SYNTAX BEFORE MORPHOLOGY? THE ROLE OF AGE AND CONTEXT OF

ACQUISITION IN THE DEVELOPMENT OF SUBJECT-VERB AGREEMENT IN

BILINGUAL CHILDREN

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ABSTRACT OF THE DISSERTATION

Syntax before morphology? The role of age and context of acquisition in the

development of subject-verb agreement in bilingual children

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Cross-linguistically, monolingual children produce target-like inflected verb forms in their speech much earlier than they are able to reliably distinguish between singular and plural subject-verb agreement morphology in comprehension (i.e. Johnson et al., 2005; Perez-Leroux, 2005). In second language (L2) and heritage speaker populations, Spanish agreement morphology has been shown to be prone to residual optionality, even at advanced levels (i.e. Montrul, 2004; Jacobson, 2012). Thus, this dissertation explores how English and Spanish subject-verb agreement morphology develops in different types of bilingual children who attend dual language schools and examines how age of acquisition (AoA) and varying learning contexts modulate this timeline, thereby contributing to our understanding of the acquisition process and, in particular, the access and retrieval of functional features.

In this study, 200 participants aged 3 to 7 took part in three experimental tasks to assess their comprehension, production and judgments of subject-verb agreement. These included a fill in the blanks task, a picture matching task and a forced choice task. The participants were divided into five groups: 42 heritage learners; 35 L2 learners with AoA

of Spanish of 3; 46 L2 learners with AoA of Spanish of 5; 40 English monolinguals; 39 monolingually-raised Spanish dominant children. The findings indicate that children's performance is modulated by AoA, but not necessarily context of acquisition. In English, bilingual children in dual language programs develop at the same rate as monolingual peers in production and, furthermore, bootstrapping effects were found in the comprehension of the early bilingual children (heritage and L2ers with AoA of 3). In Spanish, bilinguals' comprehension develops at the same rate as Spanish dominant children. Their accuracy in production, however, does not reach ceiling in this age range, while Spanish dominant children reach ceiling before age 4. Amount of language *output* and use was found to be a greater predictor of productive accuracy than amount of input for heritage speakers. Additionally, heritage and Spanish dominant children distinguish commands from declaratives before they can distinguish third person singular from third person plural morphology, suggesting that syntax is indeed acquired before morphology.

These results have implications for theories of bilingualism, bilingual education and dual language programs. First, functional features appear to be available from the very start of language learning for all children, though each group followed a different path of acquisition. Secondly, educators working with bilingual children should be aware that greater opportunities for speaking, both at home and at school, lead to stronger abilities and higher accuracy. Additionally, the bootstrapping effects found in the English comprehension of the early bilingual children provides evidence that a child's two languages can support each other and that learning in one language can provide a strong foundation for learning in the other.

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CHAPTER 1: INTRODUCTION

1.1 Introductory remarks

The primary objective of this dissertation is to explore how subject-verb agreement morphology develops in different types of bilingual children and how this knowledge may inform our understanding of the acquisition process, particularly in the access and retrieval of functional features. Analysis of the grammar of young Spanish-English bilinguals, who have an extended period of development, allows unique and valuable insight into the acquisition of syntax and inflectional morphology. This dissertation will also examine the role of some extralinguistic factors in the acquisition process by comparing children who are Spanish heritage speakers with those who are second language (L2) acquirers of Spanish with different ages of acquisition (AoA) and learning contexts. The study of AoA and amount and context of exposure provides additional information about the variables that may modulate language development, addressing some of the issues examined in current theories of bilingualism.

In monolingual (L1) acquisition, children produce adult-like subject-verb agreement at a remarkably young age, though it emerges earlier in Spanish than in English (Grinstead, 1998; Liceras et al., 1999; Hyams, 2001; Guasti, 2002; Bel, 2001, 2003; Buesa, 2007). In simultaneous bilingual acquisition (2L1), children's development follows the same pattern in each language as their monolingual counterparts (Serratrice, 2001). The subject-verb agreement paradigm in both languages includes person agreement (first, second, third) and number agreement (singular and plural). Before the emergence of consistent use of agreement morphology in each of these languages, though, young children pass through a period termed the Optional Infinitive Stage

(Wexler, 1994) in which main clause declaratives are produced with both inflected verb forms that are grammatical in the adult language as well as a large percentage of infinitival verb forms that are not (RIs). Examples of the RI phenomenon can be seen in (1a) and (1b) below:

(1) a. Michel dormir   [Child French]

           Michel sleep-INF

       b. Eve sit($\emptyset$) floor   [Child English]

                                                        (examples from Liceras et al., 2006)

In Spanish, it has been suggested that RIs are instantiated by the third person singular and second person singular imperative (which are forms that are homophonous, but lack functional content and inflection except for the thematic vowel of the verb) (Salustri and Hyams, 2003, 2006; Pratt & Grinstead, 2007; Ezeizabarrena, 2002, 2012). However, adult-like imperatives also appear in early child language (Liceras et al., 2006) and imperative clauses are just as syntactically complex as declaratives or interrogatives (Alcázar & Saltarelli, 2014). Examples of Spanish imperatives can be seen in example (2a), (2b) and (2c) below:

(2)   a. ¡Bebe!

         "Drink!"

         b. ¡Come!

"Eat!"

c. ¡Corre!

"Run!"

Third person singular morphology has also been considered to be default inflection in Spanish (i.e. Grinstead, 1998), though others have suggested that infinitive forms are the default (Phillips, 1996; McCarthy, 2006; Räsänen, Ambridge & Pine, 2014). Default inflection is used as a mechanism for building morphological paradigms and as a repair strategy while children are still in the process of acquiring inflectional morphology (Halle & Marantz, 1993; Meisel, 1994; Austin, 2017).

Agreement morphology has been shown to be prone to residual optionality both in adult L2 (Montrul, 2004; Rothman, 2007), child L2 (Herschensohn et al., 2005; Meisel, 2011), and heritage speaker children (Bedore & Leonard, 2001; Jacobson, 2012). As Jacobson (2012) notes, the strength of subject–verb inflection agreement in Spanish appears to be contingent upon its status as a null subject language. Spanish is an agreement-based null-subject language in which a subject's number and person can be easily identified in the verb's inflection without the need for a subject pronoun (Camacho, 2013) whereas English is a non-null-subject language in which null subjects are rarely allowed in declarative clauses, regardless of the discourse-pragmatic context (Chomsky, 1981). As Spanish speakers in the U.S. increasingly use overt subjects due to contact with English (Otheguy, Zentella & Livert, 2007), it is possible that U.S. Spanish may be experiencing a process of weakening in agreement morphology as a consequence of cross-linguistic influence.

Of additional interest to this dissertation is the finding that, cross-linguistically, monolingual children appear to produce inflected verb forms in their speech much earlier than they are able to rely on verbal morphology for comprehension (Johnson et al., 2005; Perez-Leroux, 2005; de Villiers & Johnson, 2007; Miller & Schmitt, 2014; Legendre et al., 2014). In sum, children produce target-like inflected verbs about one year before they reliably distinguish between singular and plural subject-verb agreement morphology in comprehension. However, little is still known about how interpretive and productive abilities develop in bilingual children at varying stages of acquisition.

To analyze these issues, this thesis is situated within the generative framework of Universal Grammar (Chomsky, 1995) which assumes that infants are innately endowed with a system of richly structured linguistic knowledge and capable of becoming multilingual (Meisel, 2011). In this framework, language consists of a lexicon, where lexical items and functional categories are stored, and the computational system that selects and integrates elements specified in the lexicon to form linguistic expressions. According to the minimalist program (Chomsky, 1995) speakers have access to three basic syntactic operations (Move, Merge and Agree), which are generally motivated by the interaction of functional features and lexical items. Features can be characterized as interpretable or uninterpretable based on the relevance of their semantic contribution. Interpretable features carry a semantic component and determine the meaning of an expression, whereas uninterpretable features do not carry any type of interpretive content and simply trigger syntactic operations (Chomsky, 1995).

