



**On the Acquisition of Differential Object Marking in Child
Heritage Spanish: Bilingual Education and Age Effects**

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Abstract:

Studies on bilingual development in late childhood and adolescence have been infrequent in research on Spanish as a heritage language. The present study explored how dual-language education and age shape Spanish heritage speaker (HS) children's production and selection of differential object marking (DOM). 75 bilingual children and eighteen Spanish-dominant adults completed an elicited production task and a forced choice task. Results revealed no difference between children in fifth grade in monolingual and bilingual schools, but those HS who produced and selected DOM most frequently were the oldest participants in the study (seventh/eighth grade) who had already completed their dual-language education program. These results show a role for age and cumulative exposure in the development of DOM, but Spanish HS children's production and selection of this structure did not decrease despite a drop in exposure to Spanish. All HS selected DOM more frequently than they produced this structure. These findings have implications for teaching HS in dual-language education and for theories of heritage language acquisition that prioritize current and cumulative exposure and that argue for the dissociation of production from underlying syntactic knowledge (i.e., Putnam & Sánchez, 2013).

Keywords: heritage languages, differential object marking, dual-language education

1. Introduction

Heritage speakers (HS) are native speakers of a language that is not spoken by the broad community in which they are raised, such that another more socially-prevalent language generally becomes more dominant over time. The processes that shape this change have motivated research on heritage language (HL) acquisition, which has become a central topic in bilingualism research. However, most studies in this line of investigation have focused on adult HS, while scholarship in dual first language acquisition has typically concentrated on very young bilingual children. Language development in late childhood thus remains underexplored, although it holds great promise in elucidating how HLs emerge and evolve over time. It is challenging to tease apart protracted development from language attrition (Montrul, 2013), but exploring bilingualism in older children is particularly prudent for developing a more complete picture of how HS’ fluid grammatical knowledge shifts over time.

One factor that may impact older children’s grammatical development is bilingual education. Although the vast majority HS do not have equitable access to bilingual education, a method of schooling known as *dual-language education* (DLE) has become increasingly popular in the United States. In DLE, children receive access to a portion of their education in English, and the remainder in a partner language. The need for DLE is particularly relevant for Spanish speakers, as there are 57.5 million people of Hispanic descent in the United States (United States Census Bureau, 2017). As a result, most DLE schools incorporate at least 50% of their content area instruction in Spanish. Although research has shown that this method of schooling has positive implications for academic achievement (Christian et al., 2004; Thomas & Collier, 2002), English proficiency and reading comprehension (Marian et al., 2013), and cultural sensitivity (Bears & de Jong, 2009), the influence of DLE on HL development remains underexplored.

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The comparative study of children in monolingual and bilingual classrooms that offer children superior amounts of HL exposure also has implications for linguistic theory. Putnam and Sánchez (2013) offer an account of HL acquisition and maintenance that posits that patterns of language exposure affect HS' dynamic linguistic system. These researchers claim that activation of the HL, defined as the processing of input to generate intake, is essential for production and comprehension, and decreased activation can lead to the reassembly of features of the HL grammar based upon crosslinguistic influence from the more socially-dominant language. Putnam and Sánchez (2013) posit that the reassembly of featural bundles in the HL begins in production, but it can ultimately affect the representational level, tested through receptive tasks. Their model of HL acquisition moves away from traditional approaches such as incomplete acquisition (see Montrul, 2008) by concentrating on the dynamic processes that shape HL change over time, rather than on the purported end state of HL acquisition, most previous studies interpreted as evidence for this framework (e.g., Cuza & Frank, 2011; Giancaspro & Sánchez, 2021; Hur, 2020; Perez-Cortes, 2016) have concentrated on adults (see Cuza & Pérez-Tattam, 2016 for an exception).

Since children in DLE and monolingual schools differ in their patterns of exposure, an experiment that compares acquisition under these distinct circumstances is a natural testing ground for this theory with children. Furthermore, since Putnam and Sánchez (2013) predict that HS will reassemble the features of their HL grammar, evaluating a group of children after the immersion years will shed light on whether this model correctly predicts shifts in speakers' knowledge after a decrease in exposure. In these ways, testing children of different age groups with different contexts of exposure to Spanish at school also has implications for whether cumulative exposure, current frequency of use, or both affect HL development.

One of the most studied grammatical properties in Spanish HS has been differential object marking (DOM), both in adults (Hur, 2020; Montrul, 2004; Montrul & Bowles, 2009; Montrul & Sánchez-Walker, 2013; Montrul et al., 2015) and children (Cuza et al., 2021; Guijarro-Fuentes & Marinis, 2011; Guijarro-Fuentes et al., 2017; Ticio, 2015). Nevertheless, no previous study has systematically investigated HS’ knowledge of DOM through bilingual education. In order to do so while exploring the role of exposure, the present study compares two age groups of HS – fifth grade students and seventh and eighth students – in two different educational contexts. Studying a property that is susceptible to omission by HS is particularly meaningful for elucidating the effects of exposure on HL acquisition, so the study of DOM lends itself nicely to the task of exploring how differential educational outcomes shape bilingual children’s development.

Therefore, the present paper makes contributions to multiple areas in HL research. Firstly, it is well-positioned to exhibit how DLE shapes language development relative to traditional methods of schooling, an approach that has been underused in previous research on this topic and that exposes how patterns of exposure shape HL development more generally. Secondly, it explores language development in older school-aged children, which is important for charting the course of HL acquisition from childhood through to adulthood (Montrul, 2013). Thirdly, it explores whether the advantage of sustained exposure to the HL is maintained after participating in a DLE program. Finally, it also contributes to knowledge of the role of age in HL development.

2. Previous Linguistic Research on Bilingual Education

The absence of extensive previous research comparing language development under multiple educational contexts exposes a widespread assumption that HS will automatically develop strong command of their HL through bilingual schooling (i.e., Lindholm-Leary & Genesee, 2014; Potowski, 2007a). There has only been one study to date that compares HS in DLE programs to

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those in monolingual schools using cross-sectional experimental methods. In this study, Gathercole (2002) evaluated bilingual children in second and fifth grades by comparing their command of non-canonical grammatical gender (e.g., nouns with opaque gender such as *puente*, ‘bridge’, or with inconsistent gender cues, such as *sistema*, *system*) using an acceptability judgment task. She reported that HS in the DLE school showed an increase in command of gender agreement from second to fifth grades, while those in the monolingual school showed decreased sensitivity during this time period. This study highlights the importance of DLE on language development in young children, alongside attrition in the absence of bilingual education. HL attrition is also documented in Merino’s (1983) longitudinal study of HS’ elementary school students’ morphosyntactic proficiency in a monolingual school.

Furthermore, a series of studies on bilingual adolescents in Germany reported in Kupisch and Rothman (2018) showcases the impact of bilingual education on language development more generally. In four studies, Kupisch and colleagues found that French HS in Germany educated in their HL patterned similarly to French-dominant speakers on measures of adjective placement (Kupisch et al., 2014), gender agreement and assignment (Kupisch et al., 2013), the distribution of determiners with plural nouns (Barton, 2015), and voiced onset time (Lein et al., 2016). However, Italian-dominant HS in Germany who did not receive a bilingual education showed greater variability in these same grammatical areas when compared to Italian-dominant bilinguals (Barton, 2015; Bianchi, 2013; Kupisch, 2012, 2014).

In contrast to these studies, all previous work on the acquisition of Spanish as a HL in DLE has not adopted this comparative approach. For example, although Montrul and Potowski (2007) found that DLE students’ command of grammatical gender increased from kindergarten to eighth grade, there was no comparison population of children educated in a monolingual school. The

same is true for all other studies on English-Spanish bilingual children in DLE, including those on verb regularity (Fernández-Dobao & Herschensohn, 2020, 2021), subject/verb agreement (Goldin, 2021), subjunctive mood (Potowski, 2007a), the preterit/imperfect contrast (Potowski, 2005), null and overt subjects (Sánchez et al., 2023), and additional syntactic properties (Potowski, 2007b). While these authors’ attention to linguistic development in DLE programs underscores the need to explore the intersection between education and bilingual development more generally, they cannot provide information about how different methods of schooling sculpt HL development *relative to one another*. Missing from this line of research is a study concerning DOM, a structure that has garnered considerable attention in HL acquisition research, which makes this area of the Spanish inflectional system an ideal one to test in this study.

3. Differential Object Marking in Spanish

Spanish is one of approximately 300 known languages that features DOM, through which some accusative (direct) objects receive overt case marking based upon semantic characteristics (Bossong, 1991). In Spanish, DOM involves the use of the inflectional morpheme *a* to mark some direct objects, particularly those that are [+animate] and [+specific]. The use of the differential object marker in Spanish is also contingent upon additional semantic and pragmatic constraints, such as topicality, lexical aspect of the preceding verb, subject agentivity, and definiteness of the object (Fábregas, 2013; Torrego, 1998; Zagana, 2002), which are not considered in the present study. DOM also occurs in some sentences where both the subject and object are inanimate to differentiate between them (Montrul & Bowles, 2009). Since multiple studies have found variation in the use of DOM in monolingual varieties (Callen & Miller, 2021; Requena, 2022), and it is optional in certain contexts such as with animals and in some relative clauses (see Sagarra et al., 2019), the present study addresses this grammatical structure with proper nouns referring to a

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specific person (e.g., *Juanito*). These instances of DOM are maximally specific and animate and do not show variability in monolingual populations. It is precisely this context of DOM that Aissen (2003) claims is the most prototypical of DOM along a scale of animacy. Note that dative objects are also marked categorically with *a* regardless of animacy.

