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## Vulnerability of Clitics and Articles to Bilingual Effects in Typically Developing Spanish-English Bilingual Children

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### Abstract

This study examines bilingual effects in Spanish-English bilingual children with good maintenance of the minority language. The present study compares the performance of a group of Spanish-monolingual children (MON;  $n=30$ ) with two groups of Spanish-speaking bilingual children (Low English proficiency group: LEP;  $n=36$ ; High English proficiency group, HEP;  $n=36$ ) on the elicited productions of Spanish articles and object clitics. Our results suggest that children with LEP performed significantly lower than MON children of the same age on both articles and clitics in Spanish. However, children with HEP, who were a year older on average, performed similarly to the MON group. Both groups of bilingual children produced errors of clitic omission and substitution, but these errors were minimal in the MON group. The results suggest that Spanish clitics and articles are vulnerable to bilingual effects for English/Spanish speaking children with good Spanish maintenance

### Keywords

articles; clitic pronouns; Spanish

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The purpose of this study is to investigate how bilingualism affects the acquisition of Spanish clitic pronouns and definite articles, and whether these two grammatical structures are equally affected during bilingual development. Bilingual development is characterized by inherent fluctuations in the intensity of experience in a given language, which leads to variability in timing of acquisition of various grammatical aspects (Hurtado et al., 2014; Paradis, Genesee & Crago, 2011). A better understanding of bilingual language acquisition

is a central step in developing optimal strategies for language assessment and identification (Kohnert, 2010; Paradis, 2011). In the present study, we explore the acquisition of determiners and object pronouns in Spanish in monolingual and bilingual children's production of clitic pronouns and articles. These two grammatical structures are of theoretical importance given that they have comparable timetables of development in Spanish (Pérez-Leroux, Castilla-Earls & Brunner, 2012), but might be affected differently in bilingual development (Castilla-Earls et al., 2016; Paradis, Tremblay & Crago, 2014). Furthermore, these two structures are both clinical markers of specific language impairment in Spanish-speaking children (Bedore & Leonard, 2001, 2005) and understanding their developmental patterns may help in distinguishing cases of bilingual typical language development from cases of bilingual children with language impairment.

## Bilingual effects

Language development in bilinguals is characterized by alterations in the timing of the acquisition of grammatical structures when compared to monolinguals. This phenomenon is referred to as bilingual effects (Castilla-Earls, et al., 2016; Grüter & Paradis, 2014; Pirvulesco et al, 2014) or quantitative effects (Meisel, 2007). Four observations regarding bilingual effects are crucial for this investigation. First, bilingual effects are not general; instead they concentrate in certain domains of grammar (Müller, 2003; Paradis, Tremblay & Crago, 2014; Unsworth, 2014; Thordasdottir, 2014). Many core syntactic structures are acquired by simultaneous bilinguals with timing and patterns comparable to monolinguals (Paradis & Genesee, 1996), at least in their stronger language. Second, bilingual effects are not limited to delays. Bilinguals also present acceleration effects in specific morphosyntactic forms (Gawlitze-Maiwald & Tracy, 1996; Kupisch, 2007; Müller, 2003). Third, bilingual effects may not directly be the result of cross language influence, especially when grammatical elements are not present in both languages. In this case, the bilingual effects may appear only as a lengthened initial development stage resulting from the inherent reduction in exposure time associate with bilingual contexts. Lastly, bilingual effects are not only evident in comparisons between monolingual and bilingual children, but also among bilingual children with different proficiency levels (Castilla-Earls, et al., 2016; Pirvulesco et al., 2014). This is particularly important in context such as the United States, where most children raised by immigrant parents speaking their home language ended up more proficient in their L2 by their adolescent years (e.g., Fillmore, 1991; Tran, 2010). These children go through a shift in language proficiency from their home language to English due to complex cultural, educational, and sociolinguistics circumstances (Lutz, 2008). Children who are just at the beginning stages of the process of learning English retain more of their home language than those who are more advanced in their English learning. In additive contexts some children might retain high competence in both languages, while in subtractive contexts, such as in the United States, an increase in L2 ability is likely to be associated with a slowdown in L1 development. We start by considering in more detail the various observations concerning the bilingual effects described in the literature in regard to the grammatical structures of interest in this study: clitics and articles. We also describe the bilingual effects previously observed for these two grammatical categories in terms of gender agreement.

## Bilingual effects in object pronouns

Object clitic drop has been intensively studied since the influential work on monolingual children by Jakubowicz, Müller, Riemer and Rigaut (1997), Schaeffer (1997), and bilingual children by Müller and Hulk (2001). While monolingual studies focus on what features of clitics are responsible for the observed children's clitic optionality stage (such as configuration and specificity; see Pirvulescu & Roberge, 2008), studies of bilinguals attempt to explain the extended clitic omission stage in bilingual children. Hulk and Müller (2000) interpret higher rates of clitic omission in bilinguals as the result of influence of German topic drop. Subsequent investigation established that object pronoun omission occurs in both clitic and non-clitic languages (Pérez-Leroux et al., 2008, 2017; Mykhaylyk & Sopata, 2014). Even within clitic languages, there is substantial variability in the length of the omission stage, and this holds true within varieties of the same language, as is the case of Spanish (Castilla, 2008; Bedore & Leonard, 2003; de la Mora, Paradis, Grinstead, Flores, & Cantú 2004; Gavarró, Torrens & Wexler, 2010, Elliot, 2016). There is consistent support for the initial observation that bilingualism extends the clitic omission stage, even in the absence of transfer effects. Bilinguals omit more clitics than monolinguals when their other language is English (Pérez-Leroux et al., 2009; Pirvulescu et al., 2014), a language lacking topic drop in which children produce object pronouns early (Pérez-Leroux et al., 2008).

One question to consider is whether bilingual children show delays in object pronouns because object pronouns have different configurations in their two languages. For example, French has clitic pronouns, which are left-adjoined to the verb, whereas English object pronouns are full pronouns placed to the right of the verb in the same position as phrasal direct objects. However, a study of bi-dialectal contact between Capeverdean and European Portuguese shows consistent and extensive delays in bilinguals (Costa, Lobo, & Pratas, 2016), although the two varieties differ minimally in their pronominal syntax. European Portuguese allows both clitics and null objects, whereas Capeverdean Portuguese only allows clitics.

