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EDITED BY
Jacopo Torregrossa,
Goethe University Frankfurt, Germany

REVIEWED BY
Katrin Monika Schmitz,
University of Wuppertal, Germany
Cristina Maria Moreira Flores,
University of Minho, Portugal

*CORRESPONDENCE
Jennifer Austin
✉ jbaustin@newark.rutgers.edu

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The comprehension of clitic gender in child heritage and second language Spanish: evidence from a dual language program

Jennifer Austin[1]*, Patrick D. Thane[2], Stephanie A. Rodríguez[1] and Michele Goldin[3]

[1]Department of Spanish and Portuguese Studies, Rutgers University, Newark, Newark, NJ, United States, [2]Western Massachusetts Bilingual Hub, University of Massachusetts Amherst, Amherst, MA, United States, [3]Graduate School of Education, Touro University, New York, NY, United States

Despite the growth of dual-language programs in the United States, few studies have examined how children acquire Spanish through immersion. This article compares how heritage speakers (HS) and English-fluent Spanish L2 learners(L2L) immersed in Spanish comprehend gender in direct object clitics, an area of Spanish grammar prone to bilingual effects. A total of 78 English-dominant children enrolled in a dual language school participated in the experiment: 24 HS (6 in 2nd grade, 10 in 4th/5th grade, 8 in 7th/8th grade) and 54 L2L (16 in 2nd grade, 20 in 4th/5th grade, 18 in 7th/8th grade). Participants completed a forced-choice task which tested their ability to select target-like clitic gender after hearing sentences such as 'La niña está tocando la guitarra (feminine). ¿Qué hace?' *The girl is playing the guitar (feminine). What does she do*? * 'Lo toca' (masculine singular clitic)/ 'La toca' (feminine singular clitic) *She plays it*. Results did not reveal any significant differences at the $p < 0.05$ level between the HS and L2L groups with accuracy in clitic gender. We found that in receptive knowledge of masculine clitic gender, the HS and L2L children had very similar scores in the 2nd grade and showed a similar improvement in accuracy by the 7th/8th grades. However, we did not find a similar pattern of growth in children's ability to select target-like feminine gender in either group. We discuss our findings and propose possible implications for immersion programs.

KEYWORDS

bilingual (Spanish/English), dual language bilingual education, clitic gender, child heritage Spanish, child L2 Spanish

1 Introduction

Differences in timing (age of acquisition) and in learning experience (through naturalistic exposure vs. classroom-based instruction) set heritage speakers (HS) and second language (L2) learners (L2L) apart. HS acquire a language at home from birth in a social context where another language has more dominant status. They often do not receive academic instruction in this home language, and therefore many HS do not develop literacy skills in their heritage language. In contrast, most L2L begin to acquire a second language later in life, often through formal instruction, having already obtained literacy

skills in their first language. By comparing the grammatical tendencies of these two groups, we can gain insights into how the experience of HS versus L2L influences the development of bilingual grammars. Research on children enrolled in dual-language programs can also shed light on how the heritage language development is enhanced when HS have greater opportunities for sustained literacy and academic instruction throughout childhood and adolescence.

In the United States, the rapid growth of dual language immersion programs in public schools provides HS with greater access to literacy and academic instruction in their heritage languages, and creates new opportunities for research on school-aged bilingual children. Dual language immersion programs teach academic content such as math, science, reading and writing in English and a partner language, most frequently Spanish, given its prevalence in many U.S. communities. There are several studies that examine language acquisition in children attending Spanish-English immersion schools (Gathercole, 2002; Herschensohn et al., 2005; Potowski, 2005, 2007a,b; Montrul and Potowski, 2007; Fernández-Dobao and Herschensohn, 2020, 2021; Goldin, 2020, 2021; Sánchez et al., 2023), but few of them focus on the development of Spanish in bilingual children between 7–18 years old. Montrul (2018, p. 534) argues that bilinguals in this age span are the "missing link" of heritage language research, as they are essential to charting the path of acquisition between preschool, an age range for which there is more abundant research evidence from bilingual children, and adulthood, where HS frequently show grammatical innovations not found in monolingual grammars. Discovering whether tendencies that adult HS exhibit are due to language loss or to the restructuring of grammatical knowledge (e.g., Putnam and Sánchez, 2013; Scontras et al., 2018; Domínguez et al., 2019; Polinsky and Scontras, 2020) or rather due to differences in the ultimate attainment of morphosyntactic structures during childhood (e.g., Montrul, 2008, 2013), requires data from this intermediate age group of school-aged children and adolescents. To this end, comparing school-aged HS and L2L in dual language immersion schools reveals how the combination of home exposure and schooling affects the acquisition of the partner/heritage language.

An unresolved question is how high a level of proficiency in the partner language (the language other than English) can be obtained through dual language schooling. Regarding the benefits of dual language programs, Potowski (2007a, p. 188) states: "Heritage Spanish-speaking children…continue developing their Spanish proficiency, particularly more formal registers, an opportunity not offered by the vast majority of United States elementary schools." Similarly, Lindholm-Leary and Genesee (2014, p. 169) affirm that "Students [in immersion] are able to achieve at grade level in their academic subjects, attain the same level of proficiency in their L1, and acquire advanced levels of functional proficiency in the additional languages." Is it reasonable to expect functional proficiency to include high levels of accuracy in areas of the partner language that are vulnerable to variability in bilingual learners? Should we have differing expectations for HS and L2L enrolled in these schools? Decades of international research, particularly in Canada, suggest that dual language students have persistent areas where their skills seem to fossilize in the partner language (Genesee, 1987, 2004; Fortune and Tedick, 2015), and where they may benefit from form-focused instruction (Lyster and Ranta, 1997; Lyster, 2007; Tedick and Lyster, 2019).

In this paper, we examine the acquisition of grammatical gender in clitics by HS and L2L in three age ranges [2nd grade (age 7–8 years), 4th/5th grade (age 9–11), 7th/8th grade (age 12–14)] enrolled in a dual language immersion program where 50%−90% of their academic instruction takes place in Spanish. Our study is the first to examine the comprehension of gender in clitics in multiple age groups of Spanish HS and L2L across the immersion years. This research also has implications for dual language immersion programs.

Our article is organized as follows. Firstly, we provide an overview of how and why bilingual schooling influences heritage language and L2 development. Secondly, we introduce grammatical gender in Spanish and summarize the previous studies on its acquisition in monolingual and bilingual populations. Thirdly, we present our research questions and hypotheses. Next, we present the participants and methods of this experiment, followed by an analysis of our results. Finally, we return to the research questions in the discussion and connect our findings to the theoretical areas described above, before concluding with limitations, future directions, and pedagogical implications for immersion programs.

2 Partner language development in dual language schools

For bilingual children, immersion schooling provides not only increased exposure to their languages, but also varied input across academic registers and content areas. Both quantity and quality of input have been shown to affect the course of heritage and second language acquisition in children (Montrul, 2008, 2013; Pires and Rothman, 2009; Paradis, 2010, 2011; Pascual y Cabo and Rothman, 2012). Specifically, children who learn Spanish through content area instruction are exposed to a broader range of lexical items that are specific to academic fields, as well as to complex sentences required for academic discourse. They also have greater opportunities to use the language with other native speakers for academic purposes and to strengthen ties to the heritage culture and community (Paradis, 2023). These advantages would augment the sustained exposure that dual language schools offer HS during a time when comparable bilingual children who attend English-only schools begin to exhibit decelerating growth (Castilla-Earls et al., 2019; Hiebert and Rojas, 2021) or language loss (Merino, 1983). Dual language programs also expose older HS to a greater range of speakers who provide them with naturalistic input (see Place and Hoff, 2011). For L2L, exposure to the partner language offers children an early opportunity to develop bilingualism and biliteracy, and situates L2 learning within a more richly-contextualized setting than traditional world language classrooms.

