cognates and "c" non-cognates was not significant: $t_{(71)} = 1.44$,

$p = 0.15$. Thus, the interaction effect is due to different patterns among cognates (where the mean for "c" words is slightly higher than for "s" words) vs. non-cognates (where the opposite is true). Nevertheless, neither of these differences are statistically significant, which means we can interpret the main effects.

DISCUSSION

The main aim of the study was to examine the linguistic factors that affect spelling ability among Spanish HLLs. We focused on spelling in what is arguably the most difficult, inconsistent PGC in Spanish: /s/ represented by "s" or "c" (note that words with "z" were not included in the study although they contribute to this inconsistency). It is worth highlighting the relatively high accuracy rate on the dictation task as a whole (approximately 82%). Our results indicate that participants' spelling of words with "s" and "c" is far from random and significantly above chance. In what follows, we return to the research questions posed initially and discuss the results in terms of what they might mean for HLL pedagogy more broadly.

The first research question aimed to compare the spelling of words with "s" and "c" in order to test the prediction from previous research that there is a tendency to use "s" as a default grapheme. Such a strategy would result in more accurate spelling of words with "s" and more errors on words with "c." Our results, however, do not provide any evidence for this; there was no main effect for letter in our data. To interpret this finding, we consider the fact that the idea of "s" as a default spelling is based partially

on data from grade school children (Diuk et al., 2009). For young children with limited print experience, it makes sense that "s" would be the default grapheme for /s/ because the grapheme-phoneme correspondence is entirely consistent: when reading the letter "s" in a word or phrase, it can only be pronounced as [s]. The same is not true for the letter "c," which is realized as [s] or [k] depending on the linguistic context. Given that Spanish-speaking children learn to read earlier than they learn to spell (Defior et al., 2009), it could be that early reading experience results in an initial mapping between "s" and /s/. However, as children gain more exposure to print and expand their vocabulary, this initial mapping diminishes in strength. In other words, adults may be less susceptible to the strategy of using "s" as default than children. In fact, HLLs may be aware that writing only "s" when they hear /s/ leads them to spelling errors, and therefore attempt to include "c" just to make sure they do not write only "s."

Our results differ from those of Beaudrie (2012), who documented an overuse of "s" in the naturalistic writing of HLLs. For all errors involving /s/, Beaudrie found that nearly 40% were "s" in place of "c" mistakes (e.g., *hise), 30% were "s" in place of "z" errors (e.g., *empesar) and the remaining 30% involved an overuse of "c" and an overuse of "z." Yet, these frequencies are reflective of the words that students chose to use in their writing, which are probably tied to word frequency overall. Beaudrie notes, for example, that the verb *hacer* [to do] and the noun *vez* [time] accounted for a high percentage of total errors affecting /s/. The fact that the verb *hacer* is one of the most frequent verbs in Spanish (Davies, 2006) could easily result in an inflated error rate for the "s" in place of "c" category[2]. Our dictation task also included the verb *hacer* (target form: *hacemos* [we do]), but this is only one item out of 20 in the C-non-cognate condition. In other words, an incorrect spelling of *hacemos* is only counted once. In contrast, in an essay where different inflected forms of *hacer* are spelled incorrectly, these all contribute to the error rate.

In sum, our data show that there is no clear preference for "s" over "c," contrary to what had been hypothesized. This finding also goes against the intuition of many instructors that "s" should be the default letter to write in case of doubt. Anecdotally, teachers find "s" for "c" errors to be *normal* errors, while they express surprise when they see, for example, the word *así* (like this) spelled as *hací,* which they consider an unnecessary complication. The results of this study suggest that instructors should not assume that HLLs will write "s" as a default and only write "c" when they learn that a particular word is spelled with "c." Accordingly, any spelling intervention designed for HLLs should include words with "s" as well as words with "c."