Several studies on Spanish-English bilinguals offer support for the view that bilingualism delays accuracy with object clitic pronouns. Using an elicited production task, Morgan et al. (2013) found that bilingual children (mean age 6;0) in the United States produced less correct responses than their monolingual counterparts in Mexico. Other studies contrast different groups of bilingual children growing up in North America, finding dominance-related advantages. For instance, in Castilla-Earls et al. (2016), bilingual children with limited English proficiency showed an increase in correct clitic productions with age, while balanced bilingual children exhibit a plateau. In Pérez-Leroux et al. (2011), English-dominant simultaneous bilinguals produce clitic omissions in a repetition task, unlike Spanish-dominant sequential bilinguals who had virtually no omission errors. In sum, while previous studies concur that bilinguals have an extended clitic omission stage, the evidence is too heterogeneous to support firm inferences about bilingual development. Some studies concentrate on omissions, while others report accuracy rates.

## Bilingual effects on articles

Across languages, articles are generally learned early, but the optionality stage differs for different languages. Several studies show that in Romance languages articles are acquired early compared to Germanic languages in both monolingual (Guasti et al., 2008) and bilingual children (Kupisch, 2007). Article realization is one of the few domains where bilingualism can lead to earlier acquisition of the functional inventory. Paradis and Genesee (1996) found that while verbal inflection emerges at different times, determiner use emerges at the same time. Kupisch (2007) compared spontaneous production of determiners in German and Italian monolingual and bilingual children. Monolingual Italian children generally use determiners and protodeterminer fillers earlier than monolingual German children, and article omissions disappear earlier as well. Bilinguals in her study acquired German determiners faster than German monolinguals, but the advantage was only detected for children with strong Italian abilities. In contrast, Castilla-Earls et al.'s (2016) study with Spanish-English bilinguals showed delays for articles in Spanish. Children's level of English proficiency predicted the accurate production of articles in Spanish. The balanced bilingual group had lower accuracy rates (78%) compared to the children with limited English proficiency (86%), even though the balanced bilinguals were older.

Most available studies of the acquisition of articles focus on gender/number agreement (which will be discussed in the next section), and omission rates are only incidentally reported. The bilingual children in Nicoladis and Marchak (2011) did not omit more articles in French than in English. These children lagged behind monolinguals in vocabulary, yet produced determiners at frequencies comparable to those of monolinguals (p. 744). In contrast, Cuza and Pérez-Tattam (2016) reported higher rates of article omission in Spanish/English bilinguals compared to Spanish monolinguals. This is also true of Morgan et al. (2013), whose Spanish monolingual children from Mexico showed evidence of article omissions (13%), but their bilingual counterparts omitted articles at almost double the rate (23%).

In sum, the previous literature suggests that bilingual effects on the omissions of articles and clitics are not homogeneous. Bilingualism leads to uniform delay in the case of clitic omissions, but the evidence is more complex in the case of article omissions. Kupisch's longitudinal study (2008) makes a compelling case for the possibility of acceleration in this domain, but the results of the few available elicitation studies do not yield a coherent picture.

## Bilingual effects on noun phrase agreement

Many studies of bilingual production of clitics and articles report accuracy but do not necessarily detail error patterns, which include omissions and morphological substitutions. As agreement in clitics and in determiners are the result of different syntactic processes, they may be differentially affected by bilingual conditions. The standard assumption is that gender in the determiner is the result of local concord within the noun phrase, where the gender feature of the determiner is valued by the gender features of the noun (Camacho, 2017). Grüter (2006) proposes that the greater structural distance between a pronominal

form and its associate can lead to feature decay in working memory, leading to more omission or substitution errors in children's production.

[DP Det [ [NP N] ]]

[CIP cl ... [vP V DP [pro]]

We concentrate on accuracy in gender agreement because more data are available, and bilingual effects have clearly been established. Furthermore, across Spanish dialects final /s/ lenition varies widely, which impacts timing of acquisition of grammatical number (Miller, 2014). Such variability renders reliable comparisons across the research literature less reliable. In general, mastery of grammatical gender varies widely across languages, depending on robustness and transparency of the morphological paradigm. Children learning a Romance language have a clear advantage in learning gender, in comparison to children learning more opaque languages like German (Eichler et al., 2013). Spanish gender marking is highly reliable, with a majority of nouns explicitly marking gender. Correct use of gender in articles is mastered early in the spontaneous speech of monolingual Spanish children, with two-year-old children reaching 97–100% target in naturalistic use (Snyder, Senghas, & Inman, 2005). Elicitation studies show high but less perfect performance, indicating that children favor masculine assignment, and strongly give primacy to morphophonological cues over semantic cues when making decisions about gender (Pérez-Pereira, 1991). Rates of gender error are generally low in monolinguals. Castilla (2008) and Castilla and Pérez-Leroux (2010) report minimal errors for concord between noun and adjectives and noun and articles (1%–2%). Errors with clitics are somewhat higher but still low (3%–4% for gender marking, and around 8% for number marking). Similarly, Bedore and Leonard (2001) found negligible morphological errors on articles (less than 1%), but gender error rates close to 11% (MLU controls, Table 6, p. 915). Morgan, Restrepo, and Auza (2009) found more gender substitutions than number omissions in articles (8% vs 3%), and the opposite for clitics (5% vs. 9%). However, this study only reports a small sample of typically developing children serving as controls for the children with language impairments under study.

The available evidence suggests that bilingualism can disrupt the course of the acquisition of gender in Spanish. Barreña (1997) noted that bilinguals simultaneously acquiring Spanish and Basque, a language that does not mark for gender, had not fully acquired gender by the age of three. Larrañaga and Guijarro-Fuentes (2012) confirmed this observation further comparing Barreña's bilinguals to a monolingual child from the Aguirre (2000) corpus<sup>1</sup>. Bilingual effects are similarly detected when both languages grammatically encode gender. German children simultaneously learning a Romance language make more gender errors than their monolingual counterparts (Kupisch et al., 2002; Kupisch and Müller, 2004; Eichler et al., 2013). This is also true for Spanish. The two German-Spanish bilingual

<sup>1</sup>From our calculations of the data reported, error rates for the monolingual child are less than 8%, and for the bilinguals 13% (Mikel) and 18% (Peru). These error frequencies are significantly different from those of the monolingual child ( $\chi^2 = 3.989$ ,  $df = 1$ ,  $p = 0.045$ , for Mikel, and  $\chi^2 = 7.334$ ,  $df = 1$ ,  $p = 0.007$ , for Peru).

children in Eichler et al. (2013) retained overall error rates of 5% and 3 until the age of four (Figure 6, p. 563).