We propose that gender agreement in clitics, as reviewed in the following section, is an ideal structure with which to explore the role of academic instruction on the acquisition of Spanish as a heritage language and L2. It is a structure that is vulnerable to bilingual effects and is susceptible to cross-linguistic influence from English in subtractive bilingual educational environments (such as those often found in the United States) where Spanish as a heritage language is not supported. Therefore, studying a structure such as

clitic gender is important for determining whether the enhanced quantity and quality of input that immersion programs provide lead to the acquisition of structures that are typically difficult for young bilingual children.

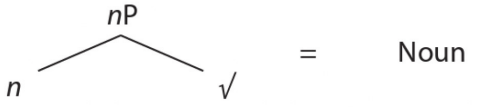
3 Grammatical gender in Spanish

Grammatical gender is a phenomenon found in many languages into which nouns are classified into at least two categories, masculine, and feminine (Corbett, 1991). Spanish is one such language that features a binary gender system, realized through suffixes on nouns, pronouns, adjectives, determiners, and even adverbs. All determiners agree in gender and number with the noun that they modify, and most adjectives also receive gender marking, and are always marked for number. Finally, third person direct object (DO) clitic pronouns are marked for the gender and number of their nominal antecedent. In sum, gender is represented syntactically through multiple agreement relations in the nominal system of Spanish (Zagona, 2002).

According to Harris (1991)'s influential proposal, the nominal markers -o and -a that have traditionally been described as gender agreement reflect the inflectional class that a word belongs to, rather than gender *per se*. Under Harris' analysis nouns are assigned these markers via rules in the lexicon, mostly arbitrarily, although there is a relationship between grammatical gender and biological sex with animate nouns (e.g., *la niña*-FEM, "the girl," but *el niño*-MASC, "*the boy*"). Harris (1991) argues that the *inner core* of Spanish nouns end with *–a* (e.g., *la casa*, "*the house")* when feminine and in *–o* (*el cuarto*, "*the room*") when masculine. 96.3% of nouns ending in –a and 99.4% of nouns ending in –o adhere to this pattern (Teschner and Russell, 1984) and represent canonical inflection. In contrast, Harris's (1991) *outer core* comprises nouns whose inflectional classification is less predictable based upon the nominal suffix (e.g., *el puente*, "*the bridge*," masculine, but *la fuente*, "*the fountain*," feminine). Finally, the small percentage of nouns ending in –a that are masculine (e.g., *mapa*, "*map*") and ending in –o that are feminine (e.g., *mano*, "*hand*") comprise the *residue*, as these nouns are contra the predictable gender cues that represent the inner core. The outer core and residue comprise instances of non-canonical gender, because the classification of nouns is not transparent based upon the nominal suffix.

In contrast to analyses such as Harris (1991) where gender is assigned in the lexicon, Kramer (2015, 2016, 2020) proposes a structural approach for assigning gender by combining the gender features of a syntactic head with a non-categorial root during the syntactic derivation. For example, as illustrated in (1), lexical categories such as nouns are created from the merging of a non-categorial root (✓) and a categorizing head *n* that contains gender features:

(1)



(Kramer, 2020, p. 58)

Furthermore, Kramer (2015, 2020) proposes that there are four types of nominalizing heads that combine to form nouns, shown in (2 a-d). In her analysis, *i* stands for an interpretable feature (one that has a semantic effect), whereas *u* stands for uninterpretable feature, or a feature that does not affect the meaning of the expression:

(2) Spanish nominalizing heads *n*'s (Kramer, 2015, p. 96):
(a) *n i* [+fem] = Female denoting, triggers feminine agreement
(b) *n i* [-fem] = Male denoting, triggers masculine agreement
(c) *n* = No semantic effect, triggers masculine agreement
(d) *n u* [+fem] = No semantic effect, triggers feminine agreement

Under this analysis, male-denoting nouns with an interpretable [-fem] feature such as (2b) as well as nouns lacking a gender feature such as (2c) are assigned masculine gender. Female-denoting nouns with an interpretable [+fem] feature such as (2a) as well as arbitrarily feminine gender nouns with an uninterpretable [+fem] gender feature such as (2d) are both assigned feminine gender. The assignment of gender to direct object clitics relies on the clitic agreeing with a discourse-linked antecedent. Given the fact that gender is obligatorily marked in all nouns, determiners, and third person DO clitics, as well as virtually all adjectives and many adverbs, it is a highly frequent feature of Spanish grammar. The acquisition of gender assignment and agreement on determiners and adjectives appears to be adult-like in production by age four in monolingual Spanish-speaking children (Hernández Pina, 1984; Pérez-Pereira, 1991; Mariscal, 2009). The production of gender agreement with direct object clitics by typically-developing monolingual children learning Spanish also converges with adult production at around age four (Eisenchlas, 2003). Castilla and Pérez-Leroux (2010) elicited production study of monolingual preschool-aged children's gender and number accuracy with Spanish DO clitics (masculine and feminine, singular and plural) found very low rates of clitic gender errors. Three year-olds produced 33% of target clitics, omitted 25% of clitics, and produced gender substitutions with clitics in 3% of cases; 4-year-olds produced 65% of target-like clitics, omitted 15% of clitics and produced gender errors with 2% of clitics; 5-year olds produced 72% of target clitics, omitted 13% of clitics and produced clitics with gender errors in 4% of possible contexts.

Bilingual children have more difficulty than monolingual children in comprehending and producing grammatical gender accurately with clitics. For English-Spanish bilingual children such as those studied in this paper who live in an English-dominant environment, the acquisition of clitic gender takes longer and is more error-ridden than for monolinguals, and is an area of grammar where bilingual effects have been observed (Grüter et al., 2012; Pirvulescu et al., 2014; Castilla-Earls et al., 2016). Castilla-Earls et al. (2020) found that 6-year old monolingual Spanish-speaking children performed similarly to 7-year old HS children on a clitic production task, but significantly better than 6-year-old heritage children. They found that 6-year-old monolingual children completed the clitic production task with 98% accuracy, compared to 88% accuracy for the 7-year old HS group and 81% target-like production for the 6-year-old heritage children.

In a comparison of HS and monolingual children who were typically-developing (TD) with children who had been diagnosed with language impairment, Morgan et al. (2013) found that the TD monolingual children (average age 5;09 years) produced target-like clitics at a rate of 75%, as compared to a rate of 64% target-like clitics by the TD HS (average age 5;03 years). The HS children in Morgan et al.'s study were enrolled in English-only K or 1st grade programs in the US, whereas the monolingual children were growing up in Mexico. Morgan et al. mention that given the protracted development of clitics in typically-developing bilingual children learning Spanish, bilinguals are at risk of being miscategorized as having a language impairment when clitics are used as a clinical marker. Martinez-Nieto and Restrepo (2022) examined the comprehension and production of clitic gender in monolingual and heritage Spanish speakers in three age groups: preschoolers (4;0–5;06 years), third graders (7;09–8;11 years) and adults (18–48 years old). The HS lived in the U.S. and attended English-only schools (and presumably had no extra-curricular literacy instruction in Spanish), whereas the Spanish monolinguals lived and attended school in Mexico. The authors' findings are summarized in Table 1.