Torrego (1998) claims that DOM is the morphological realization of inherent case in Spanish, in which accusative objects move from the VP to *spec,vP* where it checks an overt D-feature that requires movement of [+animate] and [+specific] objects. Following Guijarro-Fuentes et al. (2017) and Torrego (1998), this feature is interpretable. In her analysis, while all objects in both English and Spanish have structural case, only those accusative objects that receive differential marking receive inherent case in Spanish. Therefore, from Putnam and Sánchez's (2013) perspective of feature reassembly, English-dominant HS of Spanish may obviate the need for the inherent case system of Spanish due to crosslinguistic influence from English, which could result in the reassembly of the interpretable D-feature, either in production or at the underlying representational level.

DOM is a structure that has important implications for meaning in Spanish, as illustrated in the contrast between sentences (1) and (2) below. Specifically, sentence (1) includes non-canonical VS word order, where the subject of the verb *ver* (*to see*) is *Juana*, while in (2), there is a null subject of the same verb whose object is *Juana*, as indicated by the object marker *a*. In such cases, the presence of the differential object marker is essential to distinguish between the subject and direct object of the verb when both are animate. This facilitates the freer word order that Spanish exhibits when compared to English, the dominant language of most Spanish HS in the United States. English, in turn, does not have DOM or any system for marking inherent case; therefore, Putnam and Sánchez (2013) might predict that the “caseless” system of English could

promote an erosion of the DOM system in Spanish. Moreover, given the multiple semantic subtleties of DOM, it is plausible that bilinguals whose two languages differ in the marking of objects and inherent case (such as English and Spanish) require extensive HL exposure to develop all of the features involved in mastering this structure.

(1) Ve Juan
See-3PS Juana.
Juan sees.

(2) Ve a Juan.
Ø see-3PS Juana.
She sees Juan.

3.1. Acquisition of DOM by Monolingual and Bilingual Children

In a longitudinal study of four Spanish-speaking children, Rodríguez-Mondoñedo (2008) found that participants produced DOM with 98% accuracy by age three. However, one of the children was bilingual in Spanish and Catalan and exhibited the greatest omission of DOM due to crosslinguistic differences. This finding suggests that the bilingual acquisition of DOM, even in highly similar languages, can lead to subtle but detectable differences in its development. Further evidence for this claim stems from Ticio’s (2015) longitudinal corpus analysis. The researcher reported that seven English-Spanish bilingual children showed considerable rates of optionality through age 3;6, with DOM production rates in 25% of expected contexts, while four age-matched monolingual children produced the *a* marker in 70% of expected contexts. Most errors were due to omission of the *a* case marker in the expected context. It is important to note, however, that this study also shows considerable variability in the monolingual children, although considerably less than in bilinguals.

Cuza et al. (2021) carried out an experimental study with 15 older English-Spanish bilingual children between ages 6;7 and 11;2 who completed controlled sentence completion and

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semi-spontaneous production tasks evaluating DOM in two syntactic contexts. In the open-ended task, the authors evaluated HS' use of DOM in traditional SVO contexts, and in the controlled task, in clitic left dislocated contexts. The researchers found that the HS differed from age-matched monolingual children and Spanish-dominant bilingual adults in both syntactic contexts. Children were more variable in the clitic left dislocation condition, which involves an additional layer of pragmatic processing, although this could potentially be due to differences between the two tasks. While monolingual children's production of DOM increased with age, there was no similar effect in the HS' data, and the bilingual adults used this structure categorically. The researchers claimed that their findings point towards incomplete acquisition of DOM by bilingual children, particularly in pragmatically-dependent clitic left dislocation contexts.

Data from older children come from a set of studies by Guijarro-Fuentes and Marinis (2011) and Guijarro-Fuentes et al. (2017), who explored the production and acceptability judgments of English-Spanish bilingual children and monolingual controls between ten and fifteen years of age. These studies evaluated the use of DOM in multiple semantic contexts, testing both productive and receptive knowledge. Results showed that monolingual children produced quantitatively more DOM than their bilingual peers, and in general, participants were most consistent in [+animate] and [+specific] contexts. However, HS patterned similarly to monolingual peers in their acceptability judgments. Patterns of current exposure and age did not influence these results, although proficiency did account for variability between participants. The researchers claim that even monolingual children show protracted development of some entailments of DOM, including those that are [+animate] and [+specific], but that bilinguals exhibited greater variability, consistent with Ticio's (2015) findings.

3.2. DOM Acquisition and Adult Spanish HS

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Research with adult HS has also found considerable optionality in the use of DOM. In the first study, Montrul (2004) documented frequent omission of the preposition *a* before animate direct objects in an oral production task. In this task, HS with advanced proficiency seldom omitted DOM, while intermediate speakers did so in 21% of expected contexts. In a subsequent study, Montrul and Bowles (2009) reported high degrees of omission of DOM in HS' spontaneous oral production, where low-proficiency HS produced DOM at chance, compared with advanced HS who as a group seldom omitted the object marker *a* in the expected contexts. The researchers also reported the results of a follow-up judgment task with different participants, in which HS accepted ungrammatical double-object constructions that lacked DOM with animate direct objects and rejected grammatical direct object topicalizations with clitic left dislocation. Based upon these results, the researchers concluded that HS have incomplete knowledge of DOM in Spanish depending on their proficiency level, and that their judgments reflected crosslinguistic transfer from English.

Montrul et al. (2015) conducted a study comparing HS of Hindi, Romanian, and Spanish, all of which feature DOM. The sequential and simultaneous Spanish HS, as well as a group of Mexican-born Spanish-dominant bilinguals, showed considerable variability in their acceptability judgments of DOM, at greater rates than the Hindi and Romanian speakers who completed similar experiments. There was no effect of age of acquisition in these findings. Of the three languages, the Spanish differential object marker *a* is least perceptually salient, which the researchers advanced as an explanation for different results between it and the other languages studied.

To address the possibility that HS continue to acquire DOM from childhood through adulthood, Montrul and Sánchez-Walker (2013) compared simultaneous and sequential adult and child HS, who completed the same oral retell task as Montrul and Bowles (2009), as well as an

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oral picture description task. There was great variability in production, ranging from categorical use (100%) to complete omission (0%) of DOM in expected contexts. In general, participants were more accurate with DOM in the spontaneous oral retell task than in the controlled picture description task, and adults were more accurate than children in both tasks. Therefore, the researchers concluded that HS continue to develop their DOM system into adulthood. They also reported that current levels of exposure to Spanish at the time of testing, but not age of onset of acquisition of English, accounted for variance in the production of DOM in both tasks and for both children and adults.

Similarly, Hur (2020) found indirect evidence that patterns of language use affected HS' production of DOM on a controlled experimental task. Participants in her study reported how frequently they used a series of transitive verbs that were used to elicit DOM, and she reported that participants' frequency ratings interacted with their proficiency level to account for results. Specifically, the effect of lexical frequency was only present for participants with intermediate morphosyntactic proficiency, but not for advanced HS. She and other researchers (e.g., Hur et al., 2020) claim that variability in self-reported lexical frequency is a metric that represents participants' overall frequency of use of the HL, such that those individuals with higher frequency ratings also activate Spanish more often. Consequently, these results are consistent with Montrul and Sánchez-Walker (2013) because they support the claim that frequency of HL use modulates HS' knowledge of DOM.

Furthermore, following other researchers (Giancaspro & Sánchez, 2021; López-Otero, 2022), proficiency represents cumulative exposure to the HL. Therefore, studies that have found a role for proficiency in HS' acquisition of DOM (Guijarro-Fuentes & Marinis, 2007; Montrul, 2004; Montrul & Bowles, 2009) could be interpreted as support of claims that patterns of

cumulative exposure influence the acquisition of this structure. If frequency of input in the HL matters, DLE should facilitate its acquisition, as it offers HS with greater and more consistent exposure to Spanish during the childhood years. To date, the only information concerning DLE students' knowledge of DOM comes from a reanalysis of the oral narratives from Montrul and Potowski's (2007) study of grammatical gender, in which Montrul (2011) reported that simultaneous HS produced the differential object marker in 32% of expected contexts, while sequential bilinguals did so in 62% of expected contexts. These rates of optionality across participants suggests that DLE does not fully facilitate the acquisition of this structure, but it does not compare development under different educational circumstances.

In contrast to the role of cumulative and current exposure, the results of age are more difficult to interpret. On one hand, Montrul and Sánchez-Walker (2013) found that adults produced more DOM in both spontaneous and controlled production than children. Although these children represented a broad spectrum from ages six to seventeen, their development was not divided into age ranges. On the other hand, Cuza et al. (2021) did not find any effect for age in his participants, who were as old as the youngest children who participated in the present study. Additionally, Guijarro-Fuentes and Marinis (2011) did not find age effects in pre- and early adolescent children, so the role of age remains unclear.

