

Research Article

Production of Spanish Grammatical Forms in U.S. Bilingual Children

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Purpose: The purpose of this analysis was to understand how grammatical morpheme production in Spanish for typically developing Spanish–English bilingual children relates to mean length of utterance in words (MLUw) and the extent to which different bilingual profiles influence order of grammatical morpheme acquisition.

Method: Participants included 228 Spanish–English bilingual children ages 4;0–7;6 (years;months). Grammatical morpheme accuracy was evaluated using an experimental version of the Bilingual English–Spanish Assessment (Peña, Gutiérrez-Ciellen, Iglesias, Goldstein, & Bedore, 2014). MLUw data were calculated from children’s narrative samples. Production accuracy of plural nouns, singular and plural definite articles, preterite tense,

imperfect aspect, direct object clitics, prepositions, subjunctive, and conjunctions was calculated and analyzed as a function of MLUw in Spanish. Level of accuracy on these forms was compared for Spanish-dominant and English-dominant groups.

Results: Accuracy was significantly associated with MLUw. The relative difficulty of Spanish grammatical morphemes is highly similar across different bilingual profiles.

Conclusions: There are common elements of Spanish that are easy (imperfect, plural nouns, singular articles, conjunctions), medium (plural articles, preterite), or hard (prepositions, direct object clitics, subjunctive), regardless of whether a child is a Spanish-dominant or English-dominant bilingual.

Latinos comprise approximately 17.6% of the total population in the United States. Of these, almost 75% speak Spanish in the home (U.S. Census Bureau, 2016). Given the large Spanish-speaking population in the United States, it is important to document and explain developmental patterns of Spanish morpheme acquisition. Bilingual children exhibit more variability in linguistic development than monolingual children (Bedore & Peña, 2008; Paradis, 2007). Their language experience is divided across their two languages, and the dominance or use of each language within their environments may change over time (Jia, 1998). Thus, relevant data on developmental language milestones for bilinguals are limited (Genesse, Paradis, & Crago, 2004). Developmental expectations about grammar acquisition in English are typically indexed by mean length of utterance (MLU) or by

age (Brown, 1973; de Villiers & de Villiers, 1973). There is a strong positive relationship between age and utterance length when children are very young, with weaker associations as children’s language skills grow (e.g., Klee & Fitzgerald, 1985; J. F. Miller & Chapman, 1981; Rondal, Ghiotto, Bredart, & Bachelet, 1987). This close association with age and MLU is fairly robust for monolinguals, but this may not be the case for bilinguals. Because MLU indexes language productivity, it may be a more informative metric compared with age to benchmark the acquisition of diverse morphemes in bilinguals.

Morphosyntactic Development in Monolingual Spanish

The acquisition of morphemes is language specific in reference to morphosyntactic rules, rate, and order. In Spanish, for example, the earliest acquired grammatical morphemes appear to include articles, plurals, and past tense (Hernández Pina, 1984; Kernan & Blount, 1966; Merino, 1982; Pérez-Pereira, 1989), whereas in English, present progressive and prepositions are some of the earliest (Brown, 1973).

With respect to the acquisition of grammatical forms in monolingual or predominantly Spanish-speaking children,

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early studies have focused on age of acquisition according to a preestablished criterion. More recent studies focus on the accuracy of morpheme use in specific tasks or contexts. Other researchers have documented typical development patterns as part of studies of language impairment (LI; e.g., Anderson & Souto, 2005; Morgan, Restrepo, & Auza, 2013). Table 1 summarizes grammatical morpheme production in monolingual Spanish-speaking children and bilingual Spanish–English–speaking children to show trends in age of acquisition on the basis of peer-reviewed studies between 2002 and 2017. Most of these studies were conducted in Spanish-speaking countries with monolingual speakers, whereas some include children from the United

States who were exposed to English and Spanish to varying degrees. The results are grouped by grammatical morpheme and age or MLU in words (MLUw) of acquisition. Although Kvaal, Shipstead-Cox, Nevitt, Hodson, and Lauener (1988) precedes our set date range, we include it in the table because this is one of the few studies that investigated grammatical morphemes by MLU rather than by age, and this was a primary focus of the current study.

The earliest emerging and acquired morphemes in monolingual Spanish appear to be plurals, articles, and past tense. Findings show acquisition of plural /s/ by age 4 to 6 years, with the /es/ form emerging during this time. Studies of monolingual children, across multiple dialects,

Table 1. Studies of grammatical morphemes.