Several results from this study are worth highlighting. First, all the participants performed better on the production than the comprehension task, including the adults. All of the participants also were more accurate with masculine than feminine gender. Finally, while the HS and monolingual preschoolers performed very similarly on all the tasks, the performance of the monolingual third graders improved dramatically, particularly with the comprehension tasks, whereas the accuracy of the heritage speakers plateaued between preschool and the third grade.

There is evidence that patterns of exposure to English and Spanish outside of school shape the acquisition of grammatical gender in noun phrases and direct object clitics, although the way that this variable has been operationalized differs from study to study. Anderson (1999) reported that as exposure to Spanish decreased between the ages of 4;07 years and 6;05 years, a young simultaneous English-Spanish bilingual child produced feminine agreement errors with determiners and nouns with increasing frequency. Montrul and Potowski (2007) found that sequential bilingual children who had a longer period of monolingual exposure to Spanish were more precise in their production of feminine gender with determiners and adjectives than simultaneous English-Spanish bilinguals. Cuza and Pérez-Tattam (2016) also found that patterns of exposure affected HS children's production of adjective agreement morphology with feminine nouns. More recently, Shin et al. (2019) demonstrated that gender mismatches in DO clitics were more frequent with bilingual children who used more English and had larger English receptive vocabularies, particularly with feminine gender. These researchers also reported that HS with smaller receptive Spanish vocabularies were more likely to omit DO clitics, perhaps as a strategy for avoiding grammatical gender. However, Shin et al. did not find a correlation between children's Spanish vocabulary scores and accuracy with clitic gender, leading them to conclude that "more research is needed to understand the role of Spanish input in the development of DO clitic gender" (Shin et al., 2019, p. 679). When considered together, these results suggest that the degree of exposure to Spanish and English directly affects the acquisition and/or potential restructuring of grammatical gender in Spanish HS children, particularly with feminine gender and clitics. Although child HS and L2L often exhibit varying degrees of optionality in their production and comprehension of gender agreement morphology, research has consistently revealed patterns in their variation. Across studies using experimental methods and corpus data, child HS are more accurate in gender agreement with masculine than feminine nouns (Anderson, 1999; Cuza and Pérez-Tattam, 2016; Goebel-Mahrle and Shin, 2020; Martinez-Nieto and Restrepo, 2022), with canonical than non-canonical nouns (Bruhn De Garavito and White, 2002; Shin et al., 2019; Goebel-Mahrle and Shin, 2020), and with lexical determiner phrases than with direct object clitics (Goebel-Mahrle and Shin, 2020). That child bilinguals favor the masculine over feminine gender and are more accurate with canonical nouns is consistent with research on adult HS and L2L (McCarthy, 2008; Montrul et al., 2008, 2013; Alarcón, 2011, 2020, 2021; Grüter et al., 2012). In addition, HS adults are more accurate in the production of gender agreement morphology with nouns that they report as more frequent in their own speech (Hur et al., 2020). At the end of this section, we present theoretical analyses that provide explanations for bilingual learners' greater struggle with feminine gender.

Because English lacks grammatical gender,[1] crosslinguistic influence from English may account for some of the difficulty that bilingual children have in acquiring gender agreement with clitics. English-only schooling may also be a factor that contributes to the variability seen in clitic gender marking in bilingual children. If this is the case, we would expect children in dual language programs to show more consistency in their gender agreement system (e.g., less morphological variability) when compared to peers who do not receive this type of input in their heritage language or L2. As stated previously, sustained exposure to academic registers of Spanish at school likely offers bilingual children with a greater variety of lexical items containing gender inflections (input quality) and overall more exposure (input quality), which should facilitate the acquisition of this structure.

Previous studies of Spanish HS children enrolled in dual-language schools have found that they become more accurate in producing gender agreement with age. With data from elementary-school aged children, Gathercole (2002) found that bilinguals enrolled in a dual language immersion program and who spoke only Spanish at home grew more accurate in their judgments of non-canonical gender by second grade (typically ages 6–7). In contrast, participants who did not attend DL schools and had less home exposure to Spanish took longer to become more accurate in their judgments, showing improvement by the fifth grade (typically ages 10–11). It should be noted, however, that the younger participants were already highly accurate in accepting grammatical sentences in the second grade and showed little change in the fifth grade, such that older children's greater accuracy over time was only found in judging sentences with ungrammatical gender mismatches. While Gathercole's study investigated judgements of acceptability of gender with noun phrases rather than clitics,

1 While English lacks grammatical gender, it does have derivational suffixes such as *–or* or *–ess* for denoting natural gender (e.g., *actor*/*actress*) and marks gender on pronouns.

TABLE 1 Martinez-Nieto and Restrepo (2022, p. 12), comprehension and production of clitic gender.

	Monolinguals			Heritage speakers		
	Pre-schoolers	3rd graders	Adults	Pre-schoolers	3rd graders	Adults
Accuracy in production						
Masculine	91%	97%	99%	87%	88%	93%
Feminine	85%	93%	83%	51%	57%	82%
Accuracy in comprehension						
Masculine	55%	81%	89%	51%	57%	88%
Feminine	54%	82%	78%	50%	45%	85%

nonetheless the fact that the ability to detect ungrammatical gender marking increased with age for children enrolled in dual language programs is relevant for our study. However, because the younger children in this study received more input in Spanish at home and at school, it isn't possible to disentangle the effect of additional schooling in Spanish alone on the acquisition of gender.

Montrul and Potowski (2007) also found age effects in their data from HS and L2L children in an elementary dual language immersion program, whereby older children were significantly more accurate in the production of determiner and adjective gender agreement morphology than younger participants. However, there were considerable differences in accuracy rates between the sequential HS, who were the most accurate, followed by the simultaneous HS and then the L2L, particularly for the acquisition of feminine gender agreement with adjectives. The results of all three groups of bilinguals are summarized in Table 2, along with data from age-matched monolingual children.

After several years of immersion, the bilingual groups reached high levels of accuracy when producing the masculine gender with adjectives but not the feminine gender. Only the simultaneous HS improved in accuracy with the feminine gender, from 38% target-like production in the 6–8 year olds to 70% in the 9–11 year old group. The sequential bilinguals declined in accurate productions from 71% in the younger group to 62% in the older group, whether because of attrition or cross-linguistic influence. The L2L improved slightly from 36% accuracy in the younger group to 40% accuracy in the older children. The authors concluded that overall, Spanish immersion in a dual language program promoted language maintenance and acquisition in the HS and L2L children, with feminine gender on adjectives developing the most slowly.

In contrast, child heritage learners enrolled in English-only elementary schools do not show the same improvement in their accuracy in producing gender agreement as they grow older. In Cuza and Pérez-Tattam's (2016) study of gender agreement and word order, 5–10 year old participants who did not receive bilingual education plateaued in their production of target-like clitic gender over time. Similarly, the children in Martinez-Nieto and Restrepo's (2022) study showed little to no increase in accuracy in the production and comprehension of gender clitics from preschool (ages 4–5) to the third grade (ages 7–8); both groups attended an English-only school. Finally, there is even evidence of attrition of grammatical gender in older HS children in English-only schools (Shin et al., 2019; Goebel-Mahrle and Shin, 2020). Thus, the results from past research have shown that attending a dual language school during the elementary years (age 5–11) can help heritage learners' accuracy with gender agreement in noun phrases improve as they grow older. There is little evidence regarding the development of gender in HS during the middle school period (age 12–14), or regarding the impact of dual language schooling on the acquisition of clitic gender.