The second research question focused on the difference between cognate and non-cognate words, hypothesizing a facilitative transfer effect. The data support this hypothesis, as there was a main effect for cognate status with a large effect size. Participants spelled /s/ better in cognates ($M = 17.41$) than in non-cognates ($M = 15.45$). This was an expected finding, as it has been observed that bilinguals transfer spelling patterns from one language to another. While in some cases this is the source of error, such as in consonant doubling, in other cases it has a

facilitative effect. The finding has clear implications for research design, since researchers who test spelling should take care to control for cognates in a principled manner. This is a well-known problem in vocabulary testing (cf. Laufer and McLean, 2016), since the inclusion of cognates can result in overestimating or underestimating the vocabulary size for particular L1 groups. Indeed, this can be applied to our own data as well: once cognates are eliminated from the calculation of the overall accuracy rate, it drops to 77% (compared to 82% previously).

In any case, the facilitative transfer effect in spelling should be examined more closely. Participants' mean score on cognates yields an accuracy rate of 87%. If we assume that students spell words such as *situate, ceramics, consent*, or *police* with the right grapheme in English—or most likely at a higher rate than 87%, we should expect a higher accuracy rate for those words in Spanish. In other words, it is worth asking why the participants were not at ceiling on the cognate words. We suggest that our participants did not necessarily activate orthographic representations in English during spoken word recognition in Spanish. There is a large body of research that has confirmed the parallel co-activation of both languages known by bilinguals (cf. Kroll et al., 2012, for a review). With respect to cognates, visual word recognition entails joint activation of the word at the orthographic and phonological levels of representation (cf. Carrasco et al., 2019). However, spoken word recognition—as in the case of our dictation task—is likely to produce a slightly different effect. Specifically, when hearing a Spanish cognate word like *cerámica,* phonological representations in both languages are activated (cf. Marian and Spivey, 2003; Lagrou et al., 2011). This parallel activation of phonological representations leads to activation of the shared meaning of the cognates. However, the shared orthographic representations are not necessarily activated or, alternatively, are partially activated during auditory word recognition. This is a plausible explanation for why our participants did not perform at ceiling on the cognate words.

PEDAGOGICAL IMPLICATIONS AND RECOMMENDATIONS

Despite the generalized recognition that spelling is a very challenging aspect of literacy development for Spanish HLLs (Carreira, 2002; Beaudrie, 2012, 2018), there is still not much research on the development of spelling in this population. To our knowledge, only two intervention studies for developing spelling have been conducted, both of which involve the spelling of written accent marks (Carreira, 2002; Beaudrie, 2017). Other spelling proposals have been made based on the results of non-intervention studies on spelling conducted with SHLLs. For example, Llombart-Huesca (2017, 2019) suggests the use of activities that build the cognitive-linguistic skills underlying the development of spelling, such as phonological and morphological awareness.

Given this dearth of pedagogical proposals, language textbooks generally rely on spelling activities based on what works for developing spelling skills in more researched populations, such as monolingual and bilingual children. Burgo (2015) explains that some textbooks adapt activities

---

[2]*Hacer* is the fourth most common verb in terms of rank frequency in Davies' (2006) frequency dictionary.

and strategies used in grammar teaching, such as sentence or word completion or fill in the blanks, as well as some communicative-based activities. According to Beaudrie (2012) one of the shortcomings of language textbooks for SHLLs is that they present exhaustive lists of Spanish orthographic patterns instead of focusing on those patterns or words that present the greatest difficulty. Beaudrie exemplifies this situation with the rule prescribing the writing of "s" in words ending in -*sta*, which appears in Roca's (2005) *Nuevos Mundos*, even though such misspelling does not appear in Beaudrie's corpus.

The facilitative transfer effect for the spelling of cognates has clear pedagogical implications, especially if we consider that the estimated number of Spanish-English cognates is between 10,000 and 15,000 (Dressler et al., 2011). Utilizing cognates as a resource for bilingual students is well-known among educators who study reading comprehension and vocabulary among Hispanic children in the U.S. (c.f. Bravo et al., 2007). For spelling interventions, a natural starting point would be to consider the distinction between cognates and non-cognates. Improving spelling of cognate words will require developing activities that make explicit connections between English and Spanish words, even if the meaning correspondence is not perfect. Specifically, students could be asked to find translations of Spanish or English words that are not perfect in meaning but closest in spelling. For example, connecting *grave–grave*, *adherence–adherencia*, *edifice—edificio* would be helpful for spelling even if the meaning alignment is not ideal. Although meaning and communication has been given a prominent space in L2 classrooms, and also in the HL context, developing metalinguistic skills requires setting aside the focus on meaning to pay attention to formal aspects.