Form	Age (years;months)	MLUw/m	Investigator	Status	Location	Elicitation task
Plural	4;0–5;6	2.75–4.51	Bedore & Leonard (2005)	M	USA	Elicitation real words
	4;5–5;11		K. Miller & Schmitt (2010)	M	Chile and Mexico	Language sample
	4;9–5;3	3.2	Castilla (2008)	M	Colombia	Elicitation real words
Singular article	4;0–5;6	2.75–4.51	Bedore & Leonard (2005)	M	USA	Elicitation real words
	4;3–5;4		Anderson & Souto (2005)	M	Puerto Rico	Elicitation real words and language sample
	4;2–4;10	2.6	Simón-Cerejido & Gutiérrez-Clellen (2007)	B	USA	Language sample
	5;0–6;00		Castilla-Earls et al. (2016)	SDB	USA	Elicitation real words
	5;0–9;3		Jackson-Maldonado & Maldonado (2017)	M	Mexico	Language sample
	5;5–6;5		Morgan et al. (2013)	M	Mexico	Elicitation real words
	5;8–6;9		Gutiérrez-Clellen et al. (2006)	M	USA	Elicitation real words
	5;8–6;10		Gutiérrez-Clellen et al. (2006)	SDB	USA	Elicitation real words
	7;0		Jacobson (2012)	B	USA	Elicitation real words
			Kvaal et al. (1988)	M	USA	Language sample
Preterite	3;0		Vazquez & Alonso (2007)	M	Spain	Language sample and narrative sample
Imperfect		2.8–4.6	Kvaal et al. (1988)	M	USA	Language sample
	3;6		Vazquez & Alonso (2007)	M	Spain	Language sample and narrative sample
Preposition	4;4–5;9	4.01–6.09	Auza & Morgan (2013)	M	Mexico	Narrative sample
	5;0–9;3		Jackson-Maldonado & Maldonado (2017)	M	Mexico	Language sample
<i>en</i> ^a		4.2–4.5	Kvaal et al. (1988)	M	USA	Language sample
Direct object clitic	2;8	2.75–4.51	Wexler et al. (2004)	M	Spain	Elicitation real words
	4;0–5;6		Bedore & Leonard (2005)	M	USA	Elicitation real words
	4;2–4;10		Simón-Cerejido & Gutiérrez-Clellen (2007)	B	USA	Language sample
	4;1–5;0		Jacobson & Schwartz (2002)	SDB	USA	Picture description
	5;0		Castilla & colleagues (Castilla, 2008; Castilla & Pérez-Leroux, 2010; Castilla-Earls & Eriks-Brophy, 2012)	M	Colombia	Elicitation real words
	5;0–5;8		Varlokosta et al. (2016)	M	Not specified	Picture description
Subjunctive	5;0–9;3		Jackson-Maldonado & Maldonado (2017)	M	Mexico	Language sample
	4;0		Vazquez & Alonso (2007)	M	Spain	Language sample and narrative sample
	5;0		Castilla-Earls et al. (2018)	B	USA	Elicitation real words

Note. MLUw/m = mean length of utterance in words or morphemes; M = monolingual; B = bilingual; SDB = Spanish-dominant bilingual.

^aOnly the preposition *en* was investigated by the researchers in this study.

report converging evidence that plural /s/ (i.e., *manos* [hands]) is produced accurately between ages 4;0 and 5;11 (years; months; see Table 1) in children in the 2.75–4.51 MLUw range (Bedore & Leonard, 2005).

In Spanish, articles mark gender and number. Monolingual children begin to mark gender around 1;8–2;2 (Hernández Pina, 1984; Montes Giraldo, 1974) and articles are produced accurately around age 4 years and MLUw 2.75 in monolingual children (Bedore & Leonard, 2005), whereas other studies of monolinguals reported article acquisition between age 5 and 7 years (see Table 1).

Spanish past tense is commonly expressed using preterite and imperfect. Preterite marks completed action as a simple whole (e.g., Ayer, ella *camino* [Yesterday, she walked-preterite] a la casa de su amiga), whereas imperfect is used to mark continuous, ongoing, or habitual actions with no inherent end point (e.g., Cada día ella *caminaba* [Everyday she walked-imperfect] a la casa de su amiga). Monolinguals begin to produce all verb markings in third person singular, and preterite emerges before age 2;6 and imperfect at around 2;5 (González, 1978). Regular past tense forms are acquired before irregular forms (i.e., *camino* [he/she walked] and *estuvo* [he/she was], respectively; Merino, 1982). By 3 and 4 years of age, they have achieved a high level of accuracy, and there is a significant increase in use of tense marking forms that have been previously acquired (Vazquez & Alonso, 2007).

Clitics are bound morphemes that need to combine with another element, such as a verb (*agarrar* [to pick up]), in order for them to be used in meaningful linguistic expressions. Third person direct object clitics (i.e., *lo*, *la*, *los*, *las*) agree with the noun they replace (*el lápiz* [pencil]), which means they must mark both number and gender (*El lo agarra* [He picks it up]). These clitics emerge between 2;0 and 2;7 (e.g., Anderson, 1998; Domínguez, 2003; Ezeizabarrena, 1997), and by age 2;8, children produce object clitics with at least 80% accuracy (Wexler, Gavarró, & Torrens, 2004). Several researchers provide converging data that clitics are acquired by 3 or 4 years of age, whereas others note acquisition by age 5 years and 3.76 MLUw (see Table 1).

Prepositions are words that typically express a spatial or temporal relationship. Although extensive research has not been conducted on prepositions, they are produced with over 80% accuracy in monolinguals age 4;0–5;9 in standardized tests, structured elicitation tasks, and narrative samples (Auza & Morgan, 2013; Jackson-Maldonado & Maldonado, 2017). The preposition *en* [in, on] is acquired by an MLUm (by morpheme) of 4.2–4.5 (Kvaal et al., 1988).

The subjunctive mood is used to discuss desires, wishes, conjectures, and possibilities in Spanish (e.g., *Espero que ella se sienta mejor* [I hope that she feels-subjunctive better]). The subjunctive mood emerges in children between 2;1 and 4;6 (e.g., González, 1983; López Ornat, Fernández, Gallo, & Mariscal, 1994; Naharro, 1996). Despite the early emergence of the subjunctive form, correct use of the subjunctive varies by type of clause

(Pérez-Leroux, 1998). A temporal adjunct clause situates an event in relation to another, such as *Carlos llegó antes de que saliéramos* [Carlos arrived before we left]. A volitional clause is when a person needs or wants another person to do something, such as *El papá quiere que ella apague la luz* [The dad wants her to turn off the light]. In regard to temporal adjunct clauses, monolingual preschool-age children (3;0–5;0) lag in their ability to use mood contrasts, despite their understanding of basic temporal connectors, and their more consistent use of subjunctive with volitional clauses (Sánchez-Naranjo & Pérez-Leroux, 2010). The subjunctive mood is acquired between 4 and 7 years of age (see Table 1).