Despite variability in their production and interpretation of grammatical gender, HS children produce this structure more accurately than age-matched L2L enrolled in dual language immersion programs (Gathercole, 2002; Montrul and Potowski, 2007). The advantage for HS extends to adults, depending upon the task. HS tend to outperform proficiency-matched L2L on oral production tasks (Montrul et al., 2008; Alarcón, 2011, 2021) and on implicit and online processing measures (Montrul et al., 2013, 2014; Alarcón, 2020), while the reverse has been observed in some written tasks (Montrul et al., 2008). Research on highly-proficient adult L2L has revealed persistent, albeit occasional, morphological errors (Franceschina, 2005; Hawkins, 2009; Grüter et al., 2012; Montrul et al., 2013). These findings suggest that HS' earlier age of acquisition of Spanish confers an advantage in the online processing and production of gender, while L2L at high proficiency levels may rely on explicit knowledge of gender on more metalinguistic tasks, despite variability in both populations.

Summarizing thus far, Spanish monolinguals show early acquisition of both gender assignment (the largely arbitrary categorization of nouns) and gender agreement (the syntactic operation of appropriately mapping the [±feminine] feature onto determiners, adjectives, and DO clitics through inflectional morphology), whereas bilingual children and adults exhibit variability in their command of this structure. Spanish HS generally exhibit an advantage over L2L, particularly in childhood. Research has shown that bilinguals are more likely to exhibit gender matches with canonical and masculine nouns, and are more variable with clitics than with agreement in lexical determiner phrases. Moreover, patterns of exposure appear to impact the feminine gender in particular.

A final consideration in research on the acquisition of grammatical gender in Spanish is its interaction with number agreement. Spanish nouns, determiners, adjectives, and direct object clitics also receive markings for number (singular vs. plural), resulting in separate computations of gender and number within the nominal agreement domain. To our knowledge, previous studies have not evaluated whether HS or L2L are more likely to accurately recognize gender agreement morphology with singular

TABLE 2 Montrul and Potowski (2007, p. 318), production of gender with adjectives.

	Monolinguals		Sequential HS		Simultaneous HS		L2 Learners	
Accuracy in production	6–8 years	9–11 years	6–8 years	9–11 years	6–8 years	9–11 years	6–8 years	9–11 years
Masculine	100%	100%	98.5%	93.2%	95%	98%	89.7%	89.6%
Feminine	100%	98%	70.7%	61.8%	38%	70%	36%	40%

vs. plural nouns. Harris (1991) claims that masculine forms are gender-less in Spanish; that is, they are default forms that are used in the absence of feminine gender features. Following Harris's (1991) proposal that masculine gender is unmarked, McCarthy (2008) argues that singular and masculine are the morphologically default forms in Spanish for number and gender, respectively. Using the Distributed Morphology framework, McCarthy proposes that masculine and singular are the exponents associated with underspecified gender and number and appear as "elsewhere" forms when no more specific form is present. By extension, feminine and plural forms require additional features, which may lead to more morphological errors and the reliance on defaults in production. While the author did not report whether there was an interaction between number and gender in the production of direct object clitics, her argument suggests that producing and detecting gender agreement should be easier with nouns and clitics that are singular, rather than plural. This may be particularly evident when feminine gender is also involved, requiring processing two features with more-specified forms.

4 This study

We concentrate on the acquisition of gender marking in direct object clitics because it appears to be an area of morphosyntax that is particularly difficult to acquire for HS Spanish children who are bilingual in English. Since monolingual children continue to exhibit occasional variability with gender on DO clitics until approximately the onset of schooling (De la Mora, 2004; Castilla and Pérez-Leroux, 2010) and bilinguals exhibit more gender marking optionality with clitics than determiners and adjectives, presumably children's accuracy with clitic gender would stand to benefit from sustained exposure to the heritage language and L2 through dual language immersion education. Furthermore, to our knowledge, this is the first study to examine the receptive knowledge of Spanish clitic gender by heritage and L2 child bilinguals in a dual-language school through the middle school years. To examine the development of clitic gender comprehension, the following research questions were proposed:

1. Do HS in a dual language immersion program select gender agreement morphology with DO clitics more accurately than age-matched L2L?

Previous studies comparing the development of nominal gender agreement in HS and L2L in immersion programs (Gathercole, 2002; Montrul and Potowski, 2007) and who are adults (e.g., Montrul et al., 2008; Alarcón, 2011, 2020, 2021) have consistently reported advantages for HS on oral production measures and implicit tasks. Although a forced choice task is untimed and may tap explicit, form-focused knowledge that sometimes favors L2L (Montrul et al., 2008), both the HS and L2L in the present study have the same exposure to Spanish language instruction at school. Therefore, given HS' earlier age of acquisition of Spanish and greater exposure outside of school, yet consistent exposure to and instruction in Spanish at school, we predicted that child HS would select gender agreement morphology with DO clitics more accurately on the forced choice task than age-matched L2L children.

2. Do child HS and L2L in a dual language school show increased command of clitic gender with age?

Previous studies have reported attrition or restructuring of the clitic gender system for Spanish HS children in English-only schools in the U.S., particularly with feminine clitics (Shin et al., 2019; Goebel-Mahrle and Shin, 2020). In contrast, Gathercole (2002) and Montrul and Potowski (2007) found that during the elementary immersion years, both HS and L2L were more accurate as they grew older with grammatical gender in noun phrases, both in acceptability judgments (Gathercole) and production (Montrul and Potowski). However, to date there are no studies of the development of receptive knowledge of clitic gender (as opposed to gender accuracy with noun phrases) that have included elementary and middle-school aged children who are enrolled in dual language programs. Another novelty of our study is that it compares the development of clitic gender in Spanish HS and L2L. Based on previous research, we predicted that we would find greater accuracy in selecting clitic gender agreement in both HS and L2L children in the oldest group (7/8th grades) than in the younger grades, given they receive up to 9 years of academic instruction in Spanish.

3. Do child HS and L2L show greater accuracy with masculine gender than feminine?

Studies have consistently demonstrated greater accuracy for HS and L2L children in the production and interpretation of masculine gender with nouns and clitics than with feminine gender (e.g., Anderson, 2001; Montrul and Potowski, 2007; Grüter et al., 2012; Cuza and Pérez-Tattam, 2016; Shin et al., 2019; Goebel-Mahrle and Shin, 2020; Martinez-Nieto and Restrepo, 2022). We therefore expected to find similar results in our study, whereby HS and L2L children would overextend the masculine clitic to feminine contexts on the forced choice task. Following Kramer (2015, 2016, 2020) masculine is the form that surfaces in the absence of a gender feature, which means that it is often oversupplied as a default.

4. Does HS and L2 children's knowledge of gender with clitics vary depending on number?

There is limited previous research addressing the relationship between gender and number categories in bilingual children's development. However, McCarthy (2008) argues that for adult L2L the singular is the unmarked and syntactically underspecified form for gender, leading to its being used as a default in plural contexts. We therefore predict that in contexts where both the gender and number involve the specified form—with feminine plural clitics—HS and L2L children will exhibit greater variability in the recognition of gender on a forced choice task, given the need to process and select marked gender and number forms.