Amount of input plays a clear role. Mueller-Gathercole (2002) reports that children with the greatest amount of input in Spanish have fewer gender errors. Montrul and Potowski's (2007) study of bilinguals with good Spanish maintenance found an effect of language experience with a picture description task, particularly with feminine, the marked case. There were significant differences between Heritage speakers and monolinguals and between simultaneous and sequential bilinguals, in terms of gender accuracy.

It is important to consider that gender agreement has both a lexical and a purely grammatical dimension. Gender assignment is lexical, i.e., it pertains to knowing the gender value of a word (i.e., whether the word *pared* 'wall' is feminine or masculine). Gender concord refers to the knowledge that various elements within a noun phrase must agree, a purely structural phenomenon. Nicoladis and Marchak (2012) analyzed rates of correct gender use in elicited NPs in a group of Francophone bilingual children in Edmonton, Canada. Their goal was to test whether bilingual effects were more prominent in domains related to input frequency. In French, gender agreement is not robustly encoded, and children acquire it later than Spanish-speaking children. Nicoladis and Marchak found no significant differences between monolingual and bilinguals in gender concord, i.e., agreement between adjectives and articles. However, the fact that bilinguals were worse at matching gender between nouns and either adjectives or articles reflects problems with gender assignment. When vocabulary scores were controlled for, bilinguals did not differ from monolinguals in gender accuracy with articles. These results suggest that the lexical dimension of gender (assignment) is more sensitive to experience, whereas gender concord, the purely formal component, is less so, and therefore more stable in bilingual contexts.

Cuza and Pérez-Tattam (2016) test retention and development of Spanish gender agreement within the noun phrase in children growing up bilingual in the United States. Children in their study are significantly less accurate than monolinguals not only with gender assignment as reflected by noun-adjective agreement (*cruz amarillo* 'yellow-MASC cross-FEM', i), but also with determiner-adjective concord (*una fuente chiquito* 'a-FEM small-MASC fountain'). Their evidence suggests possible effects of levels of usage and of possible attrition patterns in the group under study.

Like expression of articles and clitics, gender agreement follows distinct patterns of acquisition in bilingual children. To date, only Morgan and colleagues (2009; 2013) have directly compared gender errors across grammatical categories in bilinguals and monolinguals. From those studies it is not clear whether bilingual vulnerability for gender marking differs between these two structures. Given the different formal mechanism involved in gender in the two categories, this issue is worth investigating with a larger sample.

## This study

The present study investigates the hypothesis that articles and clitics in Spanish are vulnerable to bilingual effects in Spanish and explore the possibility that the grammatical structures differ in the vulnerability to bilingual effects. Specifically, we seek to explore how differences in English proficiency, which is the majority language, impacts the developmental patterns of these two basic grammatical categories in Spanish, the minority language. We compare patterns of production in two groups of Spanish-speaking bilingual children living in the United States, asymmetric bilingual children with low English proficiency, vs. symmetrical bilingual children with high English proficiency, and a group of Spanish-speaking monolingual children living in Mexico.

## Research questions

1. Are there differences between monolingual children, bilingual children with low English proficiency, and bilingual children with high English proficiency in clitic and article accuracy?
2. Are clitics and articles equally vulnerable to bilingual effects in typically developing Spanish-speaking children with good Spanish maintenance?
3. Are there qualitative differences between monolingual and bilingual children in terms of error patterns?

## Methods

### Participants

All children in this study spoke Spanish and had typical language skills as evidenced by their Core Language Score on the Clinical Evaluation of Language Fundamental Spanish 4<sup>th</sup> edition (CELF-S4; Semel, Wiig & Secord, 2006). The participants included 30 monolingual Spanish-speaking children who resided in Mexico and 90 Spanish-English bilingual children who resided in the United States. Descriptive information for all participants is presented in Table 3. We recruited bilingual children for this study from English-only public schools in Arizona<sup>2</sup>. These children were tested as part of a research project developing a Spanish-screening measure to identify Spanish-speaking children with language impairment (Restrepo, Gray & Gorin, 2013). We selected the bilingual children from one of the three cohorts of the larger study. The cohort for this study included 188 participants. This cohort was chosen among three cohorts because it included Spanish and English language standardized data. Children from the original study were excluded from this study if they failed a cognitive screening (Kaufman Assessment Battery for Children, 2<sup>nd</sup> Edition: Kaufman & Kaufman, 2004; score below 80;  $n=25$ ), or if their scores on the Core Language Score of the CELF-4S were below 80 ( $n=67$ ). The children with lower scores on the Core Language Score of the CELF-4 represented both children with potential language impairments and children with low Spanish skills (e.g., Spanish loss). Therefore, we

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<sup>2</sup>Arizona's State Law mandates that all children in public schools be taught in English-only. Bilingual instruction is allowed in some cases with a waiver. For more detailed information see Mahoney, Thompson, MacSwan, Combs and Reyner (2004).

consider the children included in this study to have good language skills within normal limits and good Spanish maintenance. Children with missing data (any of the data of interest in this study) were also excluded. This selection procedure yielded 90 bilingual children to be included initially in this study.