Morphosyntactic Development in Bilingual Spanish

Researchers have also considered grammatical acquisition in bilingual environments. Comparisons to monolinguals suggest that some early emerging forms in monolingual acquisition are also observed in early bilingual acquisition. However, other forms seem to be delayed relative to monolingual development perhaps because these forms exist in Spanish but not in English.

Similar to monolingual acquisition, plurals, articles, and past tense emerge and are acquired early on. Plurals and articles appear to be one of the earliest grammatical morphemes acquired, and bilingual Spanish speakers demonstrate mastery of articles by an MLUm of 2.6 (Kvaal et al., 1988) or by age 5 years (Castilla-Earls, Pérez-Leroux, Restrepo, Gaile, & Chen, 2018; Gutiérrez-Clellen, Restrepo, & Simón-Cerejido, 2006; Simón-Cerejido & Gutiérrez-Clellen, 2007). The acquisition of regular past tense forms (MLUm of 2.8–4.2) precedes the development of irregular forms (MLUm of 4.6; Kvaal et al., 1988).

Direct object clitics emerge between ages 2;2 and 2;7 (Ezeizabarrena, 1997) and were acquired by age 4;1–5 for bilingual children (Jacobson & Schwartz, 2002; Simón-Cerejido & Gutiérrez-Clellen, 2007). In contrast, for direct object clitics, Jacobson (2012) reported acquisition by age 7 years for heritage Spanish speakers, whereas Morgan et al. (2013) did not report mastery for their oldest participants at age 6 years.

Silva-Corvalán (2014) observed the language development of two simultaneous Spanish–English bilingual boys. In these children, the Spanish subjunctive emerged at 2;05. These bilingual children used the subjunctive much like monolinguals at earlier ages. With reduced Spanish exposure after 3;06, there seemed to be inhibition for further development, leading to reduced use of the subjunctive forms in these two children (Silva-Corvalán, 2014). In a majority of group studies, bilingual children acquired the subjunctive mood by age 5 years (Castilla-Earls et al., 2018); however, Morgan et al. (2013) noted that, even at 6;4, bilinguals had not yet acquired the subjunctive. Some heritage speakers do not produce subjunctive at all and use indicative in optional contexts (Montrul, 2009) because a mood contrast only exists in Spanish. Lastly,

prepositions and conjunctions have been less systematically documented than other grammatical morphemes but continue to be important in the Spanish language and warrant further study.

Bilingual Language Acquisition

For English, MLU has been established as a useful measure and is reliably associated with language complexity (Brown, 1973; de Villiers & de Villiers, 1973; Rice, Redmond, & Hoffman, 2006). For example, de Villiers and de Villiers (1973) showed that MLU accounts for more variance than chronological age for grammatical morpheme production. In this study, age did not improve the correlation results of MLU for grammatical development, especially in the early stages of language development. Age does not appear to be a good indicator of level of language development because children vary in their rate of development (Gleason, 1993; Hoff, 2005; Vivas, 1979), and MLU is a better predictor of syntactic development than age (Bates & Goodman, 1997; J. F. Miller & Chapman, 1981). Through longitudinal research, MLU has been shown to be a more reliable and valid measure of language development (Rice et al., 2006). In the case of bilingual development, variability across input, age of exposure, and rate of acquisition are well documented, which may make chronological age an even less reliable predictor.

The present analysis evaluates how MLU relates to mastery of grammatical morphemes in bilingual children. Because MLU is commonly used to index language development for English speakers, we posit that it may also be useful for the examination of Spanish speakers. We use MLU_w because it is unaffected by cross-linguistic variation in inflectional morphology and has become widely accepted for languages other than English (Gutiérrez-Clellen, Restrepo, Bedore, Peña, & Anderson, 2000). Gutiérrez-Clellen et al. (2000) analyzed Spanish data from preschool children using four different methods of MLU_m and found significant inconsistencies across methodologies due to differing criteria regarding which morphemes should be counted. There is general agreement that MLU_w is more reliable than MLU_m as there is a lack of an adequate developmental frame of reference in morpheme-rich languages (Jackson-Maldonado & Conboy, 2007). In Spanish, significant correlations have been found between MLU_w and language ability as measured by the Bilingual English–Spanish Assessment (BESA; Bedore, Peña, Gillam, & Ho, 2010; Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2014). However, the relationship between MLU_w and grammatical morpheme production in Spanish is not well documented. In bilinguals, complexity of grammatical forms may not have a linear relationship to sentence length in Spanish due to the interaction with the English language and divided language input.

Most studies comparing morphosyntactic acquisition in bilingual and monolingual children show that bilinguals lag behind their monolingual age peers (Paradis, 2010).

The amount of exposure a bilingual has had in each of the languages and the relative complexity of the grammatical structure being examined play a role in increasing or decreasing monolingual–bilingual differences. V. M. Gathercole (2002a, 2002b, 2002c) and Pearson (2002) studied English and Spanish morphosyntactic acquisition of bilingual children in the second grade in either English-only or Spanish–English bilingual schools. They described the impact of different amounts of Spanish and English exposure by looking at the language(s) spoken at home and the school's language of instruction. V. M. Gathercole (2002a, 2002b, 2002c) found that Spanish language use in the home affected outcomes. The school's language of instruction also positively affected bilinguals' performance when the language of testing matched the instructional language. Pearson (2002) investigated children's morphosyntactic accuracy in a narrative task in each language. Bilinguals performed worse than monolinguals overall, but if a bilingual had received more linguistic exposure to the language being examined, differences with monolinguals decreased. Other research with Spanish–English bilinguals, aged 4 to 6 years, has demonstrated that, when bilingual children's morphosyntax is examined in their more proficient language, group differences with monolinguals can largely disappear (Gutiérrez-Clellen et al., 2006; Gutiérrez-Clellen & Simón-Cerejido, 2007). These findings contrast with the V. M. Gathercole (2002a, 2002b, 2002c) and Pearson (2002) findings in that bilingual children came closer to monolingual levels of performance in English when they received more input exposure to English, but monolingual–bilingual differences still persisted.