Under this generativist umbrella, the Distributed Morphology (DM) framework (proposed by Halle & Marantz, 1993) provides a somewhat different and effective approach for analyzing inflectional development in both L1 and L2 speakers. In this model, in contrast to the lexicalist approach, the syntax does not manipulate lexical items. Rather, structures are generated by combining morphosyntactic features (via Move and Merge) which are subject to Chomsky's (1995) principles and parameters governing such combination (Harley & Noyer, 1999). Learners produce default morphological forms when they have difficulty selecting the target form or when its syntactic features are underspecified and cannot be matched with a phonological form. Thus, even though evidence from children's production data in various languages suggests that functional categories are operative from the very earliest stages of L1, the DM framework accounts for the variability found in the acquisition process.

It is widely accepted that child L1 learners are universally successful in acquiring the basic properties of language, but bilingual acquisition displays pervasive within-speaker and across-speaker variability, especially with respect to the functional features associated with agreement morphology (Rothman, 2007). Cross-linguistic variation in feature specifications seems to be an important contributing factor to this optionality whereby bilinguals may heavily rely on the feature specifications of their dominant language, leading to cross-linguistic influence and variability in grammatical performance in the less dominant language (Schwartz & Sprouse, 1996; Meisel, 2011). Additionally, the degree to which successful reassembly of particular feature specifications occurs can be attributed to both linguistic and extra-linguistic factors (Lardiere, 1998, 2008).

A bilingual's interpretation and production of functional categories in both languages, therefore, is also influenced by external factors including age of acquisition (AoA) and context of acquisition, which will be explored in this thesis by incorporating various groups of bilingual children who attend dual-immersion programs in the United States. These different kinds of bilingual children receive their education in both English and Spanish. Therefore, the heritage speakers in this study, who are 2L1 bilinguals, have increased input and activation (Putnam & Sanchez, 2013) of both languages as compared to the majority of heritage speakers in the U.S. who attend English monolingual schools. This group is acquiring Spanish in the context of the home and school. The English L2 learners of Spanish have acquired the L2 only in school and began at either age 3 or age 5[1]. AoA refers to the age at which immersion in the L2 begins in earnest, with ongoing interactions with native speakers and regular use of the L2 for communicative purposes (Unsworth, 2016). The present work is aimed at investigating how the aforementioned linguistic and extra-linguistic factors modulate heritage and L2 bilingual children's interpretation and use of subject-verb agreement in declarative and imperative clauses in both of their languages. Although there has been considerable attention given to the development of verb morphology in the monolingual acquisition of English and Spanish (Meisel, 1994; Grinstead, 1998; Gathercole et al., 1999; Clahsen et al., 2002; Hyams, 2001, 2008; Salustri and Hyams, 2003, 2006; Johnson et al., 2005; Pérez-Leroux, 2005; de Villiers & Johnson, 2007; Pratt & Grinstead, 2007; Ezeizabarrena, 2012; Miller & Schmidt, 2014; among others) and adult SLA of Spanish (Liceras et al., 1999; Bruhn de

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[1] The age of 4 has been shown to be the moment in acquisition at which qualitative differences in morphosyntactic production can be detected (Meisel, 2011; Unsworth, 2016). Thus, the ages of 3 and 5 were chosen for this study as they are just before and just after this pivotal moment.

Garavito, 2003; Rothman, 2007; McCarthy, 2008; *inter alia*), only a handful of studies have been dedicated to simultaneous bilingual acquisition (Paradis & Genesee, 1996; Ezeizabarrena, 1996; Serratrice, 2001; Castro & Gavruseva, 2003; Austin, 2009) and even fewer to child L2 Spanish (Herschensohn et al., 2005). A comparative analysis of these different groups could reveal how age of acquisition and context of acquisition lead to underlying differences in the access and retrieval of functional features in language contact situations. The ultimate goal of this dissertation, through the lens of the DM framework, is to shed some light on the process of acquisition of syntax and morphology in child L1, 2L1 and L2 to further our understanding of language development as a whole.

1.2 Research questions and hypotheses

The present dissertation is designed to contribute to this body of research by triangulating data from multiple tasks, including evidence from children's interpretation, production and grammatical intuitions regarding subject-verb agreement in declarative and imperative clauses, as well as information about their specific sociolinguistic background and AoA. The incorporation of different types of experimental tasks is meant to allow for a more complete understanding of how age of acquisition and context of acquisition modulate child language development. This thesis includes two experiments designed to investigate the relationship between bilingual children's acquisition of verb morphology and corresponding syntactic features. The research questions will be presented in accordance with each one. The first experiment addresses bilingual children's production and comprehension of subject-verb agreement in number and the

second experiment assesses bilingual children's knowledge of person agreement in the imperative and the declarative forces.

In light of the aforementioned research problem, this study aims to answer the following research questions:

1. At which age do simultaneous heritage bilingual children acquire verbal number morphology in comprehension and production, and does this differ to monolingual peers?

I hypothesize that being bilingual should not affect the rate of acquisition of verbal morphology in production, as previous studies have shown (Paradis & Genesee, 1996; Serratrice, 2001; Castro & Gavruseva, 2003;). However, keeping in mind that heritage bilinguals have been shown to produce variable morphology (Bedore & Leonard, 2001; Jacobson, 2012; Rodriguez et al., 2017), this hypothesis is supported by the fact that this group of children attends a dual immersion program and, therefore, has increased input and activation (Putnam & Sanchez, 2013) of both languages[2]. By contrast, when it comes to comprehension abilities, very little is known about bilingual development. Based on what has been shown in monolingual child development, it is expected that at age 4, children will perform more accurately in production than in comprehension in both English and Spanish (Johnson et al., 2005; Pérez-Leroux, 2005; de Villiers & Johnson, 2007; Legendre et al., 2014; Miller & Schmitt, 2014). This may be due to young

[2] Some studies have found evidence of delay in bilingual children, particularly the non-dominant language, due to reduced input (Austin, 2009; Blom, 2010; Hoff et al., 2012).

children's difficulty with explicit semantic understanding of inflection (Naigles, 2002).

By age 5, though, it is expected that children will perform similarly in both production

and comprehension in their dominant language, but will continue to show variability in

their non-dominant language because as previous research has shown, child L2 learners

(Herschensohn, 2007; Meisel, 2011) and heritage children in the U.S. (i.e. Bedore &

Leonard, 2001) display continued morphological variability in Spanish throughout the

elementary years.

2. Does AoA (initial exposure to Spanish at age 3 versus at age 5) affect the
   emergence of verbal number morphology in comprehension and production in
   Spanish among child L2 learners?

It has been proposed that the pivotal moment in development at which qualitative

differences in L2 morphosyntactic production can be detected is the age of 4 because it is

by this point that the basic grammatical and lexical foundations of a first language are in

place (Meisel, 2011; Unsworth, 2016). Thus, it is hypothesized that AoA will have an

effect on the development of subject-verb agreement between children acquiring Spanish

from age 3 and those acquiring Spanish from age 5. It is expected that children acquiring

Spanish from age 5 will show a faster rate of acquisition than those acquiring Spanish

from age 3 so that comprehension and production abilities will emerge sooner for the

older learners than it does for the younger starters. Even though they've had fewer years

of exposure to the L2, the older learners may learn faster due to more mature cognitive

and metalinguistic abilities or a more thoroughly established L1 to act as a foundation for

the L2. Various studies have found this to be the case, that an older age of onset confers

an advantage in terms of speed of acquisition (Lichtman, 2016; Rothman et al., 2016; and see Muñoz, 2008 for a review).