4. The Present Study

The present study addresses the areas of research reviewed throughout the previous sections by exploring acquisition of DOM by bilingual children with proper nouns that are [+animate] and [+specific]. The use of DOM in these contexts has been least variable in previous research, which reduces the potential confound between HS' innovations in their use of this structure and general variation that is also observable in monolingual children (i.e., Guijarro-

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Fuentes et al., 2017; Requena, 2022). Furthermore, by studying the role of educational context, it is possible to make more general theoretical observations that contribute to our knowledge of how current and cumulative exposure affect the HL acquisition of morphosyntactic structures such as DOM. To address these areas, the following research questions were proposed:

1. Does DLE provide Spanish HS children with an advantage in their acquisition of DOM with [+animate] and [+specific] direct objects?

Following Gathercole's (2002) study that showed that Spanish HS in a bilingual school had stronger command of grammatical gender than those in a monolingual school, HS children who attend DLE would plausibly have an advantage in their command of DOM compared with peers in a monolingual school. However, following Putnam and Sánchez's (2013) activation-oriented framework, it is logical that HS who have already graduated from DLE would show attrition of DOM due to a drop in exposure when compared to the fifth graders enrolled in the same program. It follows that HS in fifth grade in a DLE immersion program will produce and select more DOM than children of the same age in a monolingual school, and the more DOM than the children who had graduated from a DLE school.

2. Do Spanish HS children show increased command of DOM in [+animate] and [+specific] contexts with age?

As stated above, age effects are difficult to interpret across previous studies. Although evidence is not clear, a logical hypothesis based upon the only study that evaluates children and adults (Montrul & Sánchez-Walker, 2013) is that command of this structure increases during the late school period. If this is the case, children in the seventh and eighth grade that have not attended

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DLE will increase their production and selection of DOM with age, while the drop in exposure after the DLE years will cancel out any age effects between participants in the two age groups.

3. Do Spanish HS children select DOM in [+animate] and [+specific] contexts more frequently on a receptive task than they produce it on a production task?

with parents, with other family members, with friends, in public, while watching television- Fuentes et al. (2017) provide evidence that the locus of variability between monolingual and bilingual children in their knowledge of DOM surfaced in production, but not in their acceptability judgments, although task differences were not evaluated in the statistical modeling. This aligns with Putnam and Sánchez’s (2013) predictions that HS exhibit asymmetrical knowledge of the HL between production and receptive tasks. Therefore, it was predictable that HS would select DOM on a receptive task more frequently than they would produce it on a production task.

4.1. Participants

93 bilinguals participated in this study: 75 HS between ages ten and fourteen and eighteen Spanish-dominant bilingual (SDB) adults. The HS children were divided into four groups depending on their age and school experience: fifth graders enrolled in DLE (DLE-5, $n = 19$), fifth graders in a monolingual school (MLS-5, $n = 22$), seventh and eighth graders who had graduated from the same DLE program (DLE-7/8, $n = 11$), and seventh and eighth graders in the monolingual school (MLS-7/8, $n = 23$). Note that participants who had entered the DLE school during third grade or later who had therefore received less than half of their primary education in a bilingual school were reassigned to the monolingual school groups.¹

¹ The participant counts reflect the final groupings after reassignment. Since many of the HS in the DLE-7/8 group had joined the immersion school in third grade or later, only 11 participants remained in this group who had attended the program since before third grade. Therefore, future studies may wish to consider data from multiple schools to increase sample size.

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The DLE school provided 50% of its content area instruction in each language. The decision to evaluate language development in children in the fifth grade of a DLE school offering 50% of exposure in Spanish is that this population is representative of the “end product” of most such programs, which traditionally offer half of their curricula in Spanish during elementary school only. The students in the DLE-7/8 group continued to receive Spanish language instruction, but the remainder of their curriculum had been delivered in English since sixth grade.

To control for demographic and extralinguistic variables, the DLE program and the monolingual school were matched on multiple dimensions. Both schools’ communities were predominantly Mexican-American. The DLE program was situated in a K-8 public charter school in an urban school district, and the monolingual school was located within the same region (central New Jersey). Both the DLE and monolingual schools reported that 86% of their student population was Hispanic. 78% of students in the DLE school and 77% of students in the MLS school were economically disadvantaged.² 66.3% of families in the DLE school and 77.3% of families in the monolingual school reported Spanish as the home language, although no significant differences were found between the two schools in this study (as reported in the following paragraphs). Furthermore, students completed an 18-question subsection of the Bilingual English-Spanish Assessment (BESA; Peña et al., 2014) to determine their morphosyntactic proficiency in Spanish, as well as a brief questionnaire concerning their frequency of use of Spanish, explained in greater detail below. Table 1 provides a summary of each participant groups’ characteristics.

Variable	SDB (<i>n</i> = 18)		DLE-7/8 (<i>n</i> = 11)		MLS-7/8 (<i>n</i> = 24)		DLE-5 (<i>n</i> = 19)		MLS-5 (<i>n</i> = 22)	
	μ	SD	μ	SD	μ	SD	μ	SD	μ	SD
Spanish use outside of DLE	15.2	6.2	15.6	4.6	13.3	4.1	15.8	6.2	14.5	4.4

² As obtained from state-administered school reports not cited here to maintain school confidentiality; it is not clear how this statistic was defined.

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BESA score (proficiency)	12.3	1.5	11.9	2.3	11.3	2.3	9.4	3.3	9.0	2.2
Monolingual Spanish-speaking parents	1.9	0.2	0.9	0.8	1.3	0.8	0.9	0.8	0.9	0.9

Table 1. Background characteristics by participant group.

Results of three Two One-Sided Tests (TOST) carried out in RStudio (R Core Team, 2022) using the *TOSTER* package (Lakens, 2021) with equivalence bounds set at | 0.5 | revealed no statistically significant differences between members of each school with regards to their proficiency, parental language use, or frequency of HL use. These measures highlight that the primary difference at the group level was participants’ exposure to Spanish, or lack thereof, through schooling. The results of the TOSTs are reported in Tables 2 (proficiency), 3 (frequency of use), and 4 (parental language background) below.³

Metric	<i>t</i>	DF	<i>p</i>
t-test	0.0291	62.1	.9768
TOST Upper	2.1204	62.1	.0189
TOST Lower	−2.0620	62.1	.0216

Table 2. Results of TOST for HS participants’ BESA proficiency scores.

Metric	<i>t</i>	DF	<i>p</i>
t-test	0.1248	61.7	.9010
TOST Upper	2.2240	61.7	.0149
TOST Lower	−1.9743	61.7	.0264

Table 3. Results of TOST for HS participants’ frequency of use of Spanish.

Metric	<i>t</i>	DF	<i>p</i>
t-test	−0.1420	62.3	.8874
TOST Upper	1.9446	62.3	.0281
TOST Lower	−2.2287	62.3	.0147

Table 4. Results of TOST for HS participants’ number of monolingual Spanish-speaking parents.

The SDB participants were raised in a total of seven Spanish-speaking countries or territories and had moved to the United States at age twelve or older, at which point effects of L1

³ A lack of significant effect in the *t*-test ($p > .05$) and the presence of significant effects of the upper and lower bounds ($p < .05$) implies no differences between groups at the $p < .05$ level. This is the case for all three TOST reported in Tables 2, 3, and 4.

attrition appear less likely (Ahn et al., 2017; Hakuto & D'Andrea, 1992; Schmid et al., 2013). Nevertheless, the inclusion of a bilingual comparison group accounts for the possibility that bilingual adults may encounter subtle changes in their grammatical system, following Pascual y Cabo and Rothman (2012) and Rothman et al. (2023). The inclusion of this group is crucial given previously-documented variability in SDBs' DOM systems (Montrul & Sánchez-Walker, 2013; Montrul et al., 2015) that could be transmitted to HS in their input. These bilinguals represent the input to which the HS receive exposure at school and in their communities.

4.2. Tasks

The experiment was prepared using Qualtrics software, whereby SDB participants completed activities asynchronously and HS carried out all tasks in their schools in the presence of the researcher. All participants completed an 18-question segment of the BESA testing determiner-noun gender and number agreement ($k = 4$), verbal person/number agreement ($k = 4$), preterit aspect ($k = 2$), clitic gender and number agreement ($k = 4$), and subjunctive mood ($k = 4$). In addition, they completed a language questionnaire in English that identified which members of their family spoke Spanish or another language as well as the frequency with which they used Spanish in six contexts, (with parents, with other family members, with friends, at school, in public, while watching television), rated on 1-5 Likert scales.

In addition to the BESA and language questionnaire, participants carried out two experimental tasks. The first was the elicited production task (EPT), which targeted oral production of DOM; the second was the forced choice task (FCT), which tapped participants' receptive knowledge in order to address HS' underlying knowledge and the possible asymmetries between these domains. The two tasks used the same eight transitive verbs to avoid the possibility that differences between the individual lexical items on each task could have influenced results. All

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verbs were morphologically regular, disyllabic, and ended in –ar, the most common of the three conjugation classes in Spanish. The subject of all subordinate clauses was plural (*las hermanas, the sisters*), which increased the salience of DOM,⁴ which has been argued to affect its acquisition (Montrul et al., 2015; Sagarra et al., 2019). Both tasks were situated within a communicative context in which a mother describes her desires for her children while they are away at sleepaway camp.