Bilinguals learn grammatical forms common to both languages more quickly than those unique to one language (Bedore & Peña, 2008; Gutiérrez-Clellen et al., 2000). Thus, grammatical morphemes that typically develop later in monolinguals could appear earlier or later in bilinguals (Bedore & Leonard, 2005; Bedore & Peña, 2008). Comparatively, Bland-Stewart and Fitzgerald (2001) found that bilingual children only acquired some of the grammatical structures that would be expected relative to MLU. The sequence of English grammatical morpheme development differs (Davison & Hammer, 2012). Some error patterns are different and more frequent in bilinguals than monolinguals (Anderson & Souto, 2005; Bedore et al., 2010). These differences may be due to cross-linguistic influences on the order of language acquisition for bilinguals. The frequency and saliency of morphosyntax in the two languages may cause variations in bilingual developmental milestones that are not seen in monolinguals (Gutiérrez-Clellen et al., 2000; Peña & Kester, 2004). Due to these differences, it is not appropriate to compare bilingual children to monolingual norms (Gutiérrez-Clellen et al., 2000; Peña & Kester, 2004), and MLU_w appears to be a potentially more useful metric than traditional measures of MLU. Because differences between monolingual English speakers and bilinguals have been documented, differences between monolingual Spanish speakers and bilinguals are expected.

Language Dominance

Language dominance describes the relative proficiency (V. C. M. Gathercole & Thomas, 2009) or the language to which a child has had the most exposure (Grosjean, 2010). Bilingual language learning is influenced by age of first exposure, opportunities, and context in which to learn and use each language, social value, education of each language, and more (Bedore et al., 2012). To establish bilingual status or dominance, it is common to document the history of dual language exposure and age of first exposure. Another method of classifying children's dominance is based on current patterns of exposure to each language, which is typically obtained through language questionnaires. Parents and teachers are most accurate in providing information regarding the language in which they interact with the child (Bedore, Peña, Joyner, & Macken, 2011; Gutiérrez-Clellen & Kreiter, 2003). Children's language can be explained on the basis of their current percentage of input and output of each language through the use of these questionnaires (Bunta, Fabiano-Smith, Goldstein, & Ingram, 2009; Sheng, McGregor, & Marian, 2006). Bedore et al. (2012) found that profiles of dominance on the basis of current language use (input and output percentages) were more consistent than direct measures of performance on a standardized test.

The BESA (Peña et al., 2014), a standardized test including morphosyntax, semantics, and phonology subtests, was specifically developed to determine whether speech and/or language errors observed in young children were due to limited exposure to English or to an LI. The BESA includes two questionnaires for parents and teachers to document a child's exposure to, and use of, both languages at home and in school.

In summary, previous research on language development in monolinguals and Spanish–English bilinguals provides evidence that grammatical morpheme use along with MLUw can provide valuable information on language development (Bedore et al., 2010; Gutiérrez-Clellen & Simón-Cerejido, 2009). Although indicators of LI in monolingual Spanish speakers are well documented, a typical range of Spanish language development for bilingual Spanish–English speakers is not yet established. Knowledge of typical development informs our understanding of impairment and informs selection of language learning targets (Bedore & Peña, 2008). Although it has been shown that MLU increases as language becomes more complex (J. F. Miller, 1981), available research does not provide sufficient information about the relation of MLUw in Spanish and morphosyntax development in Spanish–English bilinguals. This study evaluates the relationship between Spanish grammatical morpheme production and MLUw in Spanish–English bilinguals aged 4;0 to 7;6. Here, the focus is on plural */s/*, definite articles (*el/la/los/las* [the]), past tense, direct object clitics (*lo/la/los/las* [it]), conjunctions (and/or), prepositions (in, on, next to, on top of), and subjunctive mood. We address the following questions:

1. Does accuracy of Spanish grammatical morphemes increase as MLUw in Spanish increases in Spanish and English dominance groups?
2. Are there differences in the difficulty level of each morpheme by dominance group?

The first question will be addressed by analyzing grammatical morphemes as a function of MLUw. We hypothesize that Spanish grammatical morpheme use will increase with an increase in language complexity as measured by MLUw. The second question addresses the difficulty level of the morphemes for each bilingual dominance group. We hypothesize that the children with more exposure to Spanish will demonstrate higher levels of accuracy across morphemes compared with those with more exposure to English. Additionally, we predict that relative difficulty levels of the grammatical morphemes will be similar across groups.