4.1 Participants

Seventy eight English-dominant children enrolled in a dual language immersion school participated in the experiment: 24 HS (6 in 2nd grade, 10 in 4th/5th grade, 8 in 7th/8th grade) and 54 L2L (16 in 2nd grade, 20 in 4th/5th grade, 18 in 7th/8th grade).[2] Parental reports indicated that HS children were all simultaneous bilinguals with early exposure to both English and Spanish at home, although all predominantly used English with their family members. In addition, 26 children were multilingual, meaning that they spoke a language (or multiple languages) other than English and Spanish at home (two of these children were HS of Spanish and an additional language). The fact that the heritage learners were English-dominant is probably because their parents were also English-dominant bilinguals. Unfortunately, we cannot verify that this is the case because while we collected data on the languages spoken by the participants' parents, we did not examine the parents' language proficiency, or ask whether they were HS of Spanish themselves. The children's English dominance is likely also a reflection of the fact that they are growing up in a town where 73% of the population only speaks English, according to the most recent US Census data, despite the presence of bilingual residents.

These children were from a small middle-class city in the northeastern United States. Their dual language program ran from Kindergarten through eighth grade. Children received 90% of their instruction in Spanish in Kindergarten and first grade, 80% in second grade, and 50% for the remaining grades. All participants completed an eight-question proficiency measure, described at greater length below. The results of this test are summarized by group in Table 3.

We grouped children in these age ranges for multiple reasons. Firstly, the limited sample size of bilingual children required evaluating students in multiple grades within a single age group, which is consistent with previous studies on immersion programs (Potowski, 2005, 2007a,b; Montrul and Potowski, 2007) and on the acquisition of grammatical gender (Cuza and Pérez-Tattam, 2016; Shin et al., 2019; Goebel-Mahrle and Shin, 2020). Secondly, these data allow a simple comparison with these previous studies that have examined a subset of the age range in this study (Gathercole, 2002; Montrul and Potowski, 2007; Cuza and Pérez-Tattam, 2016). Finally, fifth grade students represent the "finished product" of elementary immersion programs, while eighth grade children are representative of the same for middle school programs.

TABLE 3 Average proficiency score (with standard deviations) by group.

Group	Mean	SD
HS, 2nd grade	6.6/8	1.9
HS, 4th/5th grades	6.8/8	1.8
HS, 7th/8th grades	8.0/8	0.0
L2L, 2nd grades	5.0/8	2.2
L2L, 4th/5th grades	6.8/8	1.7
L2L, 7th/8th grades	6.8/8	1.8

4.2 Methods

All participants completed a proficiency test and a forced choice task, in their school after their parents provided written consent. Parents also filled out a language background questionnaire that provided information on home language use and parental proficiency ratings in Spanish. Before beginning the experiment, all children provided their verbal assent. Participants had as much time as they needed to complete the experiment, but all finished in approximately 25 min. We recorded all experimental sessions for subsequent coding and review.

Before data collection, parents completed a language questionnaire from which it was possible to determine participants' home language patterns and percentage of exposure to Spanish and English. To do so, parents indicated whether children used English and Spanish in six contexts (at home, with babysitters, at daycare, at school, when reading books, and while watching television). From this questionnaire, it was possible to determine how frequently participants used Spanish relative to English, although we acknowledge that a possible limitation given the unexpectedly high number of multilingual students is that use of additional languages across these contexts was not considered.

The brief, eight-section proficiency measure was a subsection of the Bilingual English-Spanish Assessment (BESA; Peña et al., 2018) that addressed children's command of nominal number agreement morphology. In this section, we asked children to point to which of two pictures depicted the sentence that they heard. Each sentence contained either a singular or plural noun; one picture displayed a single object, and the other displayed multiple of the same object. Therefore, children needed to interpret the number of the noun and determiner to make the appropriate selection. For instance, participants heard the sentence *muéstrame donde duermen unos osos* (*show me where some bears are sleeping*), and children were expected to point to the image with multiple bears, rather than the one with one bear. Testing number agreement was a logical way to understand if children had acquired the prerequisites for gender agreement in Spanish because previous research has shown that bilinguals acquire this structure more accurately and before

2 Note that we address speaker group (HS versus L2L) and age group (2nd grade, 4th/5th grades, 7th/8th grades) separately due to a low number of HS participants, consistent with Montrul and Potowski (2007).

10.3389/flang.2024.1334269

TABLE 4 List of nouns selected for the forced choice task.

	Masculine	Feminine
Singular	lapicero (pencil case)	guitarra (guitar)
	libro (book)	película (movie)
	muñeco (doll)	piñata (pinata)
Plural	instrumentos (instruments)	cartas (notes, cards)
	libros (books)	letras (letters)
	números (numbers)	uñas (nails)

they reach ceiling with gender (McCarthy, 2008). The results of the proficiency test are summarized by group in Table 3 above, which shows that each group performed above chance in the interpretation of number.

We used a forced choice task because we thought it would be easier for our participants to complete than an interpretation task that required them to recognize a referent based upon the gender of a given clitic, which can be challenging for children, as noted by Shin et al. (2019, p. 681). The forced choice task included 28 stimuli, of which twelve targeted gender clitics. There were three masculine singular nouns, three feminine singular nouns, three masculine plural nouns, and three feminine plural nouns. This design allowed us to incorporate gender and number as separate independent variables in the statistical modeling to address research question #4. We made a concerted effort to select nouns that would be familiar to school-aged Spanish-speaking children.

In the forced choice task, all sentences were pre-recorded and children listened to them using headphones. There were two pictures that depicted a series of actions with one of the nouns listed in Table 4. For each stimulus, participants heard a female voice describe the first picture, referring to the noun it depicted. Subsequently, participants then listened to two male characters, *Cosa 1* (Thing 1) and *Cosa 2* (Thing 2), who produced sentences about the second picture. These characters used clitics to refer to the object in the picture; one produced a sentence with a masculine clitic, while the other produced the same sentence with a feminine clitic. Participants needed to indicate which sentence that described the picture sounded best to them. The recording ended with the female voice asking which character produced the best sentence, at which point participants needed to indicate their selection. If children requested listening to the sentences again, we played them once more. Figure 1 shows a sample slide from the forced choice task whose prompt is shown in (3). The expected clitics differed in gender only, such that there were no mismatches with number agreement (that is, plural nouns always occurred with one masculine plural and one feminine plural clitic). The correct responses for Cosa 1 and Cosa 2 were counterbalanced to assure that the task did not become predictable.

(3) Experimenter voice: La niña está tocando la guitarra (feminine). ¿Qué hace?
The girl is playing the guitar (feminine). What does she do?
Cosa 1: *Lo toca (masculine singular clitic).
**She plays it (masculine singular clitic).*
Cosa 2: La toca (feminine singular clitic).
She plays it (feminine singular clitic).
Experimenter voice: ¿Quién lo dijo major?
Who said it best?

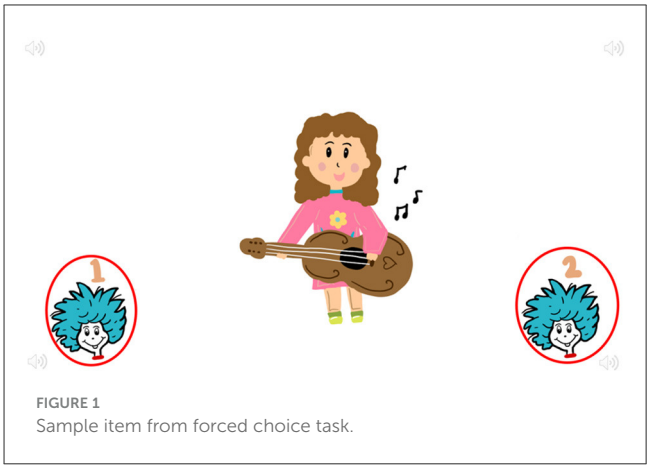


FIGURE 1
Sample item from forced choice task.