The children’s EPT contained ten target items and six distractors. The adults’ EPT contained the same items, as well as 37 additional distractors. This task design is consistent with Montrul and Sánchez-Walker (2013), in which the children’s experiment was kept brief due to younger participants’ limited attentional resources, while adults completed lengthier tasks to measure the acquisition of additional structures and reduce recognizability of the target items. Both tasks also contained a practice item. The adult distractors were inserted between the items that were also present on the children’s experiment. Each stimulus contained a brief description followed by an incomplete sentence that began with a matrix clause with either the verb *querer* (*to want*; see sentence (1) below) or *creer* (*to believe*; see sentence (2) below) as part of a larger experiment exploring HS’ mood systems. Participants needed to record their voice completing the sentence using a form of the verb whose infinitive was provided in parentheses, as well as any other words. These instructions and the practice item were conducive to the suppliance of the accusative object marker *a* following the verb.

(1) A veces Juanito se pone triste si sus hermanas dicen que no quieren hablar con él. ¿Qué quiere la mamá? Quiere que las hermanas _____ (LLAMAR) Juanito cada noche.

⁴ In the indicative, third person singular –ar verbs such as those used in the present study end in the vowel /a/, while those with plural inflections end in /an/. Therefore, avoiding third person singular subjects obviated the possible low salience of DOM (e.g., two /a/ vowels in succession).

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Sometimes Juanito gets sad if his sisters say that they don't want to talk with him. What does the mother want? She wants the sisters _____ (CALL) Juanito every night.

- (2) Los tres hermanos tienen muy buena relación. ¿Qué cree la mamá? Cree que las hermanas _____ (AMAR) Juanito.

The three siblings have a very good relationship. What does the mother believe? She believes that the sisters _____ (LOVE) Juanito.

On the FCT, there were eight stimuli targeting the use of DOM with the phrase *tienen que* (*they have to*) and the infinitive in question, as in sentence (3) below. In addition to the eight target items, the children completed fifteen distractor items, while adults completed 47 distractors. The FCT followed a similar structure to the EPT and also featured the same communicative focus; however, participants needed to read prompts and then select which of two sentences looked best to them. One sentence contained the differential object marker *a* between the verb and the direct object, *Juanito*, and one omitted it. The verb and the word *Juanito* (as well as the differential object marker) were placed in bold to highlight the contrast between the two sentences.

- (3) ¿Qué tienen que hacer las hermanas?
- Tienen que **llamar a Juanito** cada día.
 - Tienen que **llamar Juanito** cada día.

What do the sisters have to do?

- They have to call [with DOM] **llamar a Juanito** every day.
- They have to call [without DOM] **llamar Juanito** every day.

5. Results

To evaluate the research questions, statistical analyses were carried out using RStudio (R Core Team, 2021) with the *emmeans* (Lenth, 2021), *lme4* (Bates et al., 2015), *lmerTest* (Kuznetsova et al., 2017), *sjPlot* (Lüdtke, 2021), and *tidyverse* (Wickham et al., 2019) packages. All deidentified data and coding are available for analysis on a public GitHub repository (URL BLINDED). Given there were 93 participants and eighteen items targeting DOM morphology (ten in the EPT, eight in the FCT), there were a total of 1,674 possible datapoints for analysis. However,

there were 114 (6.8%) of these datapoints from the EPT in which participants did not save their audio files, their audio responses were incomprehensible, or they produced grammatical alternatives to DOM (i.e., *quiere que las hermanas peinen el pelo de Juanito*, ‘the mother wants the sisters to comb Juanito’s hair, rather than *quiere que las hermanas peinen a Juanito*, ‘the mother wants the sisters to comb Juanito). As a result, 1,560 observations were left for analysis. In all instances where participants produced the differential object marker, including those with unexpected tense/aspect/mood or subject/verb agreement morphology or uninflected forms, the response received a score of 1. All responses that did not contain the differential object marker received a score of 0.

5.1. Group-Level Analysis

Table 5 and Figure 1 summarize the group-level percentages of production and selection of DOM by participant group. To determine if the differences between groups were significant at the $p < .05$ level, a generalized linear mixed methods (GLMM) binomial logistic regression was prepared with DOM production/selection as the dependent variable, group as the independent variable, and participant and item as random effects. The SDB participants were selected as the baseline for the group variable to determine if differences that HS exhibited from this group were significant at the $p < .05$ level.

Group	Percentage of DOM	
	EPT	FCT
SDB	97.1%	99.3%
DLI-7/8	60.7%	88.6%
MLS-7/8	34.5%	81.5%
DLI-5	35.4%	69.5%
MLS-5	30.7%	69.8%

Table 5. Percentages of DOM production and selection by group.

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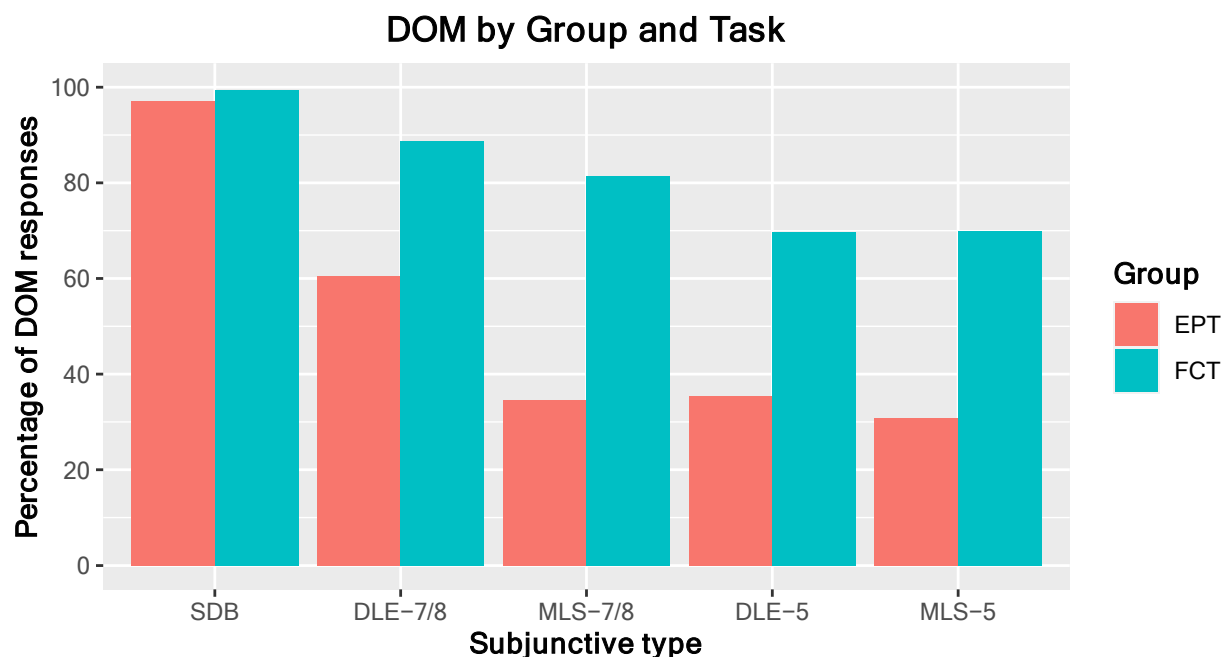


Figure 1. Production and selection of DOM by group and task.

The results of this model, which are summarized in Table 6, reveal that all groups of HS differed significantly from the SDB baseline at the $p < .05$ level. Furthermore, to determine the differences between groups of HS, Tukey post-hoc comparisons were carried out, as summarized in Table 7. Beyond the differences between the SDB and the HS, only the difference between the DLE-7/8 and the MLS-5 groups was significant at the $p < .05$ level. In order to look beyond group-level comparisons between SDB and the HS adolescents in the present study, an additional GLMM was necessary to separate the effects of age and educational exposure, as reported in the following section (5.2).

Fixed effect	Estimate	SE	<i>z</i>	<i>p</i>
Intercept	5.9513	0.7896	7.537	< .0001
DLE-7/8 group	-4.0634	0.8929	-4.551	< .0001
MLS-7/8 group	-5.4922	0.8021	-6.848	< .0001
DLE-5 group	-5.7067	0.8222	-6.941	< .0001
MLS-5 group	-5.9869	0.8091	-7.399	< .0001

Table 6. Results of GLMM model.

Contrast	Estimate	SE	<i>z</i>	<i>p</i>
SDB – DLE-7/8	4.063	0.893	4.551	.0001
SDB – MLS-7/8	5.492	0.802	6.848	< .0001

SDB – DLE-5	5.707	0.822	6.941	< .0001
SDB – MLS-5	5.987	0.809	7.399	< .0001
DLE-7/8 – MLS-7/8	1.429	0.684	2.087	.2254
DLE-7/8 – DLE-5	1.643	0.707	2.325	.1369
DLE-7/8 – MLS-5	1.923	0.690	2.787	.0424
MLS-7/8 – DLE-5	0.215	0.562	0.382	.9955
MLS-7/8 – MLS-5	0.495	0.539	0.917	.8905
DLE-5 – MLS-5	0.280	0.567	0.494	.9879

Table 7. Tukey post-hoc comparisons of groups.

5.2. HS Data Analysis

To determine whether the differences between HS were due to age group, school experience, or both factors, alongside the effect of task, a second GLMM binary logistic regression model was conducted with the HS’ data only, with DOM production/selection as the binary dependent variable and age group (fifth versus seventh/eighth grade), school (DLE versus monolingual), task (EPT versus FCT), and the age group by school interaction as independent variables. The fifth grade students, monolingual school, and FCT were selected as baselines for the variables age group, school, and task, respectively. Participant and item were random effects.