3. Do heritage speakers, who have earlier and greater amount of exposure to Spanish, display more accuracy in their comprehension and production of verbal number morphology than L2 learners? Does immersion education compensate for early exposure?

Though both groups of children in this study attend dual-language programs, the child L2 learners are, generally, only exposed to Spanish at school, while the heritage children have exposure to Spanish not only at school, but also at home and in their community (Montrul & Potowski, 2007; Montrul, 2008). Additionally, the heritage speakers have been exposed to both English and Spanish from birth whereas the L2 learners began their acquisition of Spanish at either age 3 or age 5. Thus, it is hypothesized that for the heritage children who receive a greater and earlier amount of input in Spanish, knowledge of agreement morphology should emerge sooner than for L2 acquirers who are only exposed to Spanish during school hours and began their acquisition process later in development.

4. Do bilingual children resort to default morphology to express subject-verb agreement in number?

It is hypothesized that bilingual children should have acquired subject-verb agreement in, at least, their dominant language by the age of 5 and will show variability before then. Working within the Distributed Morphology framework, it is predicted that

this variability will be expressed by default morphology (in Spanish: 3rd person singular as proposed by Grinstead (1998), Liceras et al. (2006) and McCarthy (2006); in English: the root of the verb when 2L1 and L2 children have not yet fully acquired the target inflectional morphology). This is because learners produce default morphological forms when they have difficulty selecting the target form or when its syntactic features are underspecified and cannot be matched with a phonological form.

Based on the default morphology of each specific language, singular morphology should take longer to acquire in English and plural morphology should take longer to acquire in Spanish. This is because third person singular is the only marked form in the English verb morphology paradigm (Johnson et al., 2005), whereas in Spanish, third person singular is the only unmarked form, or default, making it one of the first forms to be produced by Spanish monolingual children (Grinstead, 1998; Bel, 2001). Additionally, both Marrero and Aguirre (2003) and Forsythe (2015) have shown that plurality appears later in acquisition and that nominal plural emerges before verbal plural. Studies in monolingual children have shown that the ability to use inflectional marking on the verb to infer subject number (either plural or singular) does not emerge until after age 5 in both English (Johnson et al., 2005; de Villiers & Johnson, 2007) and Spanish (Pérez-Leroux, 2005; Miller & Schmitt, 2014). In previous studies in both English and Spanish, older children (5 and 6 year olds) performed better on the marked member of the verbal paradigm. For Spanish this was 3rd person plural (Pérez-Leroux, 2005; Miller & Schmitt, 2014; Forsythe, 2015) and for English this was 3rd person singular (Johnson et al., 2005). For bilingual children, if singular is the default in Spanish, it may be the case that singular is then acquired sooner in English due to cross-linguistic influence. A bilingual

child who must acquire both a weak and a robust inflectional system, may acquire the marked forms in the weaker system more rapidly because of the added support of the more robust paradigm. Bootstrapping effects such as these, in which the acquisition of a linguistic feature in one language aids the acquisition of a feature in the other language, have been found in syntactic structures in bilingual children (Gawlitzek-Maiwald & Tracy, 1996; Bernardini & Schlyter, 2004)

5. Does the overt value of the null subject parameter in English affect agreement in Spanish?

In Spanish, the presence of an overt subject should provide additional support for comprehension of subject-verb agreement. Though Pérez-Leroux (2005) did not find that the additional support of an overt subject helped 4-year-old Dominican children perform more accurately in subject-verb agreement comprehension, Miller & Schmitt (2014) found that 4 year old Mexican children and 5-year-old Chilean children did show improved performance when the agreeing verb was accompanied by an overt subject, rather than a null subject. The bilingual children in this study are heritage speakers of Spanish living in the U.S. and child L2 learners of Spanish whose L1 is English. As English is the majority language in this case and English is an overt subject language, it is possible that due to cross-linguistic influence or frequency of activation (Putan & Sánchez, 2013) these groups of bilingual children may over rely on the expression of overt subjects in Spanish (Jacobson, 2012). Thus, it is expected that the presence of an overt subject will help improve children's ability to produce subject-verb agreement in

number more accurately and to use inflectional marking on the verb to infer subject

number in comprehension.

6. Do bilingual children understand the syntax and morphology of imperatives in Spanish?

In Spanish, the third person singular default and second person singular

imperative lack overt inflection except for the thematic vowel of the verb and are

homophonous. It has thus been proposed that these unmarked forms realize the RI stage

in null subject languages (Salustri and Hyams, 2003, 2006; Perales et al., 2005; Pratt &

Grinstead, 2007; Ezeizabarrena, 2012). However, as Alcázar & Saltarelli (2014) posit,

imperative clauses are just as syntactically complex as declaratives or interrogatives, and

the imperatives that appear in early child language carry the same semantic and

referential value as in the adult grammar (Liceras et al., 2006). Though they may be

homophonous, RIs lack functional content (Wexler, 1994) whereas imperatives are

indeed inflected for second person singular. Therefore, in Spanish, if bilingual children

can distinguish between imperative and declarative sentences, we will have evidence that

they understand that the syntax and morphology of the imperative carry illocutionary

force and that they are not relying on third person singular morphology as a default.

7. Does comprehension of imperatives emerge before comprehension of verbal number morphology in bilingual children?

It is hypothesized that bilingual children will display the ability to comprehend

imperatives before they can comprehend verbal number morphology. They should have

representational knowledge of imperative subject-verb agreement in comprehension in both of their languages from very early on because imperatives are found among monolingual children's earliest verb utterances alongside null subject declaratives and comprise a large part of a child's early input (Gathercole et al., 1999; Orfitelli & Hyams, 2012). In English, Orfitelli & Hyams (2012) showed that monolingual children as young as 2;6 could distinguish between the imperative and the declarative in a comprehension task, but very little is known about how early this ability appears in Spanish acquisition.

If in early language development, children have comprehension of imperatives but not verbal number morphology (which has been shown to appear around age 5 in both English and Spanish acquisition), we will have evidence that syntax is acquired before morphology because children would show understanding of the illocutionary force of imperatives without relying on their verbal morphology.

1.3 Organization of the dissertation

In order to achieve these goals and effectively explore the previously mentioned research questions, this dissertation is organized as follows. Chapter 2 summarizes the most influential research on agreement, focusing on semantic and syntactic analyses of agreement morphology in both English and Spanish monolingual acquisition. Chapter 3 describes theories regarding child language acquisition and previous research regarding the acquisition of agreement morphology in bilingual children. It also addresses issues related to age of acquisition and context of acquisition. Chapter 4 describes the research methodology, the tasks involved and their implementation. This chapter presents a detailed description of the research questions and hypotheses, as well as a report of the

methods of data collection (questionnaires, tests and experimental tasks) used in the study. It also presents the results of the study and a discussion. Chapter 5 presents the results and analysis. Finally, Chapter 6 provides a discussion and concluding remarks.

CHAPTER 2: VERB MORPHOLOGY

2.1 Verb morphology

English has an impoverished subject–verb agreement system in which the only agreement marker is /s/ for third person singular verbs (Corbett, 2006; Hudson, 1999). Table 1 shows the minimal nature of the agreement paradigm. In modern English, only the copula retains a fuller paradigm of person markings: I am, you are, he is, we/you/they are (Huddleston & Pullum, 2002).

Table 1 Person and number inflections for English verbs

Person	Number	Number
	Singular	Plural
First	-Ø	-Ø
Second	-Ø	-Ø
Third	-s	-Ø

In regards to the nature of the /s/ marker, it has been argued that English may not have a real 'present tense', as it uses the present progressive to denote ongoing action. Indeed, Sauerland (2002) posits that the English 'present tense' is just in the form of an implicature in that the verb marked with /s/ makes no presuppositions as to the time of the event. Rather, the third-person /s/ marker typically attaches to a verb form to mark 'generic' aspect (Johnson et al., 2005; De Villiers & Johnson, 2007). As I will discuss further in section 2.4, this semantic analysis of verb morphology in English is relevant when compared to analyses of Spanish inflectional morphology.