Method

Participants

Our focus is on the acquisition of Spanish grammatical morphemes in 228 typically developing bilingual Latino children between the ages of 4;0 and 7;6. Data were selected from two existing data sets that have been reported on previously (Bedore et al., 2010, 2012; Bohman, Bedore, Peña, Mendez-Perez, & Gillam, 2010; Gillam, Peña, Bedore, Bohman, & Mendez-Perez, 2013; Gutiérrez-Clellen et al., 2006; Gutiérrez-Clellen & Simón-Cerejido, 2007; Peña, Bedore, & Kester, 2015; Peña, Bedore, & Zlatic-Giunta, 2002; Peña, Gillam, Bedore, & Bohman, 2011). Participants were recruited from schools that enroll high numbers of bilingual Latino students (Bedore et al., 2012; Gutiérrez-Clellen et al., 2006; Gutiérrez-Clellen & Simón-Cerejido, 2007; Peña et al., 2011). The first study was the “Development of a Test for Hispanic Children in the US” (Iglesias, Peña, & Gutiérrez-Clellen, 1997), and 800 participants were recruited. Participants were selected for the current analysis if they (a) spoke English and Spanish, (b) were between ages 4;0 and 7;6, (c) had completed the BESA, (d) were typically developing, (e) had language samples in Spanish and English, and (f) had language input and output data. From this data set, 126 children met inclusion criteria and participants included those from school districts in Texas and Pennsylvania (Gutiérrez-Clellen et al., 2006; Peña et al., 2002). Children were determined to be typically developing if the total amount of grammatical utterances in a narrative sample was 80% or greater in at least one of their languages, and there was no parent, teacher, or clinician concern regarding language development (Gutiérrez-Clellen et al., 2006; Gutiérrez-Clellen & Simón-Cerejido, 2007).

The second study was “Diagnostic Markers of Language Impairment” (Peña, Bedore, & Gillam, 2006), which followed 168 Spanish–English bilinguals with and without LI for 2 years. Participants were included if they (a) spoke English and Spanish, (b) were between ages 4;0 and 7;6,

(c) had completed the BESA, (d) were typically developing, (e) had language samples in Spanish and English, and (f) had language input and output data. There were 81 children from two time points and 21 children with one time point (yielding a total of 183 protocols) who met inclusion criteria. The participants were from school districts in central Texas and Utah. Children were determined to be typically developing if two out of three expert raters assigned a rating of 3 or above on a 6-point scale on morphosyntax and semantics (BESA and Test of Language Development–Third Edition; Newcomer & Hammill, 1997) and narrative tasks (Frog tell and retell stories in English and Spanish and Test of Narrative Language–English; Gillam et al., 2013). Thus, between the two data sets, there were a total of 309 protocols.

Children were considered bilingual if their input and output levels reached at least 20% in both Spanish and English (Gutiérrez-Clellen et al., 2006) on the Bilingual Input Output Survey (Peña et al., 2014) and if they generated stories in both languages with limited code switching and grammatical errors (Peña et al., 2002). Language dominance was determined by parent and teacher questionnaires of language use. Twenty to 50% English use was considered Spanish dominant, and 51%–80% English use was English dominant. There are 164 Spanish-dominant (mean = 30.53% English input and output) and 64 English-dominant (mean = 67.43% English input and output) protocols in the study. Information on the mother’s education and free or reduced lunch status was collected from the parent interviews and was the primary indicator of socioeconomic status (Table 2 summarizes the demographic information for the participants in this study).

Measures

Parent and Teacher Interviews

Parent and teacher interviews were conducted individually on the phone or in person in the preferred language of the parent and/or teacher using the Bilingual Input Output Survey. Parents provided information on children’s history of language exposure year by year from

birth to their current age in order to calculate age of first exposure to English. The parents were asked to report information on how much English and Spanish children hear and use on an hourly, day-to-day basis. For example, a parent was asked, “What does your child do at 4 pm on a typical weekday? What language is he/she speaking? Who is he/she with? What language is the other person speaking in?” A typical weekday and a typical weekend day were sampled and projected to a 7-day week to estimate current language input and output at home. Teachers reported information about the children’s input and output of English and Spanish during the school day (Peña et al., 2014). This information was projected to a typical 5-day week of school. The input and output data across home and school were combined to calculate total weekly language input and output.

Language Samples

Language samples were collected through story tell and retell tasks with wordless picture books: *Frog Goes to Dinner* (Mayer, 1974) and *Frog on His Own* (Mayer, 1973; Bedore et al., 2010; Gutiérrez-Clellen et al., 2006). Language samples were only used to generate MLUw for the current analyses.

Grammatical Measure

Data were collected on grammatical morpheme use in Spanish on the BESA on 52 scored items. Morphemes with two or more exemplars were considered in the analysis. Plural nouns had two targets; plural articles and preterite had three targets each; singular articles had four targets; imperfect, subjunctive, and direct object clitics had five targets each; and prepositions and conjunctions had six targets each. Noun-related items were considered correct when both number and gender agreement were accurate. Morphemes were elicited through 15 cloze items (articles, subjunctive, direct object clitics) and 10 sentence repetitions (past tense, noun agreement, conjunctions, prepositions; Peña et al., 2014). Total percent accuracy was calculated for all the targets together and for each morpheme type.

Table 2. Participant demographics.

Characteristic	Description
Number	228
Age (years;months)	4;0–7;6
Sex	117 female, 111 male
Ethnicity	Latino
Disability status	Typically developing
SES (school lunch eligibility)	164 free/reduced, 63 regular, 1 unspecified
Educational levels	Prekindergarten through first grade
Geographical distribution	Austin, TX; Philadelphia, PA; Ogden, UT
Language use	164 Spanish dominant (20%–50% English use), 64 English dominant (51%–80% English use)

Note. SES = socioeconomic status.

Procedure

Certified bilingual speech-language pathologists (SLPs) or trained bilingual graduate students under the supervision of a certified bilingual SLP administered, scored, and coded all tests and language samples. Data collection took place during regular school hours. Participants completed the BESA and language samples individually in both Spanish and English (Peña et al., 2014). To ensure reliability, a second scorer checked the responses and item scores. An independent third scorer resolved discrepancies (Bedore et al., 2012; Bohman et al., 2010; Peña et al., 2011).

Language samples were based on the procedures described by J. Miller and Iglesias (2008). Language samples were recorded, transcribed, and coded using Systematic Analysis of Language Transcripts (J. Miller & Iglesias, 2008). Interscorer reliability was above 90% and was completed to ensure accurate calculation of MLUw (Bedore et al., 2010).