To determine the goodness of fit, nested model comparisons were prepared through pairwise comparisons. The results of the pairwise comparisons are summarized in Table 8. The models for age, task, and the age by school interaction. The resulting model revealed main effects for school, task, and the age group by school interaction that were significant at the $p < .05$ level. These results are shown in Table 9 and Figure 2.

Model/predictor	#	χ^2	AIC	BIC	logLik	Dev.	DF	p
Null	3	—	1264.7	1280.7	−629.33	1258.7	—	—
Age group	4	7.132	1259.5	1280.1	−625.76	1251.5	1	.0075
School	5	0.783	1260.7	1286.4	−625.37	1250.7	1	.3760
Task	6	21.174	1241.6	1272.4	−614.78	1229.6	1	< .0001
Age group : School	7	5.581	1238.0	1273.9	−611.99	1224.0	1	.0181

Table 8. Results of pairwise nested model comparisons for GLMM model.

Fixed effect	Estimate	SE	z	p
Intercept	−0.2150	0.3842	−0.560	.5757
7 th /8 th grade	−1.1014	0.3800	−2.898	.0037
DLE school	−0.5217	0.5241	−0.995	.3199
FCT	2.2397	0.3817	5.867	< .0001

7 th / 8 th grade : DLE	1.7463	0.7291	2.395	.0166
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Table 9. Results of GLMM model.

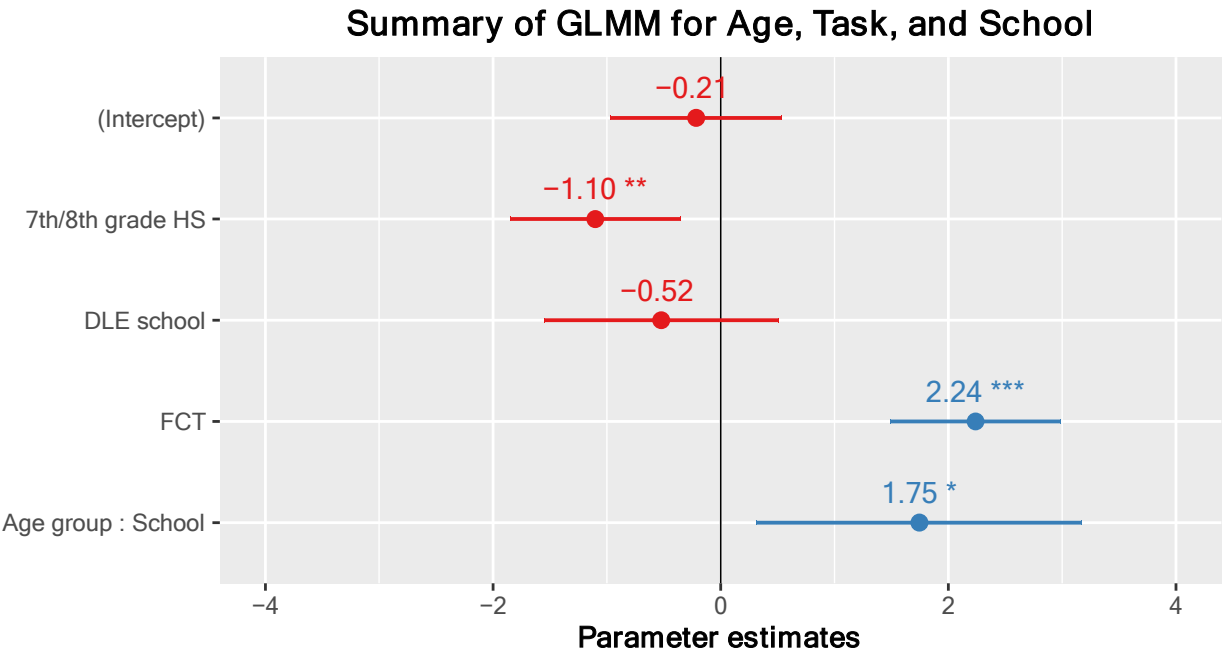


Figure 2. Summary of GLMM for age, task, and school.

5.3. Individual Analysis

Beyond group-level analyses, Figure 3 shows the number of times each HS participant produced and selected DOM. The data show that some HS selected DOM on the FCT categorically without producing it on the EPT, but reveal a general trend that those who did produce DOM had higher or equivalent rates of selection in the FCT. This aligns with the descriptive and inferential statistics that reveal a task effect favoring selection in the FCT over production on the EPT. However, an important additional finding is that the participants who produced and selected DOOM least still did so in at least 2/18 instances.

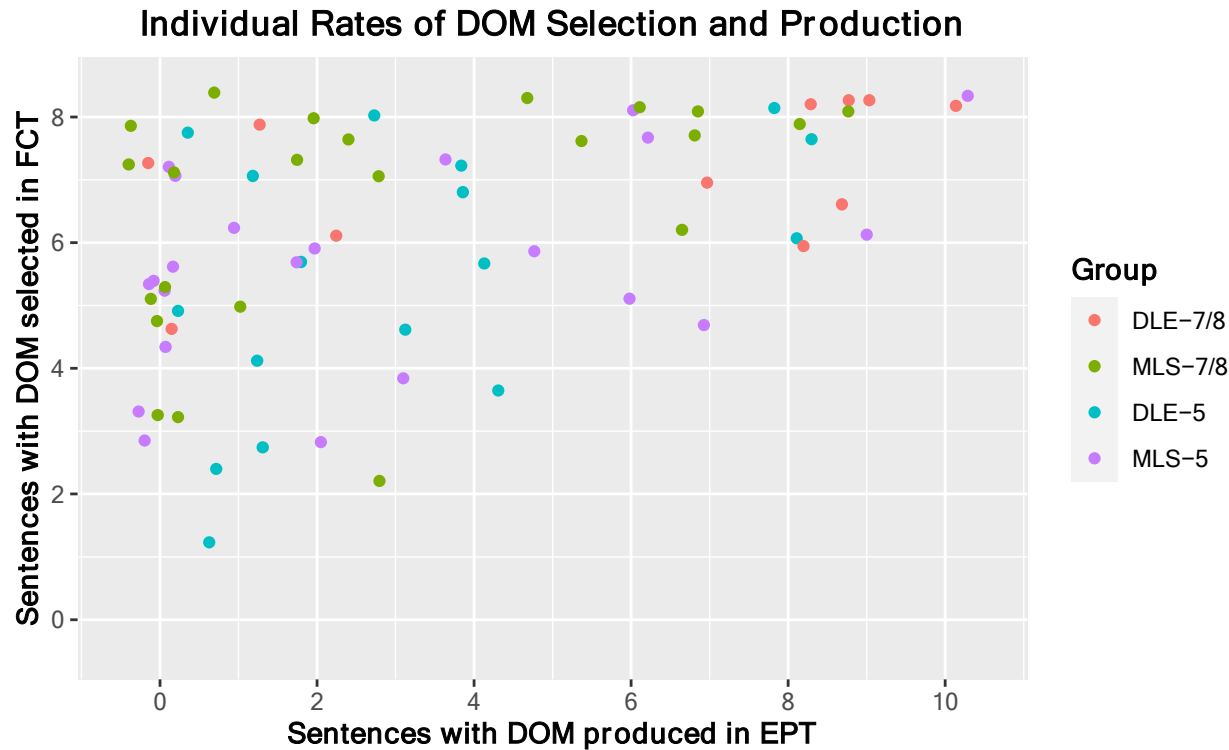


Figure 3. Individual rates of DOM production and selection for HS participants.

5.4. Summary

To summarize, the results of the statistical analyses showed that SDB produced and selected DOM at ceiling, while the DLE-7/8 group produced and selected more DOM than other HS (see Figure 1). The differences between the SDB and three of the four HS groups were significant at the $p < .05$ level, but only the differences between the DLE-7/8 and MLS-5 groups, which differed both in age and educational exposure, were significant at the $p < .05$ level within the HS participants. There was an effect for age in the statistical model, although the more robust group by school interaction reinforces the finding that the DLE-7/8 group – whose participants were older *and* who had received a bilingual education – used more DOM morphology than their peers. The effect for task was significant at the $p < .05$ level, whereby HS were more likely to select DOM on the FCT than they were to produce it on the EPT. All participants either produced

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and/or selected DOM on the tasks at least twice, which argues against the incomplete development of this feature in the HS children's grammatical repertoire.

Therefore, the results partially aligned with the hypotheses of the research questions. Regarding hypothesis 1, there was no effect found in favor of DLE in fifth graders' production and selection of DOM, nor a decrease in knowledge in the seventh and eighth grade DLE graduates, contra the hypothesis. Regarding hypothesis 2, the effect of age is negligible in the present study, contra the hypothesis. However, the group of older HS that had graduated from the DLE program was more likely to produce and select DOM than other participants, which shows that when considered together, age and school exposure modulated HS' knowledge of this structure in the present experiment. The effect for task supports the third and final hypothesis that HS would select this structure more frequently on a receptive task than they would produce it. Having spelled out the results of this analysis relative to the research questions, it is possible to turn to a more general discussion of these findings and how they contribute to theoretical questions in HL acquisition and best practices for HL teaching in the context of DLE programs.

5. Discussion

The present study adopted a novel approach to the study of language development in multiple ways. Firstly, it compared how different contexts of exposure to the HL through bilingual schooling influences its acquisition. Secondly, it is the first that evaluates HS' grammatical systems after the DLE years. This design teases apart the influences of cumulative and current exposure to the HL, both of which have been reported to influence its acquisition in previous research (see Putnam & Sánchez, 2013 and claims within). This study also fills a gap in previous experimental work by exploring the development of DOM through DLE.