Improving spelling of non-cognate words will require other strategies. Several studies have shown that adults' spelling improves by exposure to correct spelling of words (Ormrod, 1986; Dixon and Kaminska, 1997). Conversely, exposure to wrong spellings have the opposite effect (Dixon and Kaminska, 1997). Therefore, it might be beneficial to engage students into reading and input-based activities before assigning them naturalistic writing tasks that will necessarily include words to which students have not had any previous exposure. By spelling words incorrectly, which can happen when students are writing words as a guess, students are getting exposed to wrong spellings—their own. According to Share (2004), spelling errors on the very first attempt at a new word are potentially more detrimental to long-term orthographic learning than spelling errors made at a later point.

Reading before spelling, therefore, is important. However, the type of reading that will be beneficial for students' spelling abilities must be conducive to attention to each and every grapheme in the word. When a new word is not properly decoded in reading, it might still be understood, but it does not become properly encoded in our mental lexicon (Ehri and Rosenthal, 2007). In order to create a strong orthographic representation of a word in our minds, it is necessary to successfully decode a word fully and thoroughly in reading aloud, and not simply read it in silence. For example, Ocal and Ehri (2017b) conducted an experimental study in which college students were trained to read commonly misspelled words in segments (for example, for Fahrenheit, the first segment was pronounced as /fah/ and the last

two as the words *he* and *it*, respectively.) The treatment group remembered the full spellings of words better than the students in the control group, who practiced reading words using normal pronunciations. The spelling pronunciation strategy proved especially effective for helping students remember silent letters.

Note, however, that we are not proposing oral reading as a technique to be used during class for the purposes of reading comprehension. In fact, oral reading can hinder comprehension because the reader has to devote cognitive resources to the mechanics of reading (e.g., pronunciation, intonation), thus allocating fewer resources to the comprehension of the text (cf. Schimmel and Ness, 2017). Instead, we see reading aloud as a technique that strengthens phonological and orthographic processing, both considered to be lower-level processes vital to reading ability (cf. Nassaji, 2014). For example, reading aloud would help a HLL segment the phrase "voy a hablar," pronouncing all three words rather than omitting the "a" (which is not salient in oral input). A reasonable concern is that asking students to pronounce words in an exaggerated way that deviates from their normal pronunciation might cause confusion. However, Ocal and Ehri (2017b) state that they did not observe students confusing the two pronunciations, probably because students are already familiar with the normal pronunciation. Nevertheless, instructors should clarify that they are not presenting these pronunciations as the "correct" way to pronounce these words and that students are not being asked to use these pronunciations in normal speech. In sum, this should be presented as an isolated activity to help improve spelling, and not as a way to read for comprehension or to pronounce the words in normal speech.

In broad terms, there is a need for more form-focused activities that target spelling in the heritage language curriculum. One type of pedagogical activity that holds promise is the dictogloss task (Wajnryb, 1990) and its variations. The dictogloss is different from standard dictation in that it works with longer stretches of text, generally more than 100 words. The activity is a combination of listening, remembering, and writing (Prince, 2013) and the goal is for learners to use their own linguistic resources in reconstructing the text. The dictogloss has been used extensively in second language classrooms, generally with a grammatical focus, although some recent studies have targeted formulaic sequences (cf. Lindstromberg et al., 2016). In our view, the dictogloss task is ideal for targeting orthography in the heritage language classroom because the input text can be seeded with many examples of a particular PGC (e.g., words with "s" and "c"). In one variation of the dictogloss, the original text is presented in written form, and students work to produce their own written version without looking at the original. In the final phase of the dictogloss task, the students' written version is later compared to the original, and any issues surrounding language form—including orthography—can be discussed.