We divided these bilingual children into two English proficiency groups using two language measures: the Spanish English Language Proficiency Scale (SELPS; Smyk, Restrepo, Gorin, & Gray, 2013) and the Structure Photographic Expressive Language Test, 3<sup>rd</sup> edition (SPELT-3; Dawson, Stout, & Eyer, 2003). First, we used the SELPS to assign participants to an initial English proficiency group. The SELPS is a criterion reference measure of English oral proficiency validated against language sample measures and teacher's rating of language skills with moderate to high correlations. Children produce a story retell that is rated, using the SELPS, on four language domains: sentence complexity, grammaticality, verbal fluency, and vocabulary diversity. Each domain is scored between 1 and 5 following the scoring protocol. The total score of the SELPS is the average of the domain scores, and ranges from 1 to 5, with 1 being equivalent to low language proficiency and 5 to near-native-proficient language skills. A score of 6 is given to children who perform as native English speakers. We used the scores of the SELPS to divide the bilingual children into two groups using scores between 1 and 3.5 for the low English proficiency (LEP) group and scores between 3.6 and 6 for the high English proficiency (HEP) group.

To verify group membership, we employed the raw scores of the SPELT-3. The SPELT-3 is a standardized language test examining the productive use of various English morphological and syntactic structures. It includes 44 questions testing prepositions, plurals, possessive nouns and pronouns, reflexive pronouns, subject pronouns, direct/indirect objects, present progressive, regular and irregular past, future, copula be, auxiliary be, negative sentences, conjoined sentences, *wh*-questions, interrogative reversal, negative infinitive phrases, prepositional complements, relative clauses, and front embedded clauses. The raw score of the SPELT-3 was deemed appropriate to further confirm the English language proficiency of these children who are dual language learners as it provides a quantity of correct production of morphosyntax in English. We assumed that children with higher English proficiency would have more correct responses than children with LEP. All bilingual children in this study completed the SPELT-3 (Mean raw score= 20; *SD*= 10; Range: 0 – 42). Using the initial SELPS classification we confirmed LEP group membership for those children with lower scores on the SPELT-3 (between 0 and 25<sup>3</sup>), and HEP group membership for those children with higher scores on the SPELT-3 (between 15 and 42). Using this procedure, we confirmed bilingual group membership for 80% of the sample: 36 children in the LEP group and 36 children in the HEP group. Those children with incongruent data (*n*=18) (e.g., low score of the SELPS and high score of the SPELT-3) were eliminated for further analyses since we were unable to confirm their group membership.

There was a statistically significant difference in age between the three groups ( $F(2, 101)=24.028, p<.001$ ), with a statistically significant difference between the HEP and LEP ( $t=$

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<sup>3</sup>The extremes of the distribution of scores were used here. Therefore, there is some minor overlap of scores. This was considered appropriate since this was a confirmatory step for group assignment.



-1.046,  $p < .001$ ), and no difference between the LEP and MON groups ( $t = -.938$ ,  $p = .351$ ). We also compared the groups on their Core Language standard scores on the CELF-4 ( $F(2, 101) = 11.325$ ,  $p < .001$ ), and found that the scores of the MON group were significantly higher than the LEP group ( $t = 3.776$ ,  $p < .001$ ), with no differences between the LEP and HEP groups ( $t = -.702$ ,  $p = .484$ ).

## Measures

All children completed an elicitation task evaluating the productive use of direct object pronouns and articles. The elicitation task consisted of 8 direct object pronoun tokens and 8 article tokens targeting the singular-feminine, singular-masculine, plural-feminine, and plural masculine forms; all nouns but one were marked with the gender vowel (-a/-o), and the exception (*ratón*<sup>4</sup>) has predictable gender marking. All items in this task are presented in Table 1. Article responses were coded into five categories: target, omission, gender substitution, number substitution, and unscorable. Responses that used an alternative but acceptable lexical item (such as saying ‘animals’, in lieu of ‘chickens’) were included but coded according to the category of the noun. Direct object responses were coded into six categories: target, omission, gender and number substitutions, noun phrases, and unscorable. Table 2 presents examples of the various responses produced by children with the corresponding coding categories.

## Procedures

Research assistants screened children initially for English language proficiency, hearing, and cognition. Then, research assistants administered all testing in Spanish and English separately. Native Spanish speakers did all the testing in Spanish, and no tester did both languages for the same child. Monolingual children from Mexico only received the Spanish testing. All research assistants were trained to 90% procedural and scoring reliability. The total inter rater reliability for the elicitation task was 91%.

## Results

Descriptive statistics for articles and clitics<sup>5</sup> in percentages are presented in Table 4 and Table 5, respectively. We include only responses that show either realization or omission of the grammatical structure of interest (e.g., no responses, NPs, or unscorable errors are not included), to focus on the linguistically informative production patterns in these children. Figure 1 illustrates the percentages of target/correct production, omission, and substitution for both articles and clitics by group.

To investigate whether Spanish clitics and articles are vulnerable to bilingual effects in typically developing children with good Spanish maintenance, we fit a generalized linear mixed effects model using the command PROC GLIMMIX in SAS software 9.4 (SAS

<sup>4</sup>Words ending in certain derivational suffixes, such as *-dor* or *-on*, can be inherently marked for gender even when lacking a word marker (or gender vowel, *a/o*) and can fully participate in gender alternations (e.g., *peleón/peleona, trabajador/trabajadora*). These are marked masculine when bare, and to express the feminine form requires the *-a* suffix (Nuñez-Cedeño, R., 1993)

<sup>5</sup>One of the questions from the clitic elicitation task was eliminated from all analysis because it produced a low rate of target responses across groups: *¿Qué hace Luis con la espada?* (‘What does Luis do with the sword?’) because speakers described the scene with alternative verbs rather than the transitive target.

institute, 2014). Outcome data in the model are binary and therefore the model was fit with a logistic link function. We selected this statistical approach because it allowed us to model performance at the item level and examined student level effects on item performance. In this model, the dependent variable is the item level accuracy (0=incorrect, 1=correct) on both clitics and articles. We fit a random intercept for both child and item (all other model predictors were fixed effects). The outcome data were predicted by group (MON, LEP, HEP), type of grammatical structure (Clitic=1 vs. Article=0), and the interaction between group and type of grammatical structure. However, both the LEP by grammatical structure and the HEP by grammatical structure interactions were nonsignificant. Consequently, we removed them from the model and examined a main-effects-only model. Age in months, the presentation order of the items, and the Core Language Standard Score on the CELF-4S were included as covariates in the model, and both were centered on the grand mean (CELF-4S at 100.3 and age at 76.6 months). Parameters were estimated for LEP and HEP with MON being the reference group.