Analysis

For the first question, the association between percentage of grammatical accuracy and MLUw and age was explored using a correlation approach and further analyzed using a linear mixed-effects model. For the second question, a linear mixed-effects model was also used to compare the grammatical accuracy of Spanish-dominant and English-dominant children.

Results

Grammatical Morphemes and Age Versus MLUw

nlme (Pinheiro, Bates, DebRoy, Sarkar, & R Core Team, 2017) in R Studio was used to perform a linear mixed-effects analysis of the relationship between Spanish grammatical morpheme accuracy and MLUw and age. Some participants were tested at two time points, whereas others were only tested once; thus, to control for the non-independence of the participants, a linear mixed-effects analysis with participants as a random effect was chosen. As fixed effects, age and MLUw were entered into the model. As random effects, intercept for subjects was entered. MLUw was a significant predictor, $t(80) = 3.15, p = .002$, whereas age was not a significant predictor, $t(80) = 0.30, p = .764$. We then examined the correlation between MLUw and the accuracy of each Spanish grammatical morpheme (see Table 3). MLUw was positively correlated with each of the nine grammatical morphemes, $p < .05$. Generally, as children used longer sentences in their language sample, they also showed increased grammatical accuracy.

To further describe the level of grammatical morpheme mastery, we divided participants by MLUw bands (de Villiers & de Villiers, 1973; J. F. Miller, 1981). This allows a more detailed look at average grammatical morpheme use at each performance level. MLUw for our

Table 3. Correlations of grammatical morphemes and mean length of utterance in words (MLUw).

Grammatical morpheme	Correlation with MLUw	<i>p</i> value
Plural noun	.127	.026
Imperfect	.154	.007
Singular article	.127	.025
Conjunction	.178	.002
Plural article	.201	< .001
Preterite	.152	.008
Preposition	.113	.019
Direct object clitic	.156	.006
Subjunctive	.132	.020

participants ranged from 3.0 to 12.0, and they were grouped into seven bands. From MLUw 3.0 to 8.99, the children were divided into 1.0 MLUw ranges so that each band would include at least four participants. MLUw from 9.0 to 12.0 was collapsed to represent the small number of participants in the highest MLUw levels. Table 4 shows the MLUw ranges and the number of participants in each band. Table 5 illustrates the general observed trend of greater number of forms mastered as MLUw increased for Spanish-dominant and English-dominant participants. The overall accuracy of all grammatical morphemes exhibited a positive trend as MLUw increased for Spanish-dominant and English-dominant participants. Accuracy of singular articles, plural articles, conjunctions, and plural nouns increased steadily in relationship to increasing MLUw, whereas the accuracy of direct object clitics, preterite, and subjunctive showed a drop between 6.00–6.99 and 7.00–7.99 MLUw bands. There were 78 children in the 6.00–6.99 MLUw band but only 14 children in the 7.00–7.99 MLUw band. Thus, the 6.00–6.99 MLUw band was more stable and less affected by the few children with lower scores. The 7.00–7.99 MLUw band with many fewer children was more vulnerable to individual differences. For Spanish-dominant speakers, all grammatical morphemes, except for subjunctive, prepositions, and direct object clitics, reached mastery, whereas English-dominant speakers only mastered plural nouns.

Grammatical Morpheme Accuracy in Spanish-Dominant and English-Dominant Bilinguals

Our second question examined the grammatical morpheme accuracy in bilingual children comparing those who

Table 4. Number of protocols in each mean length of utterance in words (MLUw) range.

MLUw	<i>n</i> , Spanish dominant	<i>n</i> , English dominant
3.00–3.99	10	7
4.00–4.99	67	19
5.00–5.99	82	19
6.00–6.99	56	22
7.00–7.99	10	4
8.00–8.99	5	4
9.00–11.83	4	0

Table 5. Children's percent accuracy on all grammatical morphemes by MLUw groups.

Grammatical morpheme	Dominance group	MLUw levels						
		3.00–3.99	4.00–4.99	5.00–5.99	6.00–6.99	7.00–7.99	8.00–8.99	9.00–11.99
Imperfect	Spanish	62.00	72.84	75.85	78.93	92.00	84.00	85.00
	English	71.43	70.53	60.00	79.09	70.00	65.00	
Singular article	Spanish	75.00	74.25	78.66	85.27	87.50	75.00	87.50
	English	60.71	64.47	64.47	73.86	68.75	68.75	
Plural noun	Spanish	65.00	75.37	80.49	86.61	95.00	70.00	87.50
	English	42.86	68.42	65.79	68.18	87.50	75.00	
Conjunction	Spanish	56.67	70.15	73.98	79.46	80.00	86.67	91.67
	English	61.90	57.89	55.26	76.52	58.33	62.50	
Plural article	Spanish	53.33	63.18	68.29	75.60	83.33	60.00	83.33
	English	33.33	45.61	45.61	75.76	41.67	58.33	
Preterite	Spanish	53.33	59.20	70.73	74.40	80.00	40.00	83.33
	English	57.14	47.37	40.35	62.12	41.67	66.67	
Preposition	Spanish	48.33	51.99	56.30	62.50	60.00	63.33	70.83
	English	47.62	43.86	40.35	57.58	41.67	45.83	
DOC	Spanish	46.00	51.34	51.95	64.29	58.00	56.00	70.00
	English	28.57	35.79	36.84	48.18	25.00	55.00	
Subjunctive	Spanish	40.00	47.27	52.93	59.29	38.00	60.00	70.00
	English	40.00	35.79	42.11	46.36	15.00	50.00	

Note. Bolded numbers represent the MLUw level at which mastery (> 80% accurate) of a given morpheme is first observed. MLUw = mean length of utterance in words; DOC = direct object clitic.