Other pedagogical activities that would target the difficulties in choosing between "s" and "c" are morphological awareness-raising activities. Although no rule allows the student to know that *toser* (to cough) is spelled with "s" and *hacer* (to do) is spelled with 'c,' there is a consistency within word families. As *toser* is spelled with "s," so are *tos* (the noun cough), *toso*

(I cough), *tosimos* (we coughed). Similarly, as *hacer* is spelled with "c," so is *hacemos* (we do) and *hice* (I did)[3]. Therefore, knowing the spelling of one word should facilitate accuracy in spelling of all morphologically related words. However, as Llombart-Huesca (2017) found, some HLLs have difficulties in relating words that belong to the same morphological family. A student might relate words that are close in meaning, but have no formal relation, like *mirar* (watch) and *ver* (see), but not realize that *hacer* (to do), *hice* (I did), and *deshacer* (to undo) are morphologically related. However, the latter type of relatedness, and not the former, is the one that has an effect on spelling. Morphological awareness also has the potential to assist in the spelling of /s/ is some productive suffixes, such as "-oso," used in adjectives like *silencioso* and *peligroso* (silent, dangerous), "-eza" in nouns like *riqueza* and *tristeza* (*richness* and *sadness*), or "-azo" as in *vistazo* (look, glance) and *golazo* (great goal).

Activities in which students are required to either identify or produce words that are morphologically related to a given word or containing a specific suffix might raise morphological awareness, which in turn should improve spelling accuracy and consistency across morphologically related words. For example, as Llombart-Huesca (2017) proposes, students may be given pairs of words, for which they need to identify whether or not they are morphologically related (for example, *hacer—deshice*; *cocer—cosimos* [to do—I undid; to cook—we sewed]. A similar task consists in giving students a prompt word (e.g., *hacer* [to do]) and a series of words that are morphologically related to it (for example, *hace, hacemos, hice, haré* [he does, we do, I did, I will do]), as well as other words are not morphologically related, but which are phonetically similar (for example: *ase, asemos* [he roasts, we roast]; both subjunctive forms of the verb *asar*). Students are then asked to identify which ones are morphologically related to the prompt word. In the absence of context, attention to spelling is the only resource available to identify the morphological identification. Green and Wolter (2011) propose morphological match-up tasks, in which students are asked to match roots with derivational affixes to create words. Bryant et al. (2006) propose morphological sorting tasks, in which students are sort words into columns based on their endings. Llombart-Huesca (2017) suggests that these activities may be implemented as interventions that target commonly misspelled words, or in the context of vocabulary activities.

LIMITATIONS AND FUTURE DIRECTIONS

Although HLLs are a heterogeneous population with varied levels of proficiency and dominance in the heritage language, our study was not designed to examine predictors of spelling ability in Spanish. In other words, we did not address the issue of individual variation (e.g., why some participants have better spelling ability than others). To address this issue, one would need to measure a number of variables such as decoding ability, exposure to print, and vocabulary knowledge. Ocal and Ehri (2017a) conducted such a study with college-aged students,

focusing on their English spelling ability. They found that spoken and written vocabulary knowledge (combined) were strongly correlated with spelling ability. In turn, exposure to print was a significant predictor of participants' vocabulary knowledge. In the current study, our participants were given a standardized test of proficiency (DELE), which is primarily a test of vocabulary and morphology. Researchers have recommended caution in using the DELE to group participants (Carreira and Potowski, 2011) and for the purpose of comparing HLLs and L2 learners (Van Osch et al., 2018). In light of these concerns, and given the fact that the DELE scores in our study were only minimally correlated with the dictation task ($r = 0.24$), we opted not to group our participants based on their DELE scores. We suspect that the DELE is much too coarse of a measure to be a predictor of spelling ability. To address variation among HLLs, future studies should probe participants about their degree of engagement with written text in Spanish (e.g., how much time per week they spend reading, what kind of texts they read, how often they look up the meanings of new words, etc.).

To expand this line of research, pedagogical intervention studies are necessary. However, the field of instructed heritage language acquisition is still in its infancy. With respect to spelling, there are only two published intervention studies (Carreira, 2002; Beaudrie, 2017). In terms of a grammar focus, Bowles (2018) documented only three studies with Spanish HLLs that included a pedagogical intervention. Some recent research is taking a broader approach, documenting positive changes in terms of HLLs' narrative abilities over time and as a result of instruction (Parra et al., 2018). One problem with broadly-focused interventions, however, is the issue of isolating treatment effects: if participants improve their spelling over time but were exposed to various different activities (e.g., reading, writing, and feedback on essays), to what can we attribute the improvement? Thus, we envision research on spelling interventions that isolates a specific type of activity, such as several 1-h sessions focused only on developing the morphological knowledge needed to identify common suffixes (e.g., nouns ending in *–ez, -eza, -azo*). An additional challenge will be to include a control group that is also engaged in some kind of meaningful learning activity (i.e., not a testing-only control group).