At the child level, we examined whether MON, LEP and HEP children differed in their clitic and article accuracy. We examined the effect of group using two dummy coded vectors for LEP versus non-LEP and HEP versus non-HEP. This coding scheme sets the MON group as the comparison group. We found a significant effect for both LEP and HEP groups (Model parameters can be seen in Table 6). These significant effects indicate that both LEP and HEP groups differ from the MON group. Least squared means can be seen in Table 7. To examine the difference between LEP and HEP group, we ran the same model with HEP as the comparison group. This comparison between LEP and HEP was found to be nonsignificant ( $t=-1.13$ ,  $p=.259$ ). Examination of overall parameter estimates (index of accuracy with low numbers indicating that items were more accurate) across both structures revealed that the MON group was more accurate (4.18), followed by the HEP group (2.87) and then the LEP group (2.40).

We also examined the main effect of grammatical structure to investigate whether clitics and articles were equally vulnerable to the bilingual effects seen in the previous analyses. We found a significant effect for grammatical structure. An examination of the parameter estimates shows that Spanish-speaking children produced more accurate articles than clitics by 0.84 log-odds (3.57 versus 2.73). This difference was statistically significant.

## Error analyses

In addition to differences in rates of target responses, we observe variation in the distribution of errors. For this analysis, we continue to focus on the linguistically informative types of errors, which include target responses, patterns of omission and patterns of substitutions (including NPs for clitics), and leave aside other errors such as non-responses, unintelligible and unrelated responses. To explore these patterns of errors, we employed Chi-square analyses to examine the distribution of errors between groups. In general, we observe that monolinguals produced virtually no substitutions and very few omissions.

We conducted a frequency analysis to explore group differences in the distribution of responses types, separately for each condition. Since there was little difference between HEP and LEP groups, the two groups were collapsed into a single Bilingual group for these

analyses. Table 8 reports the frequency of the 3 relevant response types for monolinguals and bilinguals, for articles and clitics separately. Following the suggestion of a reviewer, we conducted separate frequency comparisons for patterns of omissions from patterns of morphological substitution. First, we consider whether the two groups were different in terms of the frequency of omissions. For this analysis, we contrasted the frequency of omission vs. all realizations (including NPs for clitic pronouns), by collapsing Target and Substitution responses into a single category. The differences in the frequency of omissions for articles is not significant ( $\chi^2 = 2.157$ ,  $df = 1$ ,  $p = 0.141$ ). For clitics, the difference is significant ( $\chi^2 = 7.439$ ,  $df = 2$ ,  $p = .006$ ). Second, we turn to the question of group differences in terms of morphological substitutions. For this analysis, we considered targets/correct responses (including NPs for clitic pronouns), vs. substitutions, removing omission responses from the comparison. The difference in the frequency of morphological errors (i.e., substitution) for articles is non-significant ( $\chi^2 = 1.537$ ,  $df = 1$ ,  $p = 0.215$ ). For clitics, the difference is again significant ( $\chi^2 = 6.248$ ,  $df = 2$ ,  $p = 0.011$ ). Substitution errors consisted to gender, number, and both gender and number in similar frequencies.

## Discussion

In this study we examined the vulnerability of articles and clitics to bilingual effects in Spanish-English bilinguals with good retention of Spanish abilities. We examined production of these categories in three groups of typically developing children: monolingual children from Mexico with a mean age of six years, low English proficiency bilinguals with the same age as the monolingual children, and high English proficiency bilinguals, who were on average one year older than the other two groups. Partitioning the bilinguals in terms of English proficiency allows us to consider grammatical structures separately for children of different dominance profiles. Two observations about the participants included in this study are crucial to interpret our results. First, we selected the bilingual children for this study from a larger pool of bilingual participants with variable language skills. We chose only those with good Spanish maintenance (approximately 50% of the total sample of participants). Therefore, the results of this study illustrate development in what can be considered the best-case scenario in terms of the retention of Spanish, given the limited support for bilingualism within the Arizona context. Second, the monolingual and bilingual children with LEP were 6 years old on average, while the bilingual children with HEP were older, 7 years old on average. This difference in age between the children with LEP and HEP reflects the longer time spent in English-only education for the HEP children. In the bilingual contexts of the United States age and language profile are intrinsically confounded. We discuss first the differences between structures and then focus on the effects of the bilingual group.

The results of this study show that overall performance on articles was high for all children, which was not surprising given the sample under study. Our results indicate an advantage for articles over clitics with all groups combined, although the difference was small. Article accuracy for all groups was above 90%, with monolinguals reaching 97% accuracy, (90% for LEP and 94% for HEP). These results are within the range of existing clinical studies of typically developing monolinguals, such as in Anderson and Souto (2005), Bedore and Leonard (2001), and Morgan et. al. (2013). Clitic performance was also quite good, although

lower than articles. Monolingual children were on average 98% accurate, while bilingual children showed lower accuracy rates (81% for LEP and 88% for HEP). These accuracy rates also fall within the range in existing clinical studies for typically developing monolinguals (Bedore & Leonard, 2001; de la Mora, 2004; Jacobson & Schwartz, 2002; Morgan et al., 2013). The difference between the results of articles and clitics is in agreement with the results of Castilla-Earls et al. (2016) and Morgan et al. (2013) in that correct article production at the item level was significantly higher than clitic production in all groups. This phenomenon might be driven to some extent by the availability of an alternative response (noun phrases) available for object pronoun elicitation (Pérez-Leroux et al., 2008). The more sizeable gap for the younger bilinguals might be driven by the acquisition patterns for these grammatical structures. Although both structures are acquired relatively early in Spanish, and omissions are drastically reduced by the age of 4, articles are inherently less vulnerable to fluctuations in vocabulary development than object pronouns, as shown by work on the dimensionality of grammar and vocabulary in Pérez-Leroux et al. (2012), and thus potentially less vulnerable in bilingual development (Castilla-Earls et al., 2016).

In terms of group difference, our results indicate that MON surpassed both LEP and HEP children on their accuracy with both grammatical structures. Importantly, the results from the CELF-4 suggested that the Spanish skills of these children were in general age appropriate, and no differences were found between the bilingual children in their standard scores. This implies that the general Spanish skills of this group of bilinguals continued to develop according to normative data. In the domain of articles and clitics, such growth was not apparent since the older HEP children were not different from the children in the LEP group. We therefore interpret this data as indicating the possibility of plateau effects in the two grammatical structures under study, as it was previously suggested by Castilla-Earls et al. (2016).