5 Results

We carried out all statistical analyses using RStudio for Statistical Computing (R Core Team, 2022), with the *lme4* (Bates et al., 2015), *lmerTest* (Kuznetsova et al., 2017), and *tidyverse* (Wickham et al., 2019) packages. All of participants' selections that contained the expected gender with the DO clitic received a score of *1*, while those that did not match the gender of the antecedent received a score of *0*. Participants' selection of clitics on the forced choice task by group, gender, and number is summarized in Figure 2.

A generalized linear mixed methods (GLMM) binomial logistic regression provides further insight into the findings summarized in Figure 2. Suppliance of the expected gender clitic was the binary dependent variable. Speaker group (HS, L2L), grade group (2nd grade, 4th/5th grade, 7th/8th grade), gender (masculine, feminine), and number (singular, plural) were the categorical predictors. The reference levels for each variable were HS (speaker group), 2nd grade (grade group), masculine (gender), and singular (number). Percentage of Spanish language exposure was calculated as a continuous predictor by dividing the total number of contexts in which parents reported their children using Spanish by the sum of the number of contexts in which parents reported their children using either language (English or Spanish).[3] Participant and item were incorporated as random effects.

To determine the model of best fit, nested model comparisons were prepared through pairwise comparisons with variables submitted in the following order: speaker group, grade group, percentage of Spanish exposure, gender, number, speaker group by grade group two-way interaction, speaker group by gender two-way interaction, grade group by gender two-way interaction, and

3 Although we collected data on children's use of Spanish and English outside of school, a limitation of our study is that we did not ask about their use of other languages as well because we had not anticipated that there would be so many multilingual participants.

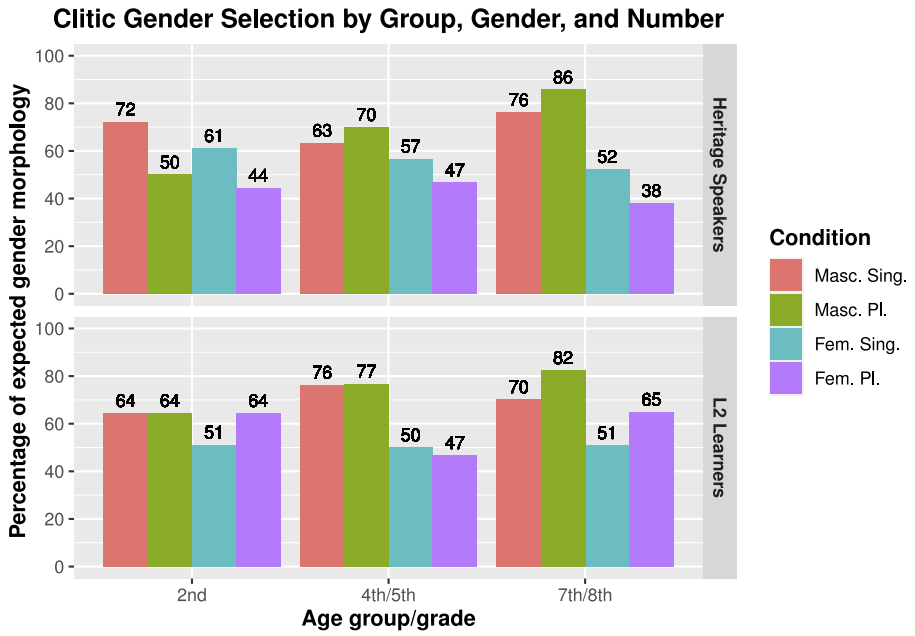


FIGURE 2
Percentages of accurate gender clitic selection by gender and number morphology and age group/grade.

gender by number two-way interaction. Only the model with the predictor of gender was significant at the $p < 0.05$ level, and also had the lowest Akaike information criterion (AIC = 1,157.2, BIC = 1,195.6, $p = 0.033$), so the model specified for speaker group, grade group, and gender was retained. The resulting model revealed a significant effect for feminine gender only ($\beta = -0.78$, SE = 0.26, $p = 0.003$). This effect was negative, suggesting stronger performance with masculine clitics.

Furthermore, the descriptive data encourage us to consider whether there was a four-way relationship between speaker group, age, gender, and number. While this is a definite possibility, testing it was too costly for the statistical modeling in our study, and our model did not converge with four-way interactions included. Future research that collapses type of speaker and age on the one hand (e.g., HS7/8) and gender and number on the other (e.g., masculine singular, feminine singular) into two sets of categories may be better equipped to answer this question, although such an approach does not highlight the roles of each of these individual variables as effectively in our study.

We also investigated whether children were more or less accurate with nouns that had an equivalent in the opposite gender (such as muñeco/muñeca).[4] Figures 3, 4 represent HSs' and L2Ls' selection of clitic gender for each of the lexical nouns included in this study; Figure 3 shows the results with the masculine nouns, and Figure 4 the feminine nouns.

While participants exhibited the greatest difficulty in selecting the expected clitic with the feminine nouns *película* and *uñas*, selection of the expected clitic was more consistent with masculine nouns. Intriguingly, only the masculine noun *muñeco* has a feminine equivalent, yet there was no effect of this "competing" feminine form on clitic selection. Furthermore, children did not experience differential levels of difficulty between *libro* and *libros*, arguing against the predicted role of number in clitic gender selection.

An important consideration is that participants' biological age could also have influenced results, as has been demonstrated in research on child HS.[5] Therefore, an additional binomial logistic regression model was prepared *post-hoc* with suppliance of the expected gender clitic as the dependent variable and standardized participant age in months as the predictor. Participant and item were again included as random effects. The effect for age in months neared the significance threshold of $p < 0.05$, but did not reach it, with a subtle effect size ($\beta = 0.16$, SE = 0.08, $p = 0.058$). Therefore, age in months did not appear to impact participants' receptive command of clitic gender. We turn now to a discussion of these results relative to our research questions and to previous studies.

6 Discussion

The purpose of the present study was to compare the comprehension of clitic gender in multiple age ranges of Spanish HS and L2L children enrolled in a dual language immersion program. We first return to our research questions, predictions, and results. We then offer a more general discussion of the implications of our findings. Finally, we focus on the pedagogical implications for literacy and content instruction in dual language immersion programs to promote the acquisition and maintenance of clitic gender in Spanish.

4 Thanks to the editor Jacopo Torregrossa for this suggestion.

5 We thank an anonymous reviewer for this suggestion.

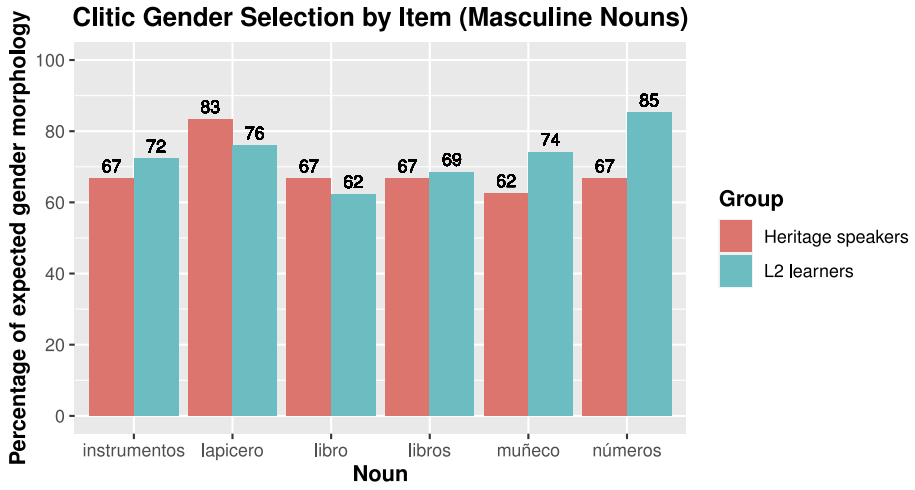


FIGURE 3
Percentages of accurate gender clitic selection for the masculine nouns by speaker group.