CONCLUSIONS

The current study offers new data on one of the more daunting areas of Spanish orthography: the representation of /s/ in words spelled with "c" and "s." In an experimental dictation task, we found that HLLs utilize their knowledge of English spellings to their benefit, resulting in more accurate spelling of cognate words. On the other hand, there was no main effect for letter in our data, which provides evidence against the notion of "s" as a default letter. This latter finding suggests that spelling interventions cannot focus only on words spelled with "c"; a more comprehensive approach targeting both "s" and "c" is needed.

Spelling is an integral part of literacy that contributes to vocabulary knowledge, reading ability, and fluency in writing; Treiman (2017) notes that uncertainty about spelling or using outside tools to look up the spelling of particular words "diverts attention from the goal of producing a well-reasoned and

---

[3] Morphologically related words with "ce" are likely to involve the alternation with "z," as in "hice" (I did) and "hizo" (he did), which is subject to a contextual rule. This contextual rule is not involved in words spelled with "s," which consistently involve "s" across the board.

polished piece" (p. 83). Despite its importance, spelling is a skill that is taken for granted when performed accurately. Moreover, in a language with a shallow orthography like Spanish, accuracy can often be accomplished by resorting to consistent PGCs. Thus, even without the benefits of formal instruction and significant exposure to print, HLLs can achieve a functional level of spelling proficiency. This resonates with Beaudrie's (2012) finding that her participants had "a fairly solid command of Spanish orthography" (p. 141). Nevertheless, this favorable situation is inevitably complicated by inconsistent PGCs, including, but not limited to, the representation of /s/. For HLLs of Spanish, mastering these spelling conventions is an important step toward using the language in professional settings. We have offered a number of pedagogical recommendations for targeting spelling in the HLL classroom. In making these recommendations, we assume that an incidental approach to teaching spelling is not sufficient. We await evidence, especially in the form of controlled intervention studies, to determine the efficacy of any pedagogical activities proposed here.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this manuscript will be made available by the authors, without undue reservation, to any qualified researcher.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board (IRB) at Cal

Poly Pomona. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AL-H designed and conducted the study, entered the data in SPSS, and wrote the following sections: Spanish orthography, methodology, and pedagogical implications. EZ conducted the analysis and wrote the data analysis section, as well as the acquisition and development of orthography, results, discussion, and conclusions. Both authors revised and edited all sections of the paper.

FUNDING

ACKNOWLEDGMENTS

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2019.00150/full#supplementary-material

REFERENCES

Beaudrie, S. (2012). A corpus-based study on the misspellings of Spanish heritage learners and their implications for teaching. *Linguist. Educ.* 23, 135–144. doi: 10.1016/j.linged.2011.09.001

Beaudrie, S. (2017). The teaching and learning of spelling in the Spanish heritage language classroom: mastering written accent marks. *Hispania* 100, 596–611. doi: 10.1353/hpn.2017.0101

Beaudrie, S. (2018). On the relationship between self-concept and literacy development in the Spanish heritage language context. *Read. Writ. Q.* 34, 147–159. doi: 10.1080/10573569.2017.1370623

Belpoliti, F., and Bermejo, E. (2019). *Spanish Heritage Learners Emerging Literacy*. London: Routledge. doi: 10.4324/9781315646589

Bowles, M. A. (2011). Exploring the role of modality: L2-heritage learner interactions in the Spanish language classroom. *Herit. Lang. J.* 8, 30–65.

Bowles, M. A. (2018). "Outcomes of classroom Spanish heritage language instruction," in *The Routledge Handbook of Spanish as A Heritage Language,* ed K. Potowski (London: Routledge), 331–344.