In contrast to English, Spanish has a more complex verbal paradigm. Verbs are inflected for person, number, tense, aspect and mood, and are classified into three classes – *-ar, -er and –ir* – depending on the thematic vowel of the infinitive ending. Inflected forms have a stem, consisting of the root plus a thematic vowel (a, e or i) to which two suffixes are added, as shown in (3a) and (3b) (Aguirre, 2011).

    (3) a. [root + thematic vowel] stem + suffix1 (tense/aspect/mood) + suffix 2 (person/number).

        b. [cant + a]stem + baAf1   + mosAf2

        sing +   past imperfect indicative +first person plural

        'We sang'

                         (example from Montrul, 2004)

The paradigm for person and number includes three persons (first, second, third) and two numbers (singular and plural), though there is some dialectal and social variation in the use of the second person, both singular and plural[3]. Verbs have different endings for person and number, with the exception of the third person singular, which is a stem form, and can be seen in Table 2 below (Dressler et al., 1987; Harris, 1991; Aguirre, 2011).

Table 2 Person and number inflections for Spanish verbs

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[3] Some spoken varieties of Spanish add a non-standard /-s/ to second person singular preterit verb forms (Barnes, 2012).

Person		Number	
	Singular		Plural
First	-o		-mos
Second	-s / Ø		-is
Third	-Ø		-n

In summary, English and Spanish have almost opposing subject-verb agreement systems. In English, the only agreement marker is that of /s/ for third person singular verbs. In Spanish, on the other hand, all verbs are marked for person and number contrast except for third person singular verbs. In the context of this study, therefore, a bilingual child acquiring both paradigms must distinguish between these two systems.

2.2 Functional categories and uninterpretable features

Meisel (1994) claims that verbs are the cornerstone of early grammatical structures in L1 acquisition and that functional categories emerge consecutively thereafter, such that agreement (Agr) is acquired before tense (T) in children's developmental chronology. Using the examples of French and German, he shows children use verbal inflection to encode grammatical agreement very early on, around age 2;0, in development and that the first agreement marking to appear is that of 3rd person singular as in (4a) and (4b):

    (4) a. Maman est là   Child French

'Mother is there'

b. Nounours dort   Child French

'Teddy sleeps'

(examples from Meisel, 1994)

Person agreement emerges before number agreement which both precede the appearance

of tense distinctions (first, verbs are produced only in present tense; the past, perfect and

future tenses appear later). In the process of L1 acquisition, a child must begin by

identifying the contexts where agreement should be expected and learn the appropriate

morphological affixes (Hyams, 2008). But, determining the function of the inflectional

system within the grammar as a whole, understanding the formal nature of the agreement

relation, and how it is interpreted, emerges as the child gets older (Pérez-Leroux, 2014).

In the Minimalist Program, Chomsky (1995) proposes that Agr and T features

occupy the same node in the structure, inflection (INFL). In the case of agreement, he

argues that the verb moves to the head of INFL to 'check' features (presumably person

and number), but once the features have been checked, they do not survive to the

representation level of Logical Form (LF), which is where meaning is computed. This is

in keeping with the economy of representation principle that superfluous features are

eliminated before reaching LF. In other words, the features disappear after the agreement

is checked and before meaning is computed. Thus, the uninterpretable features, upon

being checked, are deleted and do not survive to LF. Under this account, agreement

morphology is the spell out of feature checking but is not meaning-bearing within the

linguistic system where instead the number, case and person of the subject noun phrase are what contribute to the interpretive component. In example (5) below, the number, case and person of the subject DO *la niña* are available for computation at the interpretive component but the uninterpretable features on the verb are not.

(5)   La   niñ-a   com-e

        DEF.S.FEM   girl-FEM   eat-P.3.S

        "The girl eats"

However, in stark contrast to this syntactic approach in which agreement on the verb is supposed to lack semantic content, semantic theoreticians have argued that verbal agreement features can in fact contribute to semantic interpretation (see Adger & Harbour, 2008, for a review). An important aspect of this theoretical framework is that functional categories carry a complex interplay between formal properties in morphology, syntax and semantics, whereby formal semantic features, such as number, gender and finiteness, have related morphophonological forms (e.g., -ed, -s, in English) (Adger & Harbour, 2008).

2.3 Root infinitives, defaults and imperatives

In both English and Spanish, before the emergence of consistent use of agreement morphology, young children pass through a stage in which main clause declaratives are produced with both inflected verb forms that are grammatical in the adult language as

well as a large percentage of infinitival verb forms that are not. Due to the optional co-existence of both inflected and uninflected forms, Wexler (1994) termed this period the Optional Infinitive Stage. Sentences that appear during this period with ungrammatical verb forms are referred to as ungrammatical Root Infinitives (RIs) in the L1 acquisition literature because uninflected forms appear in places where finite verbs should appear as per the adult grammar (Montrul, 2004).

In languages such as Dutch, German or French the non-finite forms are actual infinitives, as evidenced by the presence of the infinitival morpheme on the verb, as in (6a). However, in languages that lack infinitival morphology, like English, the RI phenomenon appears as bare forms (with no tense or agreement morphology) as shown in (6b).

(6) a. Michel dormir   [Child French]

        Michel sleep-INF

    b. Eve sit($\emptyset$) floor   [Child English]

                                        (examples from Liceras et al., 2006)

While the phenomenon lasts for several years in child acquisition in Germanic languages like Dutch, English, and German, as well as French (Wexler, 1994; Hoekstra & Hyams, 1998; Hyams, 2001; Blom & Wijnen, 2013), it appears earlier and is rather short-lived in null subject Romance languages like Italian, Catalan, and Spanish (Grinstead, 1998; Hoekstra & Hyams, 1998; Liceras et al., 1999; Bel, 2001, 2003; Perales et al., 2004; Buesa, 2007; Austin, 2010). For example, in children aged 1 to 3, the rate of

RI production in Spanish and other Romance languages ranges from 3% to 16% (Grinstead, 1998; Liceras et al., 1999; Bel, 2001) compared to 78% in English (Hyams, 2001; Guasti, 2002).

In monolingual Spanish, studies examining the emergence of agreement show that children as young as 1;7 produce finite verbs with person contrast and that plural forms appear soon after. Thus, the first verbs of Spanish-speaking children are almost always inflected, with 3rd person singular present indicative being the most common form used (Grinstead, 1998; Bel, 2001; Aguado-Orea, 2004). However imperatives, infinitives and subjunctives are common as well (Gathercole et al., 1999). In Bel (2001), who analyzed the verbal productions of three Spanish acquiring children ages 1;7 to 2;1, the occurrence of ungrammatical RIs is very low, around 6% of the total sentences of the group.

To further corroborate these findings, Clahsen et al. (2002), who studied the acquisition pattern of regular and irregular verbs in Spanish child language, found that the onset of regularization errors (the misapplication of the rules that govern regular verb morphology onto irregular verbs) coincides with the disappearance of RIs between ages 2 and 3. In other words, when finiteness marking becomes obligatory in the child's grammar, children resort to the regular verb morphology rules when there are gaps in the developing lexicon with irregular forms. This demonstrates that agreement as a syntactic category is acquired in Spanish very early on.