We did not find a statistically significant interaction of grammatical structure and group, which suggests that the group differences between MON, LEP and HEP children was equal for articles and clitics. It is important to recall that the monolinguals performed equally well in articles and clitics, while we found a discrepancy in the bilingual children favoring articles. Since the interaction was not significant, we don't explore these effects in more detail. These results differ from those of Castilla-Earls et al. (2016) in that we did not find a statistically significant interaction between group and construction. However, the sample size in Castilla-Earls et al., (2016) was small for the children with typical development. In this study, the sample size of about 30 children per group is more robust. We therefore interpret the lack of interaction as an indication that both grammatical structures are vulnerable to bilingual effects in similar ways in terms of accuracy. Although bilingual effects are not general for all grammatical structures (Müller, 2003; Paradis, Tremblay & Crago, 2014; Unsworth, 2014), it seems that object pronouns and noun phrases in Spanish are vulnerable to these effects, although not to the same degree.

In terms of error analyses, both articles and clitics show omissions and morphological errors. The monolingual children produced virtually no substitutions and few omissions. The analysis of error frequencies shows that categorical omission and gender and number

substitution errors are more prevalent for clitics than for articles in bilinguals. Clitic omission was not the most prevalent error category in these 6- to 7- year old bilingual children; this is an area where reports vary widely (c.f., Castilla, 2008 and Bedore & Leonard, 2001). The frequency of clitic omissions was higher than the frequency of article omission for bilingual children in comparison to the MON group. This finding fits well with what is known about the possible influence of bilingualism. For clitics one would predict omissions on the basis of the general effect of bilingualism in extending the null object construction (Pérez-Leroux et al., 2017). Interestingly, the frequency of determiner omission did not differ between monolingual and bilingual children as previously found in other studies with strong evidence of L1 attrition (Cuza & Perez-Tattam, 2016). A higher rate of determinerless nouns in English might have influenced rates of determiner omission in Spanish, but this was not the case in this study. This difference between studies might be explained by the fact that children in this study were 6- to 7- years old and had strong maintenance of L1 language skills.

Although most of the items in the elicitation task included inanimate nouns, the rates of clitic omission in this study were relatively low. Characterizations of clitic omission patterns have suggested that omission depends heavily on animacy/inanimacy; animate referents are less likely to show clitic drop across varieties of Spanish (Schwenter, 2006). In our study, the same task was administered to all children, therefore, we don't think that the difference in rates of omission between monolingual children and bilingual children can be accounted on the basis of animacy. It is possible that animacy is a factor, as suggested by a reviewer, but the low number of items with animate nouns does not allow to further explore this issue at this time. Further studies should examine the relevance of animacy and bilingual effects.

Bilinguals and monolinguals were qualitatively different in terms of patterns of morphological errors. At this age, morphological errors instead of omissions seem to prevail for clitics. Revisiting Tables 4 and 5 we see that overall a certain percentage of gender and number errors are present for bilinguals but absent in monolinguals. For articles, the number of gender/number errors was fairly small. For clitics, gender and number errors were distributed among the substitution errors present. The low error rates with determiner-noun gender agreement is indicative of the high proficiency of these bilingual groups compared to other studies, including Cuza and Pérez-Tattam (2016), or Bedore and Leonard (2001). The asymmetry in morphological errors across the two grammatical structures parallels what has been found for monolinguals, and is well explained by the differences in the grammatical mechanism underlying the expression of gender in the two categories: local concord in the case of determiner and noun, where morphological agreement between the two elements is the result of a structurally local mechanism of feature checking, vs. notional agreement between pronoun and antecedent, where the relevant features are retrieved from a prior discourse antecedent.

The results of the current study can be used to characterize the course of language development of monolingual and bilingual children, with the goal of recruiting such characterization to assist in designing appropriate assessment strategies across bilingual populations. Our results suggest that the language production for 6-year old monolingual children in terms of clitics and articles is highly accurate with few omission errors. Accuracy

rates for same age Spanish-speaking children with limited English proficiency are lower. Importantly, 7-year old children with high English proficiency are also different from monolingual children who are a year younger, but no differences were found between the bilingual groups. This finding is important in that it shows that bilingual children's accuracy rates for both articles and clitics are different (lower) from the accuracy rates of monolingual children. In terms of error patterns, bilingual children differed from monolingual children in that they produced more substitutions than their monolingual counterparts.

Recall that our selection criteria had the aim of excluding potential bilingual children with language disorders. The consequence was that we restricted the study to children with good Spanish, while possibly excluding children undergoing attrition processes. In a sense, the children in the present study represent the best-case scenario for children attending English-only schooling in the United States and can be seen as a fortunate minority. Although many children become fluent speakers of two or more languages with appropriate community support, availability of bilingual schools, high language status, and others (Paradis and colleagues 2003, 2005, 2011), in the United States, societal support of bilingualism is not the norm. Although Spanish seems to be the language with most potential for language maintenance among other immigrant languages in the United States (Alba, 2004; Linton, 2004; Portes & Rumbaut, 2006), inter-generational and intra-generational studies show that second generation immigrants (e.g., children born in the United States with at least one immigrant parent, or foreign-born and immigrated as children) are most likely to shift to English proficiency and retain some moderate knowledge of the home language (Alba et al. 2002; Portes & Rumbaut, 2001, 2006). Within such variable context, current assessment practices cannot meet the challenge of describing typical development (Paradis, 2011).

## Conclusion

The present study investigated the alterations in the developmental timing of Spanish articles and clitics in monolingual and bilingual children. In our review of the previous literature we found support for differential vulnerability of clitics and articles in bilingual acquisition, and evidence that gender marking is vulnerable to bilingual effects. The results of the current study offer some support for the previous claims of differences between articles and clitics, as well as the presence of systematic effects of bilingualism on both structures, and on the gender realization in these grammatical markers. Bilinguals differed from monolinguals quantitatively (rates of accurate responses between MON and bilingual children) and qualitatively (in the overall error patterns). There were no differences between the bilingual groups separated by English proficiency: bilingual groups were comparable in their accuracy rates for clitics and articles, as well as in the patterns of errors in these structures. Children proficient in English were older on average than the children with limited English proficiency. Despite this age difference, these bilinguals were not different from the children with LEP or monolinguals, who were a year younger. While there is a risk in making developmental inferences from cross sectional data, 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.