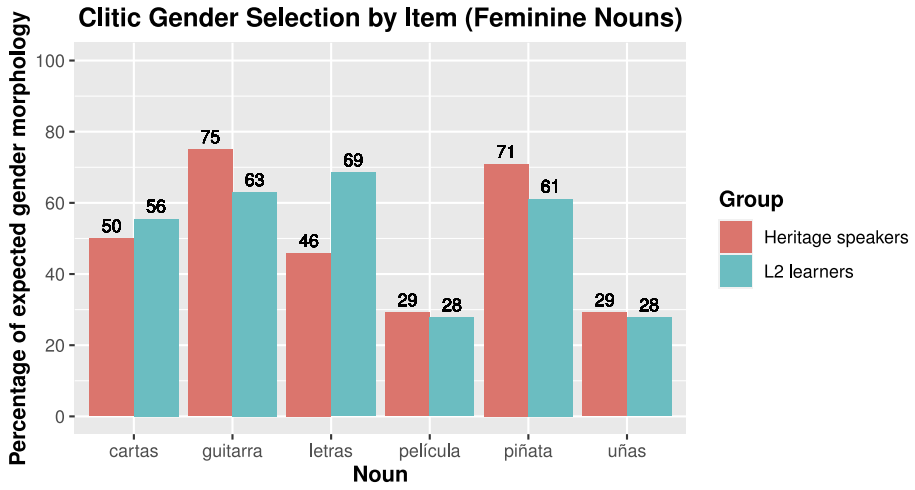


FIGURE 4
Percentages of accurate gender clitic selection for the feminine nouns by speaker group.

Our first research question targeted possible differences between groups of speakers (HS vs. L2L). We hypothesized that the simultaneous HS in our study would select gender more accurately than the L2L due to their earlier and greater exposure to Spanish outside of school. However, our findings did not reveal any significant differences at the $p < 0.05$ level between the HS and L2L groups with clitic gender. We found that in receptive knowledge of masculine clitic gender, the heritage children and the L2 children had very similar scores in the 2nd grade (61% accuracy for the HS and 64% for the L2L), and showed a similar improvement in accuracy in the 7th/8th grades (81% for the HS and 76% for the L2L group).[6] In the case of feminine gender, the scores of Spanish HS children declined slightly between the 2nd and 7/8th grades, and the L2L groups' scores remained the same between the 2nd and 7/8th grades. We had expected to find a significant advantage for the Spanish HS, based on results from previous research which showed that heritage children at a dual language school produced gender with determiner phrases at significantly higher rates than L2 children (Montrul and Potowski, 2007).

The lack of a significant difference between our participant groups most likely reflects differences between the exposure patterns of the Spanish HS in Montrul and Potowski's study, which included sequential and simultaneous HS, and our participants, who were English-dominant simultaneous bilinguals. However, it is also possible that clitic gender, the type of agreement we investigated, is more difficult for all HS (simultaneous and sequential) to acquire than the determiner and adjective agreement that Montrul and Potowski tested. Future research could help clarify this question by comparing receptive knowledge of gender in

6 These percentages are the average of the singular and plural conditions for each gender.

DO clitics in a group of sequential bilingual HS with simultaneous heritage children.

The second research question concerned the impact of grade on the development of clitic gender. We predicted that children would show stronger command of gender agreement morphology on the forced choice task as they grew older given their increasing cumulative exposure to Spanish. However, our prediction was not borne out for either the HS or L2L in the present study, as there was no evidence of increased command in the descriptive or inferential statistics regarding increased mastery of clitic gender at the receptive level with age, operationalized both as participant grade or age in months.

Our third research question concerned the role of feminine vs. masculine gender. For the third research question, we predicted that children would be more accurate in the recognition of masculine than feminine morphology, as has been found in extensive previous research on HS children and adults (e.g., McCarthy, 2005, 2008; Montrul and Potowski, 2007; Montrul et al., 2008; Alarcón, 2011, 2020, 2021; Cuza and Pérez-Tattam, 2016; Shin et al., 2019; Goebel-Mahrle and Shin, 2020). While there were no overall effects for age or gender in either the HS or L2L groups, older children (the 4th/5th grade and 7th/8th grade groups) were more accurate with masculine gender only, while selection of feminine clitics did not improve significantly at the $p < 0.05$ level.

We replicate the previous findings that HS and L2L overextend masculine gender to contexts in which feminine morphology would be expected. This finding supports the claim that HS and L2L use this form as a default, including at the underlying receptive level. Several other studies have also reported that older or more advanced HS and L2L continue to substitute masculine for feminine gender in Spanish (McCarthy, 2008; Martinez-Nieto and Restrepo, 2022). In her study of adult L2L, McCarthy (2008) reported that while intermediate speakers show mismatches with both genders, advanced learners, who likely have had more exposure like the older children in our study, only overextended masculine gender. Balam et al. (2021) found that after age 7, simultaneous Spanish/English bilingual children tended to use default masculine gender when assigning a Spanish determiner to feminine English nouns in mixed language utterances, even though their gender assignment for determiners with nouns in Spanish was at ceiling (95% target-like). All the children who participated in that study showed this preference in their speech regardless of whether they attended dual language schools or English-only programs.

The account of gender assignment proposed by Kramer (2015, 2016, 2020) would predict the overextension of masculine but not feminine gender in contexts where children have not yet fully acquired gender features of nominalizing heads or where children have difficulty establishing feature checking with the nominal antecedent of the clitic. These suggestions are similar to Roa-Rojas et al.'s (2021) analysis of their ERP results showing that monolingual children with language impairments did not show the same response to gender agreement violations as typically-developing children. To resolve the question of why our participants' comprehension of feminine gender agreement in clitics seemed to plateau over time, we would need to compare the results from this study with data from the comprehension and production of clitics and noun phrases, a possibility that we leave for future research.

Finally, our fourth research question investigated whether the number of the nominal antecedent affected participants' selection of grammatical gender morphology. We predicted no differences in the accurate recognition of gender with clitics based upon McCarthy's (2008) study with adult L2L's production, in which such an effect was not observed. As was the case for McCarthy (2008), we found no effect for singular vs. plural number in our participants' accurate selection of clitic gender. One possible explanation for this finding is the symmetry between singular (*lo*-MASC, *la*-FEM) and plural (*los*-MASC, *las*-FEM) DO clitics, such that both singular forms are made plural with the morpheme *-s*. However, the same is not the case for determiners: the masculine singular forms *el* (definite) and *un* (indefinite) do not become *els* or *uns*, but rather *los* and *unos*, in the plural, while the feminine singular *la* (definite) and *una* (indefinite) do adhere to this pattern (*las*-definite, *unas*-indefinite). For this reason, a useful future project would be to explore whether the same tendencies are observable in the production and/or interpretation of determiners by HS and L2L.

It is important to compare the findings from the present study with those that have used similar methods to assess comparable children not enrolled in immersion programs, in order to better understand the effects of enrolling in a dual language school on the acquisition of clitic gender. The third grade HS children in Martinez-Nieto and Restrepo's (2022) study selected masculine gender with 57% accuracy and feminine gender with 45% accuracy (overall 51% accuracy), which is slightly less accurate than the second grade HS in the present study, who selected masculine gender with 64% accuracy and feminine gender with 52% accuracy (see Figure 2).