Researchers have sought to explain why young children produce non-finite forms not found in adult grammars and why they often co-exist with adult-like inflected forms. The first proposal, from Radford (1990) put forth that functional categories are subject to

maturation and are therefore not available in the earliest stages of the acquisition process, leading to the production of bare forms. However, children do produce inflected verbs in morphologically rich languages like Spanish, Catalan and Italian and, so, Rizzi (1993/1994) attempted to provide a more universal account of RIs in child language. He proposed the Truncation Hypothesis which explains the presence of RIs as a lack of maturation of a principle of UG that states that all sentences (finite and non-finite) have a CP, even if this CP is not always filled with lexical material. This principle is fully developed in adult grammars but is subject to maturation in children which means they may truncate the structure of the clause at any node below the CP layer, leading to utterances in which some functional categories are missing. Wexler (1994, 1998) built upon this by adding that RIs exist within the parametric properties of infinitives and the functional categories T and Agr across languages. Both Rizzi's and Wexler's analyses posit that children are aware of and set these parameters to the correct value for their target language very early on, suggesting that functional categories are available from the very beginning of the acquisition process, which contradicts Radford (1990).

For null subject languages, it has been suggested that the third person singular and second person singular imperative (which are forms that lack inflection except for the thematic vowel of the verb and that are homophonous) can be considered the equivalent of RIs (Salustri and Hyams, 2003, 2006; Pratt & Grinstead, 2007; Ezeizabarrena, 2012). Indeed, Grinstead (1998) notes that the third person singular indicative appears frequently in early Catalan and Spanish child language and is a default form that lacks functional content, like RIs. The term 'default' has frequently been used to account for the existence of RIs (Phillips, 1996) or to describe errors of substitution, but default morphology is not

necessarily the omission of inflection (Meisel, 1994; McCarthy, 2008). Rather, within the

framework of Distributed Morphology (Halle & Marantz, 1993), default inflection,

constrained by principles of underspecification of morphological features based on

markedness (McCarthy, 2004), is used as a mechanism for building morphological

paradigms and as a repair strategy while children are still in the process of acquiring

inflectional morphology (Austin, 2017). Under the DM account, default morphological

forms are inserted when en exact match between morphosyntactic features and

phonological forms cannot be retrieved. These defaults usually appear as less-inflected

forms substituted for more-inflected ones. Räsänen et al. (2014) propose that children

default to the verb form with the highest lexical frequency or phonological simplicity

when they are unable to access or retrieve the less frequent marked form. In English, this

is the bare form which is indistinguishable from the infinitive except for the lack of "to"

which accompanies a true infinitive. In Spanish, it is the third person singular and second

person singular imperative forms that are the unmarked or default forms that realize the

RI stage (Perales et al., 2005).

In Spanish, the affirmative informal imperative takes the same form as the third

person singular present indicative and consists exclusively of the verbal root plus a

thematic vowel, as seen in the examples in (7a), (7b) and (7c):

(7)   a. ¡Bebe!

"Drink!"

b. ¡Come!

"Eat!"

c. ¡Corre!

"Run!"

Imperatives also share various traits with infinitive forms such as post-verbal clitic placement, lack of tense and aspect marking and a weak or non-existent person agreement paradigm (Gathercole et al., 2002; Ezeizabarrena, 2012). However, though they may share similar traits, imperatives are finite, hosted in the CP layer, and their syntax is not any less complex than that of declaratives and interrogatives. They are also inextricably linked to the speaker and addressee categories of the speech act and carry illocutionary force (Alcázar & Saltarelli, 2014). In the English imperative morphological paradigm, while there is no phonological verbal affix, the command or request is uttered with a null subject that is interpreted as 2nd person. In fact, the null subject's interpretive properties make it similar to the null subject of finite clauses in pro-drop languages, despite the fact that English is not a pro-drop language (Zanuttini, 2008), as seen in the above examples in (7). Null subjects in finite clauses are acceptable in languages like Spanish because its rich verbal inflection allows for the licensing and identification of a null subject, but, interestingly, the verbal morphology of the imperative paradigm is *not* rich in agreement. In fact, it has been observed that imperative verbal morphology tends to be weak across languages which suggests that the mechanism by which a null subject is licensed in imperatives may not be the same as that by which it is licensed in declaratives (Zanuttini, 2008). Zanuttini et al. (2012) propose that the interpretation and licensing of null subjects in imperatives is syntactically dependent and determined by a

functional head. They do not tie the presence of this functional projection to imperative verb morphology, rather they see it as present in all the sentences associated with imperative force referencing an addressee.

Hyams (2001) addresses the fact that during the RI stage, only certain types of verbs appear in non-finite form and that there is an issue of semantic interpretation. According to her Semantic Opposition Hypothesis, children map meanings onto agreement features on the basis of a semantic hierarchy in which Mood represents the earliest opposition: *Irrealis* Mood (desire or necessity or futurity of some event) versus *Realis* Mood (actual occurrence, whether past or ongoing, of some event). Infinitives or bare forms realize the *Irrealis* Mood and finite forms realize the *Realis* Mood. For null subject languages, Salustri and Hyams (2003, 2006) claim that the bare forms that realize the *Irrealis* Mood[4] are in fact imperatives. This is because imperatives appear more frequently in child data than in adult data and because they occur more often in the data of children learning null subject languages than in those learning overt subject languages. Bearing in mind that the *Irrealis* Mood represents verbs of desire or necessity, and that very young children use language primarily to express their emotions and needs, this connection seems to follow. Liceras et al. (2006) argue against this possibility, however, stating that RIs are not instantiated by the imperative because while imperatives appear early in child language they always carry the same semantic and referential value as in the adult grammar. Additionally, as noted by Orfitelli and Hyams (2012), young children

[4] Gavruseva (2004) provides an alternative account to Hyams (2001), also based on semantic interpretation.

seem to correctly interpret and produce imperative sentences from the earliest ages and these co-occur with root infinitives during the null subject stage.

Along the same lines, Theakston et al. (2003) present a constructivist input-driven account in which they show, through a controlled elicited production task, that English speaking children aged 2-3 produce non-finite forms more when they receive it in the input in the form of questions rather than inflected forms in declaratives (determined by interactions with the experimenter). If this is the case, the same could be said for imperatives which are prevalent in child-directed speech and make up a large amount of the input for young children (for discussion, see Orfitelli & Hyams, 2012; and see Salustri & Hyams, 2006). Few studies have addressed experimentally children's knowledge of imperative morphology. To my knowledge, only Orfitelli & Hyams (2008, 2012) have provided experimental evidence that English speaking children can interpret imperative sentences in an adult-like manner by age 2;6 while they are still in the null-subject stage that lasts until about age 4.

In summary, RIs are found in a wide variety of languages but the Optional Infinitive Stage is quite short in null subject languages with robust morphological paradigms like Spanish (Guasti, 2002; Austin, 2010). Thus, unlike their English monolingual counterparts, Spanish monolingual children produce inflected verbs very early on. Various hypotheses have been put forward by researchers to explain this optionality found in verbal inflection in child grammars from maturational constraints to differences in semantic interpretation to input-driven accounts. Additionally, it has been proposed that for Spanish, the imperative form (which lacks inflection except for the

thematic vowel of the verb) is the equivalent of RIs (Salustri and Hyams, 2003, 2006; Pratt & Grinstead, 2007; Ezeizabarrena, 2012), though others refute this claim showing that child imperatives carry the same semantic and referential value as in the adult grammar (Liceras et al., 2006; and see also Orfitelli & Hyams, 2012 for English). Therefore, it is still unclear if in Spanish imperatives develop first as RIs or not, and this dissertation intends to shed some light on this debate by examining the comprehension of imperatives and non-imperative inflected verbs by young bilinguals.