Bravo, M. A., Hiebert, E. H., and Pearson, P. D. (2007). "Tapping the linguistic resources of Spanish-english bilinguals: the role of cognates in science," in *Vocabulary Acquisition: Implications for Reading Comprehension,* eds R. K. Wagner, A. E. Muse, and K. R. Tannenbaum (New York, NY: Guildford Press), 140–156.

Bryant, P., Nunes, T., Pretzlik, U., Bell, D., Evans, D., and Olsson, J. (2006). "From the laboratory to the classroom," in *Improving Literacy by Teaching Morphemes,* eds T. Nunes, P. Bryant, U. Pretzlik, and J. Hurry (New York, NY: Routledge), 65–103.

Burgo, C. (2015). Current approaches to orthography instruction for Spanish heritage learners: an analysis of intermediate and advanced textbooks. *Normas* 5, 133–152. doi: 10.7203/Normas.5.6816

Callahan, L. (2010). U.S. latinos use of written Spanish: realities and aspirations. *Herit. Lang. J.* 7, 1–27. doi: 10.1057/9780230619104_1

Carrasco, H., Amengual, M., and Gries, S.T. (2019). Cross-language effects of phonological and orthographic similarity in cognate word recognition: the role of language dominance. *Linguist. Appro. Bilingual.* 1–29. doi: 10.1075/lab.18095.car. [Epub ahead of print].

Carreira, M. (2002). "When phonological limitations compromise literacy: a connectionist approach to enhancing the phonological competence of heritage language speakers of Spanish," in *Literacy and the Second Language Learner,* ed S. Hammadou (Greenwich: IAP), 239–260.

Carreira, M., and Potowski, K. (2011). Commentary: pedagogical implications of experimental SNS research. *Herit. Lang. J.* 8, 134–155.

Davies, M. (2006). *A Frequency Dictionary of Spanish: Core Vocabulary for Learners. Routledge Frequency Dictionaries*. New York, NY: Routledge.

Defior, S., Jiménez Fernández, G., and Serrano, F. (2006). Spelling acquisition: a transversal study of Spanish children. *Int. J. Learn.* 12, 293–300. doi: 10.18848/1447-9494/CGP/v12i10/48218

Defior, S., Jiménez Fernández, G., and Serrano, F. (2009). Complexity and lexicality effects on the acquisition of Spanish spelling. *Learn. Inst.* 19, 55–65. doi: 10.1016/j.learninstruc.2008.01.005

Defior, S., and Serrano, F. (2005). The initial development of spelling in Spanish: from global to analytical. *Read. Writ.* 18, 81–98. doi: 10.1007/s11145-004-5893-1

Delbridge, A., and Helman, A. L. (2016). Evidence-based strategies for fostering biliteracy in any classroom. *Early Edu. J.* 44 307–316. doi: 10.1007/s10643-015-0712-7

Dijkstra, T., Miwa, K., Brummelhuis, B., Sappelli, M., and Baayen, H. (2010). How cross-language similarity and task demands affect cognate recognition. *J Memory Lang.* 62, 284–301.

Diuk, B., Borzone, A. M., Sánchez Abchi, V., and Ferroni, M. (2009). La adquisición de conocimiento ortográfico en niños de 1er a 3er año de educación básica. *Psykhe* 18, 61–71. doi: 10.4067/S0718-22282009000100006

Dixon, M., and Kaminska, Z. (1997). Is it misspelled or is it mispelled? The influence of fresh orthographic information on spelling. *Read. Writ.* 9, 483–498. doi: 10.1007/978-94-017-3054-9_9

Dressler, C., Carlo, M. S., Snow, C. E., August, D., and White, C. E. (2011). Spanish-speaking students use of cognate knowledge to infer the meaning of english words. *Bilingual. Lang. Cognit.* 14, 243–255. doi: 10.1017/S1366728910000519

Durgunoglu, A. Y. (2002). Cross-linguistic transfer in literacy development and implications for language learners. *Annal. Dyslex.* 52, 189–204. doi: 10.1007/s11881-002-0012-y

Ehri, L. C., and Rosenthal, J. (2007). Spellings of words: a neglected facilitator of vocabulary learning. *J. Liter. Res.* 39, 389–409. doi: 10.1080/10862960701675341

Elola, I., and Mikulski, A. M. (2016). Similar and/or different writing processes? A study of Spanish foreign language and heritage language learners. *Hispania* 99, 87–102. doi: 10.1353/hpn.2016.0000

Fernández Dobao, A. (2019). "Exploring interaction between heritage and second language learners in the Spanish language classroom: opportunities for collaborative dialogue and learning," in *Languaging in Language Learning and Teaching: A Collection of Empirical Studies,* eds N. Storch and W. Suzuki (Amsterdam: John Benjamins), 1–23.