The results of this study are consistent with all previous research on DOM by showing that at the group level, HS have unique object marking characteristics when compared to other Spanish-speaking populations (Guijarro-Fuentes & Marinis, 2011; Guijarro-Fuentes et al., 2017; Hur, 2020; Montrul, 2004; Montrul & Sánchez-Walker, 2013; Montrul et al., 2015; Ticio, 2015). In contrast to some previous studies (Montrul & Sánchez-Walker, 2013; Montrul et al., 2015), but in line with Cuza et al. (2021), there is no evidence of SDBs’ attrition of the DOM feature, as this group produced and selected the *a* marker at above 98%.

The rates of DOM production and selection by the DLE-7/8 group (60%), but not other HS groups, are similar to those of bilingual children in other research: Guijarro-Fuentes and Marinis (2011) reported that the children in their study produced DOM in [+animate] and [+specific] contexts in approximately 70% of sentences, and Cuza et al. (2021) reported that their participants produced the object marker *a* in 65% of contexts on the controlled production task. On Montrul and Sánchez-Walker’s (2013) story retell task, sequential bilingual children produced DOM in 66.8% of expected contexts and simultaneous bilinguals in 69.3% of expected contexts. Therefore, there appears to be general consistency across studies with bilingual children concerning their knowledge of DOM in Spanish as a HL, although there was greater variability in DOM production in other HS’ groups.

Where the present study departs from previous research is in the role of educational context on the acquisition of DOM. The fifth grade HS in DLE had no advantage in the production and selection of DOM over peers in monolingual schools. This differs from the predictions that Putnam and Sánchez (2013) set forth, because those HS who had more input in Spanish at school did not produce or select DOM more than monolingually educated peers. Moreover, the decrease in exposure to Spanish that the seventh and eighth graders who had attended the DLE school faced

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3 did not result in a decrease of DOM production when compared to younger children in the DLE-5
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5 group actively enrolled in the program. This finding is also in contrast to Putnam and Sánchez's
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7 (2013) predictions because it does not support the claim that decreases in patterns of exposure
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9 cause shifts in HL knowledge, such as the reassembly of the D-feature responsible for marking
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11 inherent case in Spanish.
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15 In contrast, these findings may show a similar trajectory to that reported in a study of
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17 subjunctive mood acquisition in European Portuguese HS children by Flores et al. (2017). The
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19 researchers found that those bilinguals with more HL exposure at home produced the subjunctive
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21 at higher rates earlier than those participants with less cumulative exposure. Simultaneous HS with
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23 less home exposure to Portuguese eventually converged on a quantitatively similar level of
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25 production of the subjunctive as sequential bilinguals by mid-adolescence, which could potentially
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27 be the case for the children who had attended the monolingual school in this study. Therefore,
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29 adolescent HS may still be amidst a protracted process of development of DOM morphology that
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31 is modulated by the relationship between age and exposure, as was the case in Flores et al.'s (2017)
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33 study.
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38 Nevertheless, data from children in late adolescence and from adults would be necessary
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40 to determine whether HS continue to grow in their rates of DOM production and selection past the
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42 age range studied. In the absence of such data, comparisons to similar studies with adults are
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44 warranted. In the oral narrative task carried out by Montrul and Sánchez-Walker (2013), the adult
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46 HS produced DOM in 80% of the expected contexts, 11% more than the simultaneous bilingual
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48 children and 14% more than the sequential bilingual children. Additionally, Montrul and Bowles
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50 (2009) found that HS adults with intermediate proficiency produced DOM in 73% of expected
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52 contexts, while advanced speakers seldom omitted this structure. Therefore, the DLE-7/8 HS in
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the present study produced DOM slightly less frequently than adults, and may continue to acquire this structure into late adolescence.

The interaction between age and HL exposure that accounted for the differences between groups of children in the present study adds an additional layer to our current understanding of the role of age effects on the acquisition of DOM and of inflectional morphology more generally. For instance, although Guijarro-Fuentes and Marinis (2011) did not find age effects in their data, they did find that proficiency accounted for variability in HS children’s production of DOM. Since, as reviewed previously, proficiency has been interpreted as a proxy for cumulative exposure to the HL (Giancaspro & Sánchez, 2021; López-Otero, 2022), a possibility is that this variable alongside age may have interacted in HS’ knowledge of DOM in their study, as it did in the present project.

In addition, there were asymmetries between HS’ production and receptive knowledge of DOM in all four groups. Had only those HS with less cumulative or current exposure exhibited asymmetrical knowledge of DOM across tasks, this would argue in favor of Putnam and Sánchez’s (2013) claim that HS reassemble features in production before they restructure their underlying linguistic competence. However, while Putnam and Sánchez (2013) correctly predict asymmetrical performance in the use of inflectional morphology across productive and receptive knowledge, as argued above, the reason for HS’ asymmetries does not appear to be due to the reassembly of the D-feature associated with DOM, which is against the predictions of their hypothesis. It is important to recognize that a possible alternative explanation for HS’ asymmetrical knowledge is that the EPT focused on DOM in the subordinate clause, designed to elicit mood morphology. In contrast, items on the FCT evaluated DOM in the main clause. Higher processing costs could have been associated with the syntactic position of DOM in the production task, which potentially could have

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3 affected results. Consequently, future research may wish to establish a more consistent method of
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5 measuring this structure across tasks.
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8 Nonetheless, considered together, the findings from this study have important implications
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10 for Putnam and Sánchez's (2013) model of HL acquisition. While this approach moves away from
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12 deficit frameworks proposed in previous theoretical accounts of HL acquisition (see Montrul,
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14 2008) and towards a holistic and process-driven perspective, it does not yet make a clear distinction
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16 between the ways in which cumulative and current HL exposure shape HS' knowledge. For
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18 instance, some studies that have reported effects for cumulative exposure to Spanish have been
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20 interpreted as evidence for this framework (i.e., Cuza & Frank, 2011; Cuza & Pérez-Tattam, 2016),
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22 while others have supported Putnam and Sánchez's predictions of feature reassembly based upon
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24 current patterns of HL use (Perez-Cortes et al., 2019). Putnam and Sánchez (2013) claim that drops
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26 in HL use and exposure will cause restructuring of the HL grammar and are at the root of the
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28 production-comprehension asymmetries evident in HS' grammar. However, in the present study,
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30 it was older HS whose exposure to Spanish had decreased who produced and selected the greatest
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32 quantities of DOM, and all speakers showed asymmetries between tasks.
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38 The data from the present study reveal quantitative differences between HS and the SDB
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40 baseline in percentage of DOM produced. A traditional interpretation of such trends would be that
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42 HS experience incomplete acquisition of this structure, which has been claimed in previous
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44 research on this topic with children and adults (Cuza et al., 2021; Montrul & Bowles, 2009;
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46 Montrul et al., 2015). However, the inclusion of individual data in this study challenges this
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48 assumption, because all 75 HS produced and/or selected DOM in at least two instances, and almost
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50 all participants selected it at a higher rate on the FCT than they produced it in the EPT. This shows
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52 that HS may experience difficulties mapping the morphology of their HL onto lexical items, as
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3 predicted by Putnam and Sánchez (2013), but that the underlying syntactic knowledge of DOM
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5 (e.g., the syntax and semantics of the D-feature and inherent case) is intact. This problematizes the
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7 concept that HS’ knowledge is incomplete, as it is unclear how to reconcile with such variability
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9 within a single speaker’s knowledge under such a framework. Therefore, the next step for future
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11 research on bilingual children is to focus on how to account for the within-speaker variability that
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13 the HS children exhibit (e.g., why participants produce DOM in some contexts but not others),
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15 which is an important and promising topic for future analysis and has epistemological importance
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17 for the field at large (see Giancaspro et al., 2022).
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22 Additionally, the present study has important implications for DLE programs nationwide.
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24 One possible extrapolation from the present data is that children need to receive at least 50% of
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26 their content instruction throughout the middle school years, beyond elementary school. If age and
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28 exposure interact to account for patterns of morphological development, as argued throughout this
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30 article, then it would behoove educators to create and implement DLE programs that sustain
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32 greater HL exposure during these key developmental years. This is particularly relevant
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34 considering research that argues that the effects of first language attrition are least pronounced for
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36 those individuals who receive exposure through age twelve (Ahn et al., 2017; Hakuta & D’Andrea,
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38 1992; Schmid et al., 2013).
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42 Finally, these programs should concentrate on meaning-based or community-oriented tasks
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44 that require output in Spanish, which has already been argued to be an essential component of L2
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46 acquisition (Swain, 1985, 1993, 2000) and has been shown to correlate with favorable outcomes
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48 in early HL acquisition in the context of DLE programs (Goldin, 2021; Sánchez et al., 2023). In a
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50 case study of classroom discourse in a DLE school, Potowski (2004) reported that the four children
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52 in her analysis produced English responses 52% of the time in content areas where 100% of teacher
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input occurred in Spanish. Many students in the present study reported using Spanish infrequently at school on the biographical questionnaire, which further reinforces this claim. This invites the possibility that HS need extensive opportunities for language output, even in input-rich environments, to accelerate the development of their HL. It is, of course, a challenge to balance these recommendations with the reality that teacher training, materials, and bilingual personnel remain unjustly limited resources.