2.4 Morphology and Semantics

It is clear from the previous sections that finiteness has numerous consequences not only for morphology and syntax, but also for semantics (Gretsch, 2004). Pratt and Grinstead (2007) propose that agreement in morphologically rich languages may be an incorporated pronominal, an actual pronoun that incorporates into the verb. In this framework, children's lack of overt tense marking, a fundamentally discourse-semantic notion, can be seen as part a larger discourse-syntax interface delay. In this way, they assume the RI phenomenon to fall under the larger and empirically more well-established phenomenon of delays at the syntax-pragmatics interface (Hulk & Muller, 2000) where syntactic mechanisms depend on context and discourse presuppositions. The authors posit that tense marking presupposes a representation of an event taking place at a time relative to speech time and that children, with an immature syntax-pragmatics interface, may simply assume, as in cases of nominal anaphora, that their interlocutors share their presuppositions. Children may assume that their listeners are aware of their temporal presuppositions and consequently use morphosyntactic verb forms which do not mark tense morphologically. As children mature, nonfinite verbs gradually decrease. Under

these circumstances, children could have completely adult-like morphosyntactic knowledge, but simply be unable to take advantage of it, as a function of the Temporal Interface Delay (TID) Hypothesis. The TID states that children have adult-like morphosyntactic competence, but lack adult-like access to discourse-pragmatic information regarding tense and consequently allow verb forms which may or may not mark tense overtly.

Anderson (2001) carried out a longitudinal study of two Spanish-speaking children who had moved to the United States and were in the process of becoming English dominant speakers. She observed their use of verbal morphology and the increase of variability and non-target-like forms over time. The data shows that with greater exposure to English and less exposure to Spanish, the children make increasingly frequent errors, especially in agreement marking, and when they produce an incorrect person and/or number marker, the form most often used is that of third person singular. Anderson situates her discussion within Bybee's (1985,1995) lexical morphology model which predicts that morphological markers for identifying person and number distinctions will be more prone to error in children who are evidencing L1 loss because they are peripheral to the verb's meaning. According to the model, person and number features don't carry the same semantic relevance as aspect, for example, because they do not impact the inherent meaning of the verb. Therefore, the author claims that the children in her study (who overuse third person singular default forms) evidence production patterns reminiscent of an earlier developmental stage in monolingual Spanish children, suggesting possible loss of person and number contrasts.

This notion of semantic relevance brings us to Logical Form in Chomsky's (1995) Minimalism. As discussed in Section 2.2, under this account person and number features are grammatical but not meaning-bearing within the linguistic system. Logical Form is where meaning is computed, but verb features are redundant and do not contribute to this computation. Thus, listeners must rely on other features in the phrase like context or the overt subject for information about number and person. However, while this may be the case for English, with its minimal morphological paradigm, Spanish morphology carries all the semantics of person and number of the subject, especially because of its status as a null subject language (Harris, 1991; Aguirre, 2011). This brings us to an important aspect of the development of verb morphology for the specific context of this study which is that of bilingual heritage and L2 Spanish learners growing up in the United States. As we have seen, although children acquiring Spanish in monolingual contexts (Montrul, 2004) and bilingual children living in contexts of societal bilingualism (Paradis & Genesee, 1996; Serratrice, 2001; Castro & Gavruseva, 2003; Austin, 2009) use accurate agreement verb morphology in both of their languages by age 4, bilingual children in the U.S. continue to show optionality with verb inflection agreement in Spanish throughout the preschool years and beyond (Bedore & Leonard, 2001). As Jacobson (2012) notes, the strength of subject–verb inflection agreement in Spanish appears to be contingent upon its status as a null subject language. Spanish is an agreement-based null-subject language in which a subject's number and person can be easily identified in the verb's inflection without the need for a subject pronoun (Camacho, 2013) whereas English is a non-null-subject language in which null subjects are rarely allowed in declarative clauses, regardless of the discourse-pragmatic context (Chomsky, 1981). As Spanish speakers in

the U.S. increasingly use overt subjects due to contact with English (Otheguy, Zentella & Livert, 2007), it is possible that Spanish as a heritage language may be experiencing a process of weakening in agreement morphology as a consequence of cross-linguistic influence. The same may be true for Spanish as an L2. Both of these types of bilinguals may show an overreliance on the expression of overt subjects in Spanish, thereby reducing the semantic relevance of verbal person and number features.

2.5 The comprehension - production asymmetry

It is important to consider how researchers define the point at which a child has acquired agreement marking. Traditionally, and as I have outlined in section 2.3, studies on the acquisition of agreement have focused on emergence (onset of productive use) or endpoint (high rates of production in adult-like obligatory contexts). However, these perspectives ignore the significant, yet gradual learning process of morphosyntactic markers that takes place during the intermediate and advanced stages of acquisition (Lakshmanan, 1995; Paradis & Genesee, 1996; Pérez-Leroux, 2014). Importantly, acquisition of morphosyntactic markers entails the ability to apply a range of distributional, paradigmatic, and interpretive knowledge. It is this last piece of learning that has been addressed in the agreement acquisition literature of the last decade.

Beginning with perception, several studies have shown that grammatical subject-verb agreement distinctions emerge in very young children but that they may be susceptible to phonetic properties of the verb and/or utterance. Using a head-turn preference procedure, Soderstrom et al. (2002) and Soderstrom et al. (2007) showed that English acquiring infants as young as 16 months listened longer to sentences with

grammatical agreement morphology than to ungrammatical ones. Infants showed preferences for the sentences in which there was correct subject-verb agreement or in which the inflection was in the grammatically appropriate place, suggesting that grammatical representations are already in place by age 1.5. As a follow-up to Song et al. (2009) in which 2 year old children produced subject-verb agreement more accurately when the final syllable of the verb contained a simple as opposed to a complex coda, Sundara et al. (2011) investigated whether children's ability to detect the presence or absence of the third person singular /s/ in English would differ in embedded sentence-medially versus sentence-finally due to the phonetic variations of these two positions. Indeed, at age 2, children in their study were sensitive to missing agreement only when the verb was placed in sentence final position, not when the verb was the middle of the sentence, suggesting that the agreement marker is more or less easily detected phonetically depending on where it appears in the input.

For older children, aged 3 to 6, researchers have begun to employ comprehension methodologies, specifically picture-choice comprehension tasks, to further examine the acquisition process of agreement morphology. The first of these studies was Johnson et al. (2005) who sought to discover *when* children are sensitive to the third person singular /s/ marker in comprehension rather than production to determine when and/or if children understand the linguistic information encoded in the agreement marker. They administered a picture selection task to English-speaking children, testing singular and plural verbs only in the third person, where the expression of number in the subject was masked by the initial /s/ of a verb. Under such conditions, children did not reliably comprehend third person singular /s/ until well past the age of five. The researchers

attribute the comprehension delay to the uninterpretable status of subject-verb agreement morphology. They offer that perhaps in agreement in general, the features trigger agreement reflexively in production but cannot stand alone to carry meaning in comprehension when there is no extra support for meaning from the subject number (which was masked in their tasks). Similarly, de Villiers & Johnson (2007) found that children did not reliably detect /s/ as a marker of subject-verb agreement until 5 or 6 years old. While these authors propose a similar explanation to that of Johnson et al. (2005), it appears that what we see is that English children do not rely exclusively on /s/ inflection to determine the number of the subject because English declaratives always carry an overt subject. English agreement is almost always fully redundant because person and number markings appear on the subject noun, hence young children may simply ignore the verb marking in these tasks.

However, data from English, with its very weak agreement system, do not suffice in order to determine whether or not agreement features contribute to interpretation. It would follow that children acquiring languages with richer morphological paradigms, as well as null subjects, would show a different pattern of results, but this is not necessarily the case. Despite evidence that these children produce nonfinite verbs earlier than children acquiring English (i.e. Hoekstra & Hyams, 1998), comprehension studies in Spanish (Dominican: Pérez-Leroux, 2005; Mexican and Chilean: Miller & Schmidt, 2014), German (Brandt and Höhle, 2010), Czech (Smolik & Blahova, 2016) and Xhosa (Gxilishe et al., 2009), one of the Nguni group of Bantu languages, have found that the same production/comprehension asymmetry appears to exist cross-linguistically. Miller & Schmidt (2014) tested 4 and 5 year old monolingual Spanish speakers in Mexico and

in Chile. These two varieties were chosen because Chilean Spanish exhibits a
phonological lenition process affecting the realization of second person singular /-s/
which does not occur in Mexican Spanish. They found that, similarly to English and
regardless of the dialect, children performed around chance level in comprehension, but
were better when an overt subject, rather than a null subject, was paired with the inflected
verb. They posit that multiple, redundant markings may increase performance by
providing cumulative evidence for a plural or singular subject, as shown in (8a) and (8b):

(8) a. El pato nada en el charco

The.SG duck-SG swim-3SG in the pond.