Such results have important developmental and potential clinical implications. Both grammatical structures of interest in this study are clinical grammatical markers of language impairments in Spanish-speaking children (Bedore & Leonard, 2001). However, as seen in this study, both of these grammatical structures appear vulnerable to bilingualism, even in the best-case scenario of language maintenance represented by the groups we targeted. This underscores the conclusion by Morgan and colleagues (2013), that it is important to avoid assessing bilinguals' performance using monolingual baselines, because the two populations might differ in terms of relevant grammatical markers even while undistinguishable by general test batteries. Language impairment is generally considered an extension of the developmental timetable of language acquisition (Rice & Wexler, 1996). As a result, it is easy to read structural omissions and grammatical errors as signs of impairment when they might better be understood as indications of normal bilingual development. Evidence of plateau effects in the minority language also adds to the difficulty of identifying bilingual development versus bilingual language impairment.

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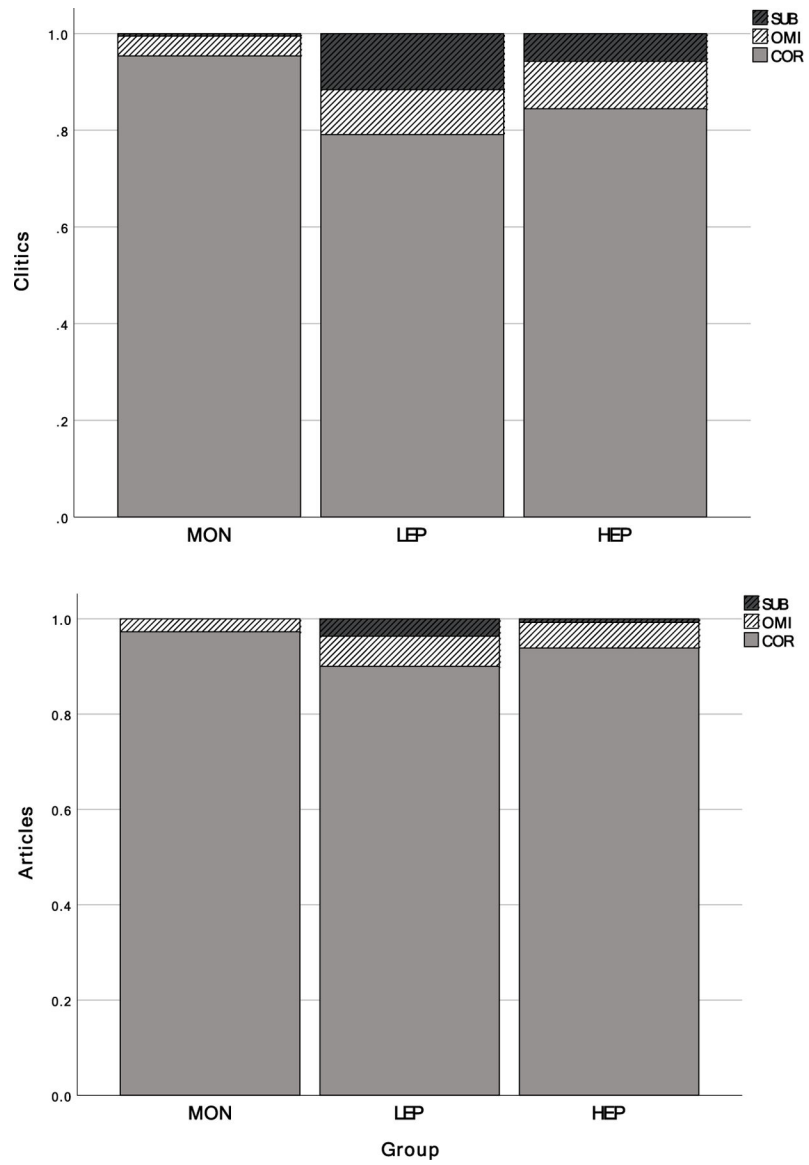
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**Figure 1.**  
Percentage of correct, substitution and omission responses

Table 1.

## Stimuli

Question	Target response
<i>¿Qué hace el perro con los regalos?</i> (inan) (‘What does the dog do with the gifts?’)	Masculine plural pronoun
<i>¿Qué hace el niño con las tortugas?</i> (anim) (‘What does the girl do with the turtles?’)	Femenine plural pronoun
<i>¿Qué hace Luis con la espada?</i> (inan) (‘What does Luis do with the sword?’)	Femenine singular pronoun
<i>¿Qué hace el ratón con el queso?</i> (inan) (‘What does the mouse do with the cheese?’)	Masculine singular pronoun
<i>¿Qué hacen los hermanos con las sábanas?</i> (inan) (‘What do the brothers do with the sheets?’)	Femenine plural pronoun
<i>¿Qué hizo el niño con la leche?</i> (inan) (‘What did the boy do with the milk?’)	Femenine singular pronoun
<i>¿Qué hizo el gato con los peces?</i> (anim) (‘What does the cat do with the fish?’)	Masculine plural pronoun
<i>¿Qué hace la chica con las fresas?</i> (inan) (‘What does the girl do with the strawberries?’)	Femenine plural pronoun
Article	
Question	Target response
<i>¿Qué animales tienen las orejas largas? Los conejos.</i> (‘What animals have long ears? The Rabbits’) (transp)	Masculine plural article
<i>¿Quiénes son las mamás de los pollitos? Las gallinas</i> (‘Who is the chickens’ mom? The hens’) (transp)	Femenine plural article
<i>¿Qué le dieron al perro para jugar? Un hueso’</i> (‘What do they give the dog to play with? A bone’) (transp)	Masculine singular article
<i>¿Qué animales siempre comen de las flores? Las mariposas</i> (‘What animal always eats from the flowers? The butterflies’) (transp)	Femenine plural article
<i>¿A quién les lee la gallina? Los ratones</i> (‘To whom is the hen reading to? The mice’) (opaque)	Masculine plural article
<i>¿Quiénes están bailando? Las señoras</i> (‘Who is dancing?’) (transp)	Femenine plural article
<i>¿Qué le quito la niña a la muñeca? Los zapatos</i> (‘What did the girl take off from the doll? The shoes’) (transp)	Masculine plural article
<i>¿Quién enseña la clase? Las maestras’</i> (‘Who teaches the class? The teachers’) (transp)	Femenine plural article

Note: transp= transparent; inan=inanimate; anim=animate.