6. Conclusion

The present study tested child HS' production and selection of DOM with [+animate] and [+specific] direct objects in subordinate clauses. The study contained two age groups of pre- and early adolescent children who attended a DLE school and two matched groups enrolled in a monolingual school. Although there are no signs of attrition cross-sectionally, the older group that had received a bilingual education had higher rates of production and selection of DOM on the EPT and FCT, respectively, than the other three groups of children. All HS groups selected the object marker *a* on a receptive task more than they produced this form, although the SDB group used DOM at ceiling across both tasks. However, HS' knowledge of DOM does not seem incomplete given that all participants produced or selected the object marker *a* at least twice. There were asymmetries between production and comprehension, which suggests mapping difficulties. Such mapping difficulties do align with Putnam and Sánchez's (2013) predictions; however, there is no evidence of reassembly in the data, which suggests that this phenomenon is not related to attrition of the DOM feature.

Before concluding, it is important to recognize three limitations of this study. Firstly, this study did not distinguish between HS' frequency of use of Spanish for production and for comprehension purposes, which could have been useful considering recent studies that have found

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a role specifically for language output reviewed in the previous section. Secondly, the present data were collected during the COVID-19 pandemic, and it is highly difficult – if not altogether impossible – to quantify the impact of distance learning on children’s grammatical knowledge. Future research may wish to repeat the present experiment under more consistent learning conditions. Finally, it is essential to recognize that this is but a preliminary investigation into the comparison of different methods of bilingual education. While this study takes a novel methodological approach to the study of DOM and of HL acquisition in school-aged children more broadly, it is important to recognize that there are many factors, including teacher preparation, language policy, and the availability of bilingual materials, that can affect each DLE program in unique ways. Therefore, the present sample may not be reflective of the national context of bilingual education, and *need not* be interpreted as a counterargument against DLE. Instead, these findings show that DLE does not *automatically* confer in advantage in HL acquisition of all structures and in all instances, which challenges us to develop more precise tools for assessing, teaching, and facilitating the development of the HL in this impactful method of education that has positive educational implications for diverse children.

References

- Ahn, S., Chang, C. B., DeKeyser, R., & Lee-Ellis, S. (2017). Age effects in first language attrition: Speech perception by Korean-English bilinguals. *Language Learning*, 67(3), 694–733. <https://doi.org/10.1111/lang.12252>
- Aissen, J. (2003). Differential Object Marking: Iconicity vs. Economy. *Natural Language & Linguistic Theory*, 21(3), 435–483. <https://doi.org/10.1023/A:1024109008573>
- Barton, D. (2015). *Generische nominalphrasen bei deutsch-französischer zweisprachigkeit* [Doctoral dissertation]. University of Hamburg.
- Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1). <https://doi.org/10.18637/jss.v067.i01>
- Bearse, C., & de Jong, E. (2008). Cultural and linguistic investment: Adolescents in a secondary two-way immersion program. *Equity & Excellence in Education*, 41(3), 325–340. <https://doi.org/10.1080/10665680802174817>
- Bianchi, G. (2013). Gender in Italian–German bilinguals: A comparison with German L2 learners of Italian. *Bilingualism: Language and Cognition*, 16(3), 538–557. <https://doi.org/10.1017/S1366728911000745>
- Bossong, G. (1991). Differential object marking in Romance and beyond. In D. Wanner & D. A. Kibbee (Eds.), *Current issues in linguistic theory* (Vol. 69, p. 143). John Benjamins Publishing Company. <https://doi.org/10.1075/cilt.69.14bos>
- Callen, M. C., & Miller, K. (2021). Children’s acquisition of variable differential object marking in Spanish. In Y. Gong & F. Kpogo (Eds.), *Proceedings of the 46th annual Boston University Conference on Language Development* (pp. 76–89). Cascadia Proceedings Project.

Christian, D., Genesee, F., Lindholm-Leary, K., & Howard, E. R. (2004). *Final progress report: CAL/CREDE study of two-way immersion education*. Center for Applied Linguistics.

<http://www.cal.org/twi/CREDEfinal.doc>

Cuza, A., & Frank, J. (2011). Transfer effects at the syntax-semantics interface: The case of double-que questions in heritage Spanish. *Heritage Language Journal*, 8(1), 66–89.

<https://doi.org/10.46538/hlj.8.1.4>

Cuza, A., Miller, L., Pérez-Tattam, R., & Ortiz Vergara, M. (2019). Structure complexity effects in child heritage Spanish: The case of the Spanish personal *a*. *International Journal of Bilingualism*, 23(6), 1333–1357. <https://doi.org/10.1177/1367006918786467>

Cuza, A., & Pérez-Tattam, R. (2016). Grammatical gender selection and phrasal word order in child heritage Spanish: A feature re-assembly approach. *Bilingualism: Language and Cognition*, 19(1), 50–68. <https://doi.org/10.1017/S1366728914000893>

Fábregas, A. (2013). Differential Object Marking in Spanish: State of the art. *Borealis – An International Journal of Hispanic Linguistics*, 2(2), 1. <https://doi.org/10.7557/1.2.2.2603>

Fernández-Dobao, A., & Herschensohn, J. (2020). Present tense verb morphology of Spanish HL and L2 children in dual immersion: Feature Reassembly revisited. *Linguistic Approaches to Bilingualism*, 10(6), 775–804. <https://doi.org/10.1075/lab.18026.fer>

Fernández-Dobao, A., & Herschensohn, J. (2021). Acquisition of Spanish verbal morphology by child bilinguals: Overregularization by heritage speakers and second language learners. *Bilingualism: Language and Cognition*, 24(1), 56–68.

<https://doi.org/10.1017/S1366728920000310>

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- Flores, C., Santos, A. L., Jesus, A., & Marques, R. (2017). Age and input effects in the acquisition of mood in Heritage Portuguese. *Journal of Child Language*, 44(4), 795–828. <https://doi.org/10.1017/S0305000916000222>
- Gathercole, V. C. (2002). Grammatical gender in bilingual and monolingual children: A Spanish morphosyntactic distinction. In K. Oller & R. Eilers (Eds.), *Language and literacy in bilingual children* (pp. 207–219). Multilingual Matters. <https://doi.org/10.21832/9781853595721-010>
- Giancaspro, D., Perez-Cortes, S., & Higdon, J. (2022). (Ir)regular mood swings: Lexical variability in heritage speakers' oral production of subjunctive mood. *Language Learning*, 72(2), 456–496. <https://doi.org/10.1111/lang.12489>
- Giancaspro, D., & Sánchez, L. (2021). Me, mi, my: Innovation and variability in heritage speakers' knowledge of inalienable possession. *Glossa: A Journal of General Linguistics*, 6(1). <https://doi.org/10.5334/gjgl.1240>
- Goldin, M. (2021). Language activation in dual language schools: The development of subject-verb agreement in the English and Spanish of heritage speaker children. *International Journal of Bilingual Education and Bilingualism*, 25(8), 1–22. <https://doi.org/10.1080/13670050.2021.2005529>
- Guijarro-Fuentes, P., & Marinis, T. (2011). Voicing language dominance: Acquiring Spanish by British English/Spanish speaking bilingual children. In K. Potowski & J. Rothman (Eds.), *Bilingual youth* (pp. 227–248). John Benjamins.
- Guijarro-Fuentes, P., Pires, A., & Nediger, W. (2017). Delay in the acquisition of Differential Object Marking by Spanish monolingual and bilingual teenagers. *International Journal of Bilingualism*, 21(2), 159–177. <https://doi.org/10.1177/1367006915601249>

Hakuta, K., & D’Andrea, D. (1992). Some properties of bilingual maintenance and loss in Mexican background students. *Applied Linguistics*, 13, 72–99.

Hur, E. (2020). Verbal lexical frequency and DOM in heritage speakers of Spanish. In A. Mardale & S. Montrul (Eds.), *Trends in language acquisition research* (Vol. 26, pp. 207–235). John Benjamins. <https://doi.org/10.1075/tilar.26.hur08>

Hur, E., López Otero, J. C., & Sánchez, L. (2020). Gender agreement and assignment in Spanish heritage speakers: Does frequency matter? *Languages*, 5(48). <https://doi.org/10.3390/languages5040048>

Kupisch, T., Akpinar, D., & Stöhr, A. (2013). Gender assignment and gender agreement in adult bilinguals and second language learners of French. *Linguistic Approaches to Bilingualism*, 3(2), 150–179. <https://doi.org/10.1075/lab.3.2.02kup>

Kupisch, T., Lein, T., Barton, D., Schröder, D. J., Stangen, I., & Stoehr, A. (2014). Acquisition outcomes across domains in adult simultaneous bilinguals with French as weaker and stronger language. *Journal of French Language Studies*, 24(3), 347–376. <https://doi.org/10.1017/S0959269513000197>

Kupisch, T., & Rothman, J. (2018). Terminology matters! Why difference is not incompleteness and how early child bilinguals are heritage speakers. *International Journal of Bilingualism*, 22(5), 564–582. <https://doi.org/10.1177/1367006916654355>

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). **lmerTest** package: Tests in linear mixed effects models. *Journal of Statistical Software*, 82(13). <https://doi.org/10.18637/jss.v082.i13>