'The duck swims in the pond'

b. Nada en el charco

Swim-3SG in the pond.

'(It) swims in the pond'

Additionally, they found that the 4 year olds were only able to perform above
chance in conditions with 2nd person singular, suggesting that some parts of the person
paradigm may be acquired before others. However, Pérez-Leroux (2005), whose
experimental procedure was very similar to that of Johnson et al. (2005), found that the
presence of an overt subject did in fact *not* help her 4 year old Dominican subjects to
improve their comprehension performance. In this case, Dominican Spanish was also
chosen because of its variability in the production of final /s/ (realized as an alternation

between omission, aspiration and deletion) and argued by the author to be an excellent population for comparison with English since number is primarily recoverable by means of the verb rather than other clues in the phrase. The monolingual Dominican children performed above chance at ages 5 and 6, but not before. She concluded that there is a cross-linguistic developmental gap in using verbal morphology in comprehension.

The exception to this general picture of late comprehension is data on French-acquiring children (Legendre et al., 2010; Barrière et al., 2011; Legendre et al., 2014). Legendre et al. (2010) showed that 2.5 year old monolingual French children could successfully distinguish 3rd person singular and plural morphology not only in a preferential looking task, but also in a picture-matching task. Example stimuli from the task are shown in (9a) and (9b):

(9) a. Il embrasse le gef.

He.3sg kiss.3sg the 'gef.'

'He kisses the gef.'

b. Ils embrassent le tak.

He.3pl kiss.3pl the 'gef.'

'They kiss the tak.'

Barrière et al. (2011) carried out a similar pointing task using novel verbs representing unfamiliar actions and again showed that children of the same age could

distinguish 3rd person singular and plural morphology in comprehension. To address these cross-linguistic differences, Legendre et al. (2014) tested monolingual children aged 2 and 3 across three languages – English, Spanish and French - using the same picture-matching experiment with each group of children. The French stimuli were the same as Legendre et al. (2010). Examples of the stimuli for English (10a) and (10b) and Spanish (11a) and (11b) are shown below:

(10)   a. The boys kiss the /dajt/.

          b. The boy kisses the /naj/.

(11)   a. Besa el micho.

          kiss.3sg the 'micho.'

          'He kisses the micho.'

          b. Agarran el duco.

          catch.3pl the 'duco.'

          'They catch the duco.'

Their results confirmed the findings from previous studies in these languages, that there is a comprehension delay in English and Spanish, but not in French. The authors conclude, then, that the timeline of subject-verb agreement acquisition is language specific and may depend on the perceptual saliency and cue reliability of the morpho-phonological markers and root changes in each language. French-acquiring children, in

particular, can rely on the unambiguous marker of the /z/ liaison used in the examples in the study that does not exist in Spanish.

There is some evidence that children do not develop the ability to make explicit metalinguistic judgments about the grammaticality of sentences until around the age of six (Cairns et al., 2006; Goldin, forthcoming). This lends further support to a semantic explanation that accounts for the discrepancy between the findings of studies on infants' grammatical perceptions and those that have found toddlers to produce agreement inflection, while experiencing difficulty in interpreting it. Naigles (2002) identifies that studies with infants are generally perception studies in which the tasks focus on form and are devoid of meaning, whereas studies with young children tend to involve tasks that require some type of semantic interpretation, something that may still be difficult in the preschool years. Discrepancies across age groups, then, are due in part to methodological differences in the tasks, but more importantly to the difference in semantic content by adding referential context to auditory stimuli (Sundara et al., 2011). Indeed, in the previously mentioned studies, infants show perceptual sensitivity to verbal morphology, but the tasks do not assess comprehension. By contrast, the studies in multiple languages with slightly older children deal with their explicit semantic understanding of inflection. In fact, Brandt and Höhle (2010) showed that, independent of the linguistic characteristics of the sentences contrasted, German-speaking children aged 3 and 4 could reliably use the information provided by number agreement on the verb in a preferential looking task. However, when asked to point to a matching picture, the same children did not perform above chance level. Gonzalez-Gomez et al. (2017), who led two experimental tasks testing subject-verb agreement comprehension with Spanish-speaking

children, reached similar conclusions. In the first task the children listened to auditory stimuli with pseudowords and in the second tasks these were replaced with a noun they already recognized. By lowering the task demands in the second experiment, their results revealed earlier comprehension, at age 4 rather than at age 5.

Similar results were obtained in English-speaking children, even at age 6 (Beyer & Hudson Kam, 2009). Therefore, it appears to be the case in monolingual L1 acquisition of English and Spanish that knowledge of the distributional properties of functional morphemes related to agreement (perception of the grammar) precede knowledge of their interpretive implications (comprehension of the grammar) by several years (Soderstrom, 2008). This may be due to cognitive maturity or task complexity, but young children seem to recognize grammatical structures before they understand their meaning.

CHAPTER 3: HERITAGE AND L2 ACQUISITION APPROACHES

3.1 Introduction

Both child second language (L2) learners and heritage language bilingual children have been shown to undergo differential language development patterns and to display divergent outcomes to monolingual children and to dominant bilinguals in non-heritage contexts. Heritage speakers are raised in homes where a non-majority language is spoken and their levels of proficiency in each language vary dependent upon input and domain of use (Valdés, 2000). As they acquire and use their languages for different purposes, in

different contexts and with different people, heritage language children are rarely equally

proficient in both languages (Grosjean, 1998; Gathercole, 2016; Montrul, 2004). Rather,

their speaking and comprehension abilities fall within a continuum (Polinsky & Kagan,

2007). Similarly, child L2 acquisition differs from monolingual first language (L1)

because there is L1 influence in child L2 just as in adult L2 acquisition (Unsworth, 2007;

Montrul, 2008). Comparisons of child L1, child L2, child 2L1 and adult L2 acquisitions

demonstrate that these processes are decidedly different in developmental path and

ultimate attainment. It is widely accepted that child L1 is universally successful whereas

the other categories of acquisition often result in continued within-speaker and across-

speaker variability, especially in the production of verb morphology (Rothman, 2007).

This study is dedicated to understanding the development of subject-verb agreement in

Spanish heritage children and child L2 learners of Spanish attending a dual-language

program. A comparative analysis of these two groups may reveal underlying differences

in the acquisition process, and in the access and retrieval of functional features.

There is a growing body of literature dedicated to child L2 acquisition,

particularly regarding its similarities and differences in various grammatical areas with

respect to child L1 and adult L2 acquisition (Lakshmanan 1994, 1995; Schwartz, 2003,

2004; Meisel, 2007, 2008, 2011; de Houwer, 2011; Pladevall-Ballester, 2010, 2016;

Unsworth, 2007, 2016; Unsworth & Blom, 2010; Unsworth et al., 2014). Within the

generativist framework it is generally assumed that L1 acquisition is derived from access

to Universal Grammar (UG). In adult L2 acquisition, though, there has been a

longstanding debate over the involvement, or not, of UG (e.g. Bley-Vroman, 1990;

White, 2003). However, many studies have shown clear poverty of the stimulus effects in

which L2 adults show knowledge of grammatical constraints that cannot be attributed to their native language, input or instruction (for a review see Schwartz, 2003). Thus, this kind of L2 data points to the involvement of UG in L2. From this perspective, child L2 is also constrained and guided by UG, but does not necessarily follow the same developmental path as L1. Based on evidence from studies on various language pairs, Schwartz (2003, 2004) concludes that in the domain of inflectional morphology, child L2 acquisition is more like child L1 acquisition, but in the domain of syntax, child L2 acquisition is more like adult L2 acquisition in that there is L1 influence. Schwartz calls this *Asymmetric Acquisition* whereby L2 adults appear to acquire grammar asymmetrically, such that syntax typically precedes inflectional morphology.