**Table 2.**

## Coding categories and examples for the elicitation task

Coding Category	Example
Direct Object Pronoun	
Question	<i>¿Qué hace el ratón con el queso?</i> (‘What does the mouse do with the cheese’)
Target	<i>Se lo come</i> (‘he/she eats it-masc’) <i>Jalarlo</i> (‘he/she pulls it-masc’)
Omission	<i>Poniendo en su casa</i> (‘Placing O in his house’) <i>Esta empujando</i> (‘she/he is pushing’)
Gender error	<i>Se la está comiendo</i> (‘he/she is washing it-fem’) Number error
Number error	<i>Los jala</i> (‘he/she is pulling them-masc’)
Noun Phrase	<i>Se come el queso</i> (‘he/she eats the cheese’)
Unscorable	<i>Porque tiene hambre</i> (‘because he/she is hungry’) <i>No se</i> (‘I don’t know’) <i>Unintelligible</i>
Articles	
Question	<i>¿A quién les lee la gallina?</i> (‘to whom the chicken reads to?’)
Target	<i>A los pollitos</i> (‘the-masc chickens’) <i>A el pollito</i> (‘the-masc chicken’)
Omission	<i>pollitos</i> (‘chickens’), <i>chicken</i> (‘chicken’)
Gender error	<i>Las pollitos</i> (‘them-fem chickens’)
Number error	<i>El pollito</i> (‘the-masc-sg chickens’)
Unscorable	<i>No sé</i> (‘I don’t know’), <i>a los baby hens</i> (‘to the baby hens’), <i>Esos</i> (‘those’), No response, Unintelligible.

Note: masc- masculine

**Table 3.**

## Descriptive information

	<b>MON</b>	<b>LEP</b>	<b>HEP</b>
Age in Months	Mean =72; <i>SD</i> 7	Mean = 74; <i>SD</i> 8	Mean =84; <i>SD</i> 10
CELF-4	Mean =108; <i>SD</i> 14	Mean = 98; <i>SD</i> 9	Mean= 96; <i>SD</i> 11
SPELT-3	N/A	Score between 0 and 25	Scores between 15 and 42
SELPS	N/A	Score between 1 and 3.5	Scores between 3.6 and 6

Notes: CELF-4 =Clinical Evaluation of Language Fundamentals 4<sup>th</sup> Edition. SPELT-3= Structure Photographic Expressive Language Test, 3<sup>rd</sup> edition. SELPS= Spanish English Language Proficiency Scale. MON= Monolingual group. LEP= Limited English Proficiency group. HEP=High English Proficiency group.

**Table 4.**

## Article responses in percentages

		<b>Mean</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Target	MON	97	8	63	100
	LEP	90	19	25	100
	HEP	94	16	14	100
Omission	MON	3	8	0	38
	LEP	6	11	0	50
	HEP	5	4	0	71
Gender error	MON	0	0	0	0
	LEP	2	11	0	67
	HEP	1	3	0	14
Number errors	MON	0	0	0	0
	LEP	1	8	0	50
	HEP	0	0	0	0

Notes: The unscorable category included NR, unintelligible, English responses and other non-related responses. MON= Monolingual group. LEP= Limited English Proficiency group. HEP=High English Proficiency group.

**Table 5.**

Clitic responses in percentages

		Mean	SD	Min	Max
Target	MON	98	6	80	100
	LEP	81	20	33	100
	HEP	88	20	29	100
Omission	MON	2	5	0	20
	LEP	7	12	0	50
	HEP	6	15	0	57
Gender error	MON	0	0	0	0
	LEP	4	10	0	40
	HEP	2	8	0	43
Number errors	MON	1	3	0	17
	LEP	5	9	0	33
	HEP	3	7	0	33
Gend & Num	MON	0	0	0	0
	LEP	3	8	0	33
	HEP	2	5	0	17

Notes: MON= Monolingual group. LEP= Limited English Proficiency group. HEP=High English Proficiency group.



**Table 6.**

Multilevel model parameter estimates for item performance predicted by group, and item type

Effect	Estimate	SE	Den DF	t	p
Intercept	2.60	0.5813	12	4.48	0.0008
Age	0.02	0.02	1285	1.00	0.3155
CELF-4	0.04	0.02	1285	2.33	0.0199
LEP	-1.78	0.4885	1285	-3.65	0.0003
HEP	-1.31	0.5593	1285	-2.34	0.0194
Clitics	-0.84	0.35	1285	2.41	0.0162
Item order	0.24	0.08	1285	3.24	0.0012

Notes: MON= Monolingual group. LEP= Limited English Proficiency group. HEP=High English Proficiency group. CELF-4 =Clinical Evaluation of Language Fundamentals 4<sup>th</sup> Edition

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**Table 7.**

Least Squares Means for groups and grammatical structures in log-odds

	Mean	Std Dev
Mon	4.1794	0.4551
LEP	2.3959	0.2994
HEP	2.8706	0.3435
Articles	3.5686	0.3043
Clitics	2.7288	0.2878

Notes: MON= Monolingual group. LEP= Limited English Proficiency group. HEP=High English Proficiency group

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**Table 8.**

Frequency of target responses and error types in monolinguals and bilinguals

Articles	Targets	Omissions	Noun Phrase	Gender Sub.	Number Sub.	Both Gender and Number Sub.
Monolinguals	237	7	N/A	0	0	0
Bilinguals	471	26	N/A	7	0	0
Clitics						
Monolinguals	198	3	10	0	1	0
Bilinguals	384	29	15	13	16	11

Notes: N/A = not applicable; Sub=Substitution

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