Figueredo, L. (2006). Using the known to chart the unknown: a review of first-language influence on the development of english-as-a-second-language spelling skill. *Read. Writ.* 19, 873–905. doi: 10.1007/s11145-006-9014-1

Ford, K., Invernizzi, M., and Huang, F. (2018). The effect of orthographic complexity on Spanish spelling in grades 1–3. *Read. Writ.* 31, 1063–1081. doi: 10.1007/s11145-018-9828-7

Green, L., and Wolter, J. A. (2011). Morphological awareness intervention: techniques for promoting language and literacy success. *A symposium presentation at the annual American Speech Language Hearing Association*, San Diego, CA.

Helms-Park, R., and Dronjic, V. (2013). "Cognates," in *The Encyclopedia of Applied Linguistics,* ed C. Chapelle (West Sussex, UK: Wiley-Blackwell).

Henshaw, F. G. (2015). Learning outcomes of L2-heritage learner interaction: the proof is in the posttests. *Herit. Lang. J.* 12, 245–270.

Kroll, J. F., Bogulski, C. A., and McClain, R. (2012). Psycholinguistic perspectives on second language learning and bilingualism: the course and consequence of cross-language competition. *Linguist. Approach. Bilingual.* 2, 1–24. doi: 10.1075/lab.2.1.01kro

Lagrou, E., Hartsuiker, R. J., and Duyck, W. (2011). Knowledge of a second language influences auditory word recognition in the native language. *J. Exp. Psychol.* 37:952. doi: 10.1037/a0023217

Laufer, B., and McLean, S. (2016). Loanwords and vocabulary size test scores: a case of different estimates for different L1 learners. *Lang. Assess. Qual.* 13, 202–217. doi: 10.1080/15434303.2016.1210611

Laurent, A., and Martinot, C. (2010). Bilingualism and phonological awareness: the case of bilingual (French-Occitan) children. *Read. Writ.* 23, 435–452. doi: 10.1007/s11145-009-9209-3

Linan-Thompson, S., Degollado, E. D., and Ingram, M. D. (2018). Spelling it out, one por uno: patterns of emergent bilinguals in a dual language classroom. *TESOL J.* 9, 330–347. doi: 10.1002/tesj.328

Lindstromberg, S., Eyckmans, J., and Connabeer, R. (2016). A modified dictogloss for helping learners remember L2 academic english formulaic sequences for use in later writing. *Eng. Spec. Pur.* 41, 12–21. doi: 10.1016/j.esp.2015.08.002

Llombart-Huesca, A. (2017). Morphological awareness and heritage language learners. *Linguist. Edu.* 37, 11–31. doi: 10.1016/j.linged.2016.11.004

Llombart-Huesca, A. (2018). Understanding spelling errors in Spanish heritage language learners. *Hispania* 101, 211–223. doi: 10.1353/hpn.2018.0114

Llombart-Huesca, A. (2019). Phonological awareness and spelling of Spanish vowels in Spanish heritage language learners. *Hispanic Stud. Rev.* 4, 80–97.

Marian, V., and Spivey, M. (2003). Competing activation in bilingual language processing: within-and between-language competition. *Bilingualism* 6, 97–115. doi: 10.1017/S1366728903001068

Medrano, A. P., Zarabozo, D., and Matute, E. (2004). "Los efectos de la ortografía del español sobre el comportamiento lector y escritor del disléxico," en *El Aprendizaje de la Lectura: Bases Biológicas y Estimulación Ambiental,* coord E. Matute (Guadalajara: Universidad de Guadalajara), 71–94.