Similarly, the school-aged children in Shin et al. (2019) who did not attend a dual language immersion school had a clitic matching rate of 49%, lower than that of the HS in the present study, which was 60%. Many of these children were sequential HS, although some were simultaneous English-Spanish bilinguals. Since previous research has found that age of acquisition of English also affects the acquisition of gender agreement in bilingual children (Montrul and Potowski, 2007), and the HS children in our study were predominantly simultaneous bilinguals with an earlier age of exposure to English than those in Shin et al.'s, we would expect a lower clitic gender recognition rate if immersion education had not impacted the acquisition of this structure. However, despite an early age of onset of bilingualism in our study, our participants showed stronger command of clitic gender on the forced choice task than the children in the Shin et al. study, suggesting that the additional exposure offered through a dual language school boosted the HS' performance. Furthermore, considering that Goebel-Mahrle and Shin (2020) found evidence of attrition of clitic gender in older bilingual children, it is possible that the relative constancy of this structure across age groups in our experiment means that the dual language immersion program has slowed attrition of clitic gender during this time period. We leave the investigation of this possibility for future research.

Nevertheless, while immersion appears to benefit HS and L2L participants' command of clitic gender on a receptive task, by the

7th/8th grades, the HS children's accuracy was 81% for masculine clitics but 45% for feminine clitics. L2L children in the 7th/8th grades correctly selected gender with masculine clitics in 76% of contexts, and with feminine gender 58% of the time. The HS in the 7th/8th grades' combined accuracy for masculine and feminine clitic selection was 63%, higher than the 49% overall rate for the HS in Shin et al. (2019) study, who did not attend a dual-immersion school, but lower than 82% accuracy for monolinguals in the 3rd grade that Martinez-Nieto and Restrepo (2022) reported. While students began the 2nd grade comprehending clitic gender at above-chance levels, there was no progression in feminine gender clitic comprehension between the 2nd and 8th grades in our HS and L2L participants. This result resembles the findings from Castilla-Earls et al. (2020), whose HS participants showed little progress in producing targetlike clitics between the ages of 6 and 7: "...taken as a group, it appears that these children's first language plateaus in regards of their accuracy in both clitics and articles. Importantly, bilingual children seem to exhibit error patterns which are no longer present in monolingual children in early school age" (Castilla-Earls et al., 2020, p. 834). We found a similar plateau in the development of clitics in our participants even though they have had the support of dual language schooling in Spanish for up to 9 years, unlike the participants in the studies by Castilla-Earls et al. (2016, 2020) and Martinez-Nieto and Restrepo (2022).

Therefore, it appears that at minimum, immersion does not *guarantee* high levels of accuracy in the acquisition of clitic gender agreement. Findings from previous studies have suggested that other factors such as age of acquisition of English and home exposure may exert a greater influence on the gender acquisition process with DO clitics, although we did not find an effect for home exposure in our participants. It should be noted that the HS children in our study, while early acquirers of Spanish, were mostly exposed simultaneously to English from birth and live in a predominantly English-speaking community. As stated previously, a limitation of our study was the absence of a larger group of sequential bilinguals with which to weigh the role of age of acquisition of English against that of school exposure through dual language immersion. For this reason, we cannot evaluate the role that age of acquisition may play in the acquisition of clitic gender in Spanish heritage learners.

Since the simultaneous bilinguals in our study are, in many cases, children of HS themselves, their input at home could also contain gender agreement mismatches that affect their rate of acquisition and, potentially, ultimate attainment of this structure. Furthermore, since these bilingual children had been exposed to English and Spanish consistently from birth, it is also possible that cross-linguistic influence from the genderless system of English had already altered gender agreement in their Spanish before beginning Kindergarten (Cuza and Pérez-Tattam, 2016). Both possibilities are not mutually exclusive, whereby HS show innovations in their gender system beyond their input, and also acquire an agreement system that has already encountered change. Such alterations have even been found in the grammatical knowledge of Spanish-dominant bilingual adults (e.g., Montrul and Sánchez-Walker, 2013; Pascual y Cabo, 2016; Thane, 2023). Indeed, Martinez-Nieto and Restrepo (2022)'s results found that heritage adults performed at high levels of accuracy but not at ceiling on comprehension and production tasks with clitic gender, particularly with the feminine gender. Interestingly, these authors also had similar findings for the monolingual adults who participated in their study, which raises the question of how high our expectations should be for the advanced proficiency that we expect children in dual language programs to attain. If the monolingual and heritage adults in Martinez-Nieto and Restrepo's study reached 78%—85% levels of accuracy in comprehending and producing feminine gender, then clearly we should not expect children to perform even better.

On a similar note, many teachers and administrators in dual language immersion programs are HS and L2L of Spanish themselves. Although this was not the case in our study, as the majority of teachers in the immersion program where we collected our data were raised and educated in Spanish-speaking countries, it would be valuable in future studies to consider the role of qualitatively different input that children in other programs may receive in bilingual schools. Considering previous research on adult HS and L2L has shown consistent variability in the acquisition of the Spanish gender system (e.g., Silva-Corvalán, 1994; Montrul et al., 2008, 2013, 2014; Alarcón, 2011, 2020, 2021; Grüter et al., 2012; Hur et al., 2020), including after extensive exposure to varieties of Spanish in contact with English (Franceschina, 2005; Hawkins, 2009), it is possible that some HS and L2L teachers also produce mismatches in gender agreement in the input that their students receive.

Our findings show that the comprehension of clitic gender in children enrolled in dual language programs is protracted, particularly for feminine clitics and suggest that it is an area of Spanish grammar that may require special focus in order to be acquired by HS and L2 at high levels of accuracy. More generally, this suggests that it would be helpful for teacher preparation programs to train teachers to recognize areas of partner language development that are vulnerable to bilingual effects, and to instruct them in best methods for providing form-focused instruction to children of different ages.

A final factor that we should mention is the unknown impact of the COVID-19 pandemic on our participants, who received all or part of their instruction online from March 2020 until September 2021 (we collected data in June 2023).

7 Conclusions

Our study on bilingual children's receptive knowledge of direct object clitics did not reveal differences between HS and L2L who have received content and literacy instruction in Spanish. This is despite the heritage language having had earlier and greater exposure to Spanish in the home. Although older children's command of masculine morphology increased in both the HS and DL groups, feminine gender remained a persistent area of variability for them. While dual language immersion programs are a highly effective way to promote bilingualism in children, nonetheless students who complete these programs may not have high levels of accuracy in some areas of the heritage or partner language (Genesee, 1987; Fortune and Tedick, 2015). In areas such as these that are particularly susceptible to bilingual effects and fossilization, it would be useful for teacher preparation programs to make dual language teachers aware of areas of persistent variability in HS and L2L child grammars, and to foster training in form-focused pedagogies for bilingual learners. The implementation of these pedagogies may be important in order to optimize the

development of gender agreement in DO clitics, even for children who receive exposure to Spanish at home.

Data availability statement

The raw data from this study cannot be shared due to IRB regulations. Materials can be made available upon request.

Ethics statement

The studies involving humans were approved by the Institutional Review Board of Rutgers University. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

JA: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing—original draft, Writing—review & editing. PT: Data curation, Formal analysis, Investigation, Methodology, Software, Visualization, Writing—original draft, Writing—review & editing. SR: Data curation, Investigation, Methodology, Software, Writing—review & editing. MG: Data curation, Methodology, Writing—review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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