used more Spanish and those who used more English using a linear mixed-effects analysis in order to control for the nonindependence of the participants. As fixed effects, dominance and morpheme type were entered into the model. As random effects, intercept for subjects was entered. Using the mixed function in the afex package (Singmann, Bolker, Westfall, & Aust, 2017) in R studio, the interaction of dominance and morpheme was not significant and was thus removed from the model. There was a significant fixed effect of morpheme, $F(8, 2543.56) = 59.00, p < .001$, but not dominance, $F(1, 1141.64) = 2.28, p = .13$. Post hoc comparisons using lsmeans (Lenth, 2016) in R Studio explored the morpheme-type fixed effect using a Bonferroni correction of $p < .001$. Imperfect, plural nouns, singular articles, and conjunctions did not significantly differ from each other, and children produced these with significantly higher accuracy rates than the other targets ($p < .001$). These four forms were more accurate than plural articles and preterite ($p < .001$). Plural articles and preterite verbs were produced with similar accuracy ($p = .487$), and these were more accurate than prepositions, direct object clitics, and the subjunctive ($p < .001$). Prepositions, direct object clitics, and subjunctive were similar in their accuracy ($p < .003$; see Figure 1).

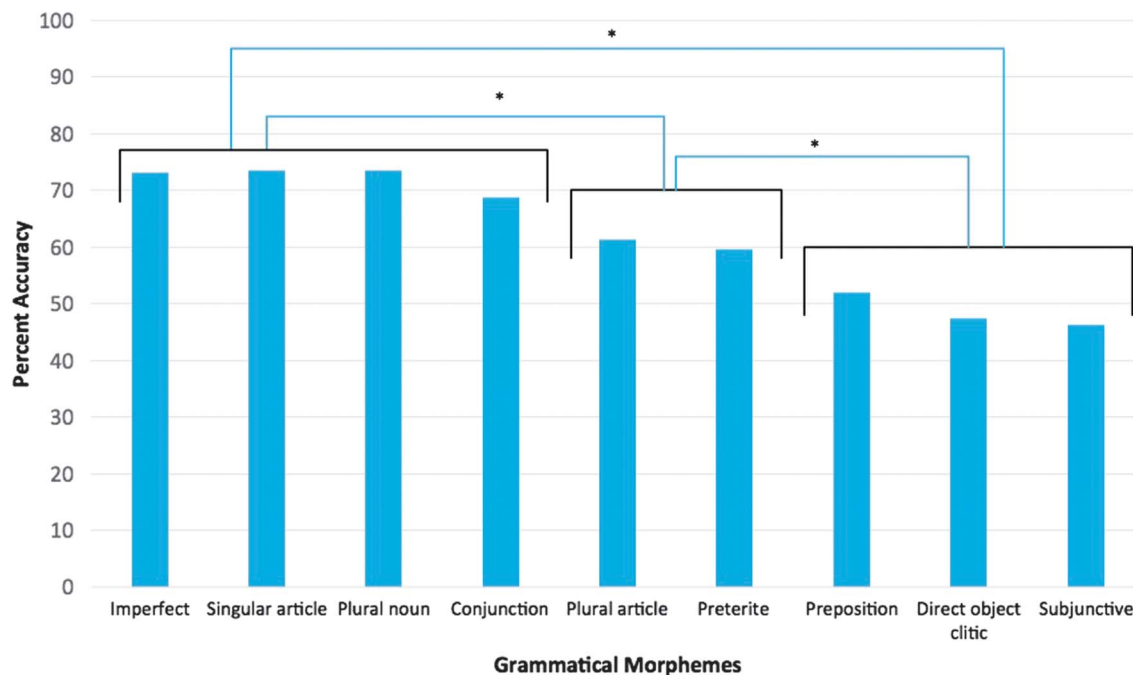
Discussion

Our goal was to better understand how bilingualism influences Spanish grammatical morpheme learning in 4;0 to 7;6 Spanish-English speakers. We hypothesized that, as language became more complex as indexed by MLUw, grammatical morpheme accuracy would increase even when children did not demonstrate the same level of accuracy as their

monolingual peers, as reported in the literature. Overall, the results supported this hypothesis. There was a consistent upward trend of grammatical morpheme accuracy as MLUw increased, although the correlation was generally weak. The upward trend was more clearly seen in the Spanish-dominant group than in the English-dominant group of speakers. Though previous research indicates a strong correlation between MLU and grammatical morpheme development (Bedore et al., 2010; Brown, 1973; de Villiers & de Villiers, 1973; Rice et al., 2006), our study reveals that MLUw has a significant but reduced correlation with grammatical morpheme production relative to the monolingual English literature. There are perhaps several explanations. First, the demands of two languages may have a constraining effect on MLUw as grammatical accuracy improves. Although MLUw in Spanish may not increase as rapidly as the literature on monolingual English or Spanish acquisition would suggest, Spanish sentence complexity and morpheme accuracy is higher in older children. Second, most studies that have noted a strong correlation between MLU and language development are based on spontaneous language samples. This study, however, uses an elicited production task and a sentence repetition task. Children typically use forms they are familiar with and produce accurately when they speak spontaneously, but an elicited production task obligates the children to respond with a specific grammatical structure they may or may not be comfortable with using. Thus, the reduced correlation between MLUw and language development here may reflect the context in which grammatical structures are elicited.