IMMERSION AND AGE IN DOM DEVELOPMENT

3

- Lein, T., Kupisch, T., & van de Weijer, J. (2016). Voice onset time and global foreign accent in German–French simultaneous bilinguals during adulthood. *International Journal of Bilingualism*, 20(6), 732–749. <https://doi.org/10.1177/1367006915589424>
- Lenth, R. V. (2021). *emmeans: Estimated marginal means, aka least-squares means* (R package version 1.7.1-1). <https://CRAN.R-project.org/package=emmeans>
- Lindholm-Leary, K., & Genesee, F. (2014). Student outcomes in one-way, two-way, and indigenous language immersion education. *Journal of Immersion and Content-Based Language Education*, 2(2), 165–180. <https://doi.org/10.1075/jicb.2.2.01lin>
- López Otero, J. C. (2022). Lexical frequency effects on the acquisition of syntactic properties in heritage Spanish: A study on unaccusative and unergative predicates. *Heritage Language Journal*, 19(1), 1–37. <https://doi.org/10.1163/15507076-bja10011>
- Lüdtke, D. (2021). *sjPlot: Data visualization for statistics in social science* (R package version 2.8.10). <https://CRAN.R-project.org/package=sjPlot>
- Marian, V., Shook, A., & Schroeder, S. R. (2013). Bilingual two-way immersion programs benefit academic achievement. *Bilingual Research Journal*, 36(2), 167–186. <https://doi.org/10.1080/15235882.2013.818075>
- Merino, B. J. (1983). Language loss in bilingual Chicano children. *Journal of Applied Developmental Psychology*, 4(3), 277–294. [https://doi.org/10.1016/0193-3973\(83\)90023-0](https://doi.org/10.1016/0193-3973(83)90023-0)
- Montrul, S. (2004). Subject and object expression in Spanish heritage speakers: A case of morphosyntactic convergence. *Bilingualism: Language and Cognition*, 7(2), 125–142. <https://doi.org/10.1017/S1366728904001464>

IMMERSION AND AGE IN DOM DEVELOPMENT

3

Montrul, S. (2008). *Incomplete acquisition in bilingualism: Re-examining the age factor* (Vol. 39). John Benjamins Publishing Company. <https://doi.org/10.1075/sibil.39>

Montrul, S. (2011). Multiple interfaces and incomplete acquisition. *Lingua*, 121(4), 591–604. <https://doi.org/10.1016/j.lingua.2010.05.006>

Montrul, S. (2013). Incomplete L1 acquisition. In J. Herschensohn & M. Young-Scholten (Eds.), *The Cambridge handbook of second language acquisition* (pp. 353–371). Cambridge University Press. <https://doi.org/10.1017/CBO9781139051729.022>

Montrul, S., Bhatt, R., & Girju, R. (2015). Differential object marking in Spanish, Hindi, and Romanian as heritage languages. *Language*, 91(3), 564–610. <https://doi.org/10.1353/lan.2015.0035>

Montrul, S., & Bowles, M. (2009). Back to basics: Incomplete knowledge of Differential Object Marking in Spanish heritage speakers. *Bilingualism: Language and Cognition*, 12(3), 363–383. <https://doi.org/10.1017/S1366728909990071>

Montrul, S., & Potowski, K. (2007). Command of gender agreement in school-age Spanish-English bilingual Children. *International Journal of Bilingualism*, 11(3), 301–328. <https://doi.org/10.1177/13670069070110030301>

Montrul, S., & Sánchez-Walker, N. (2013). Differential object marking in child and adult Spanish heritage speakers. *Language Acquisition*, 20(2), 109–132. <https://doi.org/10.1080/10489223.2013.766741>

Peña, E. D., Gutiérrez-Clellen, V. F., Iglesias, A., Goldstein, B. A., & Bedore, L. M. (2014). *Bilingual English-Spanish Assessment (BESA)*. BROOKES Publishing CO. <https://brookespublishing.com/wp-content/uploads/2021/01/BESA-excerpt.pdf>

IMMERSION AND AGE IN DOM DEVELOPMENT

4

Perez-Cortes, S., Putnam, M., & Sánchez, L. (2019). Differential access: Asymmetries in accessing features and building representations in heritage language grammars.

Languages, 4(81), 1–27. <https://doi.org/10.3390/languages4040081>

Potowski, K. (2004). Student Spanish use and investment in a dual immersion classroom:

Implications for second language acquisition and heritage language maintenance. *The*

Modern Language Journal, 88(1), 75–101. [https://doi.org/10.1111/j.0026-](https://doi.org/10.1111/j.0026-7902.2004.00219.x)

[7902.2004.00219.x](https://doi.org/10.1111/j.0026-7902.2004.00219.x)

Potowski, K. (2005). Tense and aspect in the oral and written narratives of two-way immersion

students. In D. Eddington (Ed.), *Selected proceedings of the 6th Conference on the*

Acquisition of Spanish and Portuguese as First and Second Languages (pp. 123–136).

Cascadilla Proceedings Project.

Potowski, K. (2007a). *Language and identity in a dual immersion school*. Multilingual Matters

Limited.

Potowski, K. (2007b). Characteristics of the Spanish grammar and sociolinguistic proficiency of

dual immersion graduates. *Spanish in Context*, 4(2), 187–216.

<https://doi.org/10.1075/sic.4.2.04pot>

Putnam, M. T., & Sánchez, L. (2013). What's so incomplete about incomplete acquisition?: A

prolegomenon to modeling heritage language grammars. *Linguistic Approaches to*

Bilingualism, 3(4), 478–508. <https://doi.org/10.1075/lab.3.4.04put>

R Core Team. (2022). *R: A language and environment for statistical computing*. R Foundation

for Statistical Computing. <https://www.R-project.org/>

IMMERSION AND AGE IN DOM DEVELOPMENT

4

Requena, P. E. (2022). Variation versus deviation: Early bilingual acquisition of Spanish

Differential Object Marking. *Linguistic Approaches to Bilingualism*.

<https://doi.org/10.1075/lab.21001.req>

Rodríguez-Mondoñedo, M. (2008). The acquisition of Differential Object Marking in Spanish.

Probus, 20(1). <https://doi.org/10.1515/PROBUS.2008.004>

Rothman, J., Bayram, F., DeLuca, V., Di Pisa, G., Duñabeitia, J. A., Gharibi, K., Hao, J., Kolb,

N., Kubota, M., Kupisch, T., Laméris, T., Luque, A., van Osch, B., Pereira Soares, S. M.,

Prystauka, Y., Tat, D., Tomić, A., Voits, T., & Wulff, S. (2022). Monolingual

comparative normativity in bilingualism research is out of “control”: Arguments and alternatives. *Applied Psycholinguistics*, 1–14.

<https://doi.org/10.1017/S0142716422000315>

Sagarra, N., Sánchez, L., & Bel, A. (2019). Processing DOM in relative clauses: Salience and

optionality in early and late bilinguals. *Linguistic Approaches to Bilingualism*, 9(1), 120–160. <https://doi.org/10.1075/lab.16020.sag>

Sánchez, L., Goldin, M., Hur, E., Jimenez, A., López Otero, J. C., Thane, P., Austin, J., &

Markovits Rojas, J. (2023). Dominance, language experience, and increased interaction effects on the development of pragmatic knowledge in heritage bilingual children:

Acceptance of null and overt subjects in Spanish and English. *Heritage Language Journal*, 20, 1–39. <https://doi.org/10.1163/15507076-bja10012>

Schmid, M. S., Köpke, B., & de Bot, K. (2013). Language attrition as a complex, non-linear development. *International Journal of Bilingualism*, 17(6), 675–682.

<https://doi.org/10.1177/1367006912454619>

IMMERSION AND AGE IN DOM DEVELOPMENT

4

- Swain, M. (1985). Communicative competence: Some roles of comprehensive input and comprehensible output in its development. In S. M. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 235–256). Newbury House.
- Swain, M. (1993). The Output Hypothesis: Just speaking and writing aren't enough. *The Canadian Modern Language Review*, 50(1), 158–164.
<https://doi.org/10.3138/cmlr.50.1.158>
- Swain, M. (2000). French immersion research in Canada: Recent contributions to SLA and applied linguistics. *Annual Review of Applied Linguistics*, 20, 199–212.
<https://doi.org/10.1017/S0267190500200123>
- Thomas, W. P., & Collier, V. P. (2002). *A national study of school effectiveness for language minority students' long-term academic achievement*. Center for Research on Education, Diversity, and Excellence (CREDE). <https://escholarship.org/uc/item/65j213pt>
- Ticio, M. E. (2015). Differential object marking in Spanish-English early bilinguals. *Linguistic Approaches to Bilingualism*, 5(1), 62–90. <https://doi.org/10.1075/lab.5.1.03tic>
- Torrego, E. (1998). *The dependencies of objects*. MIT Press.
- United States Census Bureau. (2017). *Facts for features: Hispanic Heritage Month 2017*. United States Census Bureau. <https://www.census.gov/newsroom/facts-for-features/2017/hispanic-heritage.html>
- Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T., Miller, E., Bache, S., Müller, K., Ooms, J., Robinson, D., Seidel, D., Spinu, V., ... Yutani, H. (2019). Welcome to the Tidyverse. *Journal of Open Source Software*, 4(43), 1686.
<https://doi.org/10.21105/joss.01686>

IMMERSION AND AGE IN DOM DEVELOPMENT

4

Zagona, K. T. (2002). *The syntax of Spanish*. Cambridge University Press.

For Peer Review