Mikulski, A. M. (2006). Accentuating rules and relationships: motivations, attitudes, and goals in a Spanish for native speakers class. *Foreign Lang. Ann.* 39, 660–682. doi: 10.1111/j.1944-9720.2006.tb02282.x

Montrul, S. (2005). Second language acquisition and first language loss in adult early bilinguals: exploring some differences and similarities. *Sec. Lang. Res.* 21, 199–249. doi: 10.1191/0267658305sr247oa

Montrul, S., and Ionin, T. (2012). Dominant language transfer in Spanish heritage speakers and second language learners in the interpretation of definite articles. *Mod. Lang. J.* 96, 70–94. doi: 10.1111/j.1540-4781.2012.01278.x

Montrul, S., and Perpiñán, S. (2011). Assessing differences and similarities between instructed heritage language learners and L2 learners in their knowledge of Spanish tense-aspect and mood (TAM) morphology. *Herit. Lang. J.* 8, 90–133.

Nassaji, H. (2014). The role and importance of lower-level processes in second language reading. *Lang. Teach.* 47, 1–37. doi: 10.1017/S0261444813000396

Ocal, T., and Ehri, L. (2017a). Spelling ability in college students predicted by decoding, print exposure, and vocabulary. *J. Coll. Read. Learn.* 47, 58–74. doi: 10.1080/10790195.2016.1219242

Ocal, T., and Ehri, L. (2017b). Spelling pronunciations help college students remember how to spell difficult words. *Read. Writ.* 30, 947–967. doi: 10.1007/s11145-016-9707-z

Ormrod, J. E. (1986). Learning to spell: three studies at the university level. *Res. Teach. Eng.* 20, 160–172.

Parra, M. L., Bravo, M. L., and Polinsky, M. (2018). De bueno a muy bueno: how pedagogical intervention boosts language proficiency in advanced heritage learners. *Herit. Lang. J.* 15, 203–241.

Prince, P. (2013). Listening, remembering, writing: exploring the dictogloss task. *Lang. Teach. Res.* 17, 486–500. doi: 10.1177/1362168813494123

Roca, A. (2005). *Nuevos Mundos, Workbook: Lectura, Cultura y Comunicación/Curso de Español Para Bilingües*. New York, NY: John Wiley & Sons.

Rolla San Francisco, A., Mo, E., Carlo, M., August, D., and Snow, C. (2006). The influences of language of literacy instruction and vocabulary on the spelling of Spanish–english bilinguals. *Read. Writ.* 19, 627–642. doi: 10.1007/s11145-006-9012-3

Schimmel, N., and Ness, M. (2017). The effects of oral and silent reading on reading comprehension. *Read. Psychol.* 38, 390–416. doi: 10.1080/02702711.2016.1278416

Share, D. L. (2004). Orthographic learning at a glance: on the time course and developmental onset of self-teaching. *J. Exp. Child Psychol.* 87, 267–298. doi: 10.1016/j.jecp.2004.01.001

Snow, C. E., Griffin, P. E., and Burns, M. (2005). *Knowledge to Support the Teaching of Reading: Preparing Teachers for a Changing World*. San Francisco, CA: Jossey-Bass.

Sun-Alperin, M. K., and Wang, M. (2008). Spanish-speaking children's spelling errors with english vowel sounds that are represented by different graphemes in english and Spanish words. *Contemp. Edu. Psychol.* 33, 932–948. doi: 10.1016/j.cedpsych.2007.12.005

Treiman, R. (2017). Learning to spell: phonology and beyond. *Cognit. Neuropsychol.* 34, 83–93. doi: 10.1080/02643294.2017.1337630

Treiman, R., and Bourassa, D. C. (2000). The development of spelling skill. *Top. Lang. Disord.* 20, 1–18. doi: 10.1097/00011363-200020030-00004

Van Osch, B., Hulk, A., Aalberse, S., and Sleeman, P. (2018). Implicit and explicit knowledge of a multiple interface phenomenon: differential task effects in heritage speakers and L2 speakers of Spanish in the Netherlands. *Languages* 3:25. doi: 10.3390/languages3030025

Wajnryb, R. (1990). *Grammar Dictation*. Oxford: Oxford University Press.

Westwood, P. (2018). Learning to spell: enduring theories, recent research and current issues. *Aust. J. Learn. Diff.* 23, 137–152. doi: 10.1080/19404158.2018.1524391