Grammatical morphemes were divided into three distinct sets by morpheme difficulty across dominance

Figure 1. Grammatical morpheme accuracy. Set 1 = imperfect, singular article, plural noun, conjunction; Set 2 = plural article, preterite; Set 3 = preposition, direct object clitic, subjunctive. $S1 > S2 > S3$. $*p < .001$.



groups (illustrated in Table 5). The most accurate forms were imperfect, plural /s/, singular articles, and conjunctions. Our results align with the monolingual and bilingual literature in that plural /s/, imperfect, and articles are the earliest morphemes to be acquired (see Table 1) and are produced in high accuracy. The relative ease of imperfect, plural /s/, and articles is consistent with the literature except that some researchers report differences in article acquisition. Several researchers report article acquisition by age 5 years for monolinguals and bilinguals, whereas others report later mastery (see Table 1). This may be due to English-only environments (Morgan et al., 2013) or to the combination of singular and plural articles in the same task. Conjunctions occur in compound sentences, which typically occur in longer and more complex utterances (Toronto, 1976). All conjunctions in this study were elicited through a sentence repetition task. Even though these children may not be using conjunctions, such as “aunque” (although), “antes de” (before), or “cuando” (when) in spontaneous speech (which would lengthen their MLU), they are able to produce them in a sentence repetition task, as these are sentence constructions they have heard before (Bedore et al., 2018).

The second most accurate set of morphemes was plural articles and preterite. These are reported to be produced with significant variability within the literature. Children who were Spanish dominant mastered plural articles and preterite forms at an MLUw of 7.00–7.99; however, English-dominant children did not reach a comparable level. Although plural articles and preterite are more difficult for bilingual

children to master, they are grammatical morphemes that have the potential and ability to be acquired.

The third set of morphemes (prepositions, direct object clitics, and subjunctive) was the least accurate and not fully acquired by either bilingual group. Prepositions map on differently in English and Spanish. *In*, *on*, *into*, and *onto* in English all map on to *en*; *out of*, *off of*, and *from* map on to *de*; and *at* and *to* map on to *a*. Thus, some Spanish prepositions have multiple prepositional meanings in English. Previous literature indicates that Spanish prepositions have varying levels of difficulty. Grouping them may have lowered our estimate of accuracy in this task. Additionally, direct comparisons between English and Spanish cannot be made for subjunctive. The subjunctive mood has a lower frequency, and some studies show that it is acquired after age 8 years (Pérez-Leroux, 1998). Furthermore, subjunctive is thought to be particularly susceptible to language attrition (S. Montrul, 2009). Most monolingual Spanish speakers acquire direct object clitics between ages 4 and 6 years (see Table 1). For bilinguals, they appear to be less accurate at producing direct object clitics at the level studied. Thus, direct object clitics in this study were produced less accurately by bilinguals than has been reported for monolingual 4- to 6-year-olds. The differences in age of acquisition across the literature for direct object clitics may be due to inconsistencies in the amount and type of errors produced, which may be linked to different stages of contact with English (Jacobson, 2012). Direct object clitics emerge early, but fully accurate production requires number and gender agreement, which is mastered during the preschool

years (Anderson, 1998). Additionally, direct object clitics accuracy has been calculated by using elicitation tasks, spontaneous language samples, and picture descriptions. This leads to differences in accuracy as children typically produce fewer direct object clitics in spontaneous language samples (Jacobson & Schwartz, 2002) where more weight is placed on each production in the total accuracy. Other researchers have shown that the degree of bilingualism affects accuracy of production of direct object clitics (Castilla-Earls et al., 2016; Pirvulescu, Perez-Leroux, Roberge, Strik, & Thomas, 2014).

In sum, three distinct sets of grammatical morphemes emerge from our data. Although there are a few exceptions, the relative difficulty of the grammatical morphemes aligns with the previous literature. Despite the variability in the literature and within this study, regardless of dominance, the general order of difficulty is the same for Spanish–English bilingual children in this study. This research suggests that there are common elements of Spanish that are easy or difficult, regardless of whether a child is a Spanish-dominant or English-dominant bilingual.

Limitations and Future Directions

The grammatical morpheme data in this study is based on an elicitation task, and MLUw was calculated using a language sample. These different forms of data collection may affect the results (Kapantzoglou, Fergadiotis, & Restrepo, 2017). Some of the MLU ranges have a smaller number of children and large standard deviations. Extending the age range of the participants would be useful for future studies. Previous monolingual Spanish literature divided plurals into two categories (short and long) and preterite into two categories (regular and irregular). In the future, the analysis could make these distinctions to see if there are differences in age of acquisition.

Clinical Implications

This study highlights the importance of assessing children in both languages and considering language exposure. While bilinguals may be less accurate than monolinguals when comparing a single language due to less experience in either language, they may be similar on measures of total language (Bedore & Peña, 2008; Hoff et al., 2012). Additionally, several variables, such as exposure, cross-linguistic influence, and context, could influence the pattern of grammatical morpheme development in bilinguals (Bedore & Peña, 2008).

SLPs can use our results when assessing Spanish language development in bilinguals and creating treatment goals. Our results confirm previous research claims that MLUw can serve as an indicator of language development (de Villiers & de Villiers, 1973). MLU is affected by experience and is related to language knowledge (Bedore et al., 2012). Thus, researchers and clinicians can continue to build on current research to see how language experience moderates MLU (Davison & Hammer, 2012).

Some evidence was provided to suggest the order of acquisition of Spanish grammatical morphemes in bilinguals and their corresponding MLUw ranges at mastery. When compared with previous research on monolinguals, there was some variability in the order of acquisition of the grammatical morphemes. This supports the idea that both languages need to be considered and Spanish norms will be beneficial when evaluating language development in Spanish–English bilinguals. Moreover, there was a difference in morpheme accuracy between dominance groups but not in the general order of difficulty. Thus, SLPs should gather language input and output information so that, when we evaluate a bilingual child, we choose the most informative referent for comparing language abilities.

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