3.2 Age of acquisition

Having established that child L2 shares representational and developmental properties with both L1 and adult L2 (Lakshmanan, 1995; Schwartz, 2003, 2004; Unsworth, 2007), teasing apart these similarities and differences is valuable for our general understanding of language acquisition. L2 children are both cognitively and biologically more mature than child L1 acquirers but less mature than adult L2 learners. Both child and adult L2 learners are affected by the existence of an L1 grammar which may influence the acquisition of the L2. In terms of child bilingualism, defining the age boundary at which point child 2L1 becomes child L2 or when child L2 becomes adult L2 is not straightforward. Some researchers argue that 2L1 should only constitute exposure to both languages within the first 2 months of life, others claim this period can last up to age 4 (for discussion, see Unsworth & Blom, 2010). Perhaps a more valid criterion to qualify a language as an L2 rather than 2L1 is that the basic properties of an L1 grammar

are in place before regular exposure to an L2 begins (Schwartz, 2004; Unsworth, 2007). While some discourse dependent properties continue to develop later into childhood and some linguistic phenomena develop at different rates across languages, the basic grammatical and lexical foundations of the first language are in place by the age of 4 (Guasti, 2002). Hence, this has been pinpointed as the pivotal moment in development at which qualitative differences in morphosyntactic production can be detected (Meisel, 2011; Unsworth, 2016).

Thus, a great deal of L2 acquisition research has addressed age of acquisition (AoA) effects because, in the long term, L2 children typically outperform L2 adults. However, whether these age effects take the form of a critical period remains controversial due to the range of variation in L2 acquisition (Herschensohn, 2007; and see Muñoz & Singleton, 2011, for a recent review). In fact, Meisel (2011) suggests there is a large degree of inter-individual variation between L2 children in terms of how fast they learn to speak a second language in addition to the variation found in ultimate attainment. The selective variability of different aspects of language at different chronological moments (for example, phonological variability precedes syntactic variability) suggests that if there is a critical period, it is not the same period for all aspects of grammar (Johnson & Newport, 1989). Most studies in this area have attempted to identify at which point the ability to acquire an L2 to nativelike levels starts to decline (e.g. age 4: Meisel, 2011; age 7: Johnson & Newport, 1989; or age 9: Hawkins and Franceschina, 2004). It appears, then, that the range of ages 5 to 10 is a period of diminishing ability in language acquisition (Herschensohn, 2007), but there has been little systematic investigation of the potential role of AoA within childhood and its

impact on child L2 development. Crucially, however, AoA, or biological maturity, is only one predictor for L2 outcomes because it co-exists with many other variable factors including L1/L2 proficiency, language dominance, frequency of L1 and L2 use, and kind of input (native vs. non-native) (Unsworth & Blom, 2010; de Houwer, 2011; Unsworth, 2016) as well as socio-motivational and individual cognitive factors. This thesis attempts to disentangle some of these factors by examining not only AoA, but also context of acquisition.

3.3 Context of acquisition

This study recruited bilingual participants from dual language programs in preschools and elementary schools with the purpose of finding bilinguals who are exposed to a significantly greater amount, as well as an academic register, of Spanish than those who are only exposed to the heritage language in the home. Additionally, in this environment there are children acquiring Spanish as an L2 in the U.S. which is not a context of general societal bilingualism. While there are various models used in the U.S., the basic principle of dual immersion education is that the mainstream curriculum is taught through two languages (Collier & Thomas, 2004; Montrul, 2008). It is important to note that these programs are not the norm. Most public schools are English monolingual with special ESL or transitional bilingual classrooms designed to mainstream students as quickly as possible into the English monolingual curriculum. Dual immersion schools, on the other hand, aim to foster bilingualism and biliteracy. These schools separate the two languages of instruction, focus on the core academic curriculum rather than a simplified or watered-down version (which is what is found in remedial ESL classrooms), high cognitive demand of grade-level lessons, and

collaborative learning in engaging and challenging academic content across the curriculum (Lindholm-Leary, 2001; Collier & Thomas, 2004; Potowski, 2007a, 2007b). In one-way dual language programs, the student population is composed entirely of language minority or heritage students with a common home language, acquiring English as a second language, but the educational model is the same. Two-way dual language programs serve a student population composed of nearly balanced numbers of language minority students from a single language group and English-fluent speakers (Lindholm-Leary, 2001). As of 2011, the Center for Applied Linguistics documented nearly 450 dual immersion programs operating in elementary schools across the country, which is a substantial increase from the previous decade, as can be seen in Figure 1. The majority of bilingual schools in the U.S. are Spanish-English, but there are also programs offered in a wide variety of other languages.

Figure 1 Growth of dual immersion programs in the U.S.

Growth of Language Immersion in the United States 1971-2011
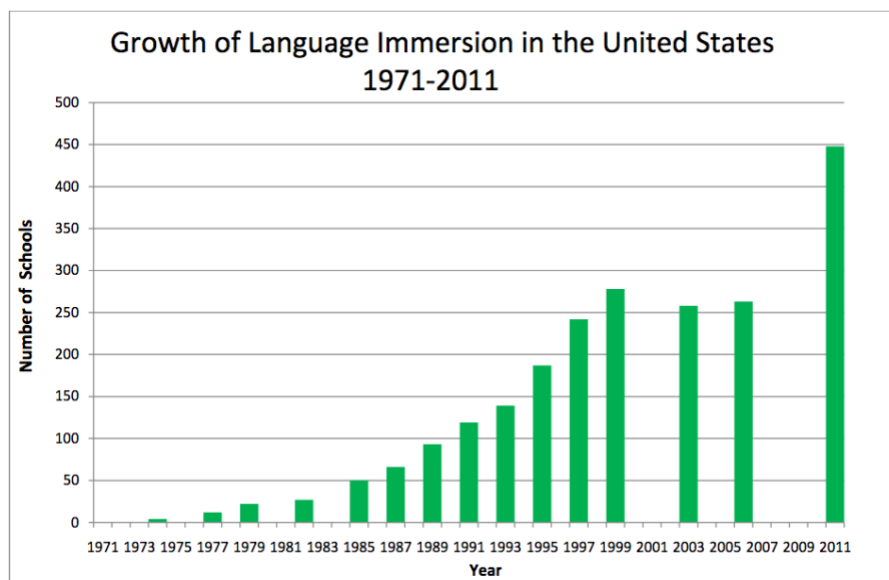
from CAL (2016)

Dual immersion programs confer several important advantages over other types of bilingual education. Heritage speakers of Spanish benefit because they are integrated with native English-speaking peers throughout the school day while they are acquiring English as a second language and can also continue to develop their Spanish proficiency, particularly more formal registers, which is an opportunity not offered by the vast majority of U.S. elementary schools (Montrul & Potowski, 2007; Potowski, 2007b). Likewise, English-speaking students benefit from interaction with native Spanish-speaking peers, instead of relying on the teacher as the sole source of Spanish input. Depending on the school, in a dual immersion program 50–90% of the school day is taught in Spanish, and the proportion of English instruction is often progressively and gradually increased in each grade. Students, therefore, have the opportunity to use Spanish for real communication about a wide variety of topics across the curriculum. Students also have social and academic opportunities to interact in their L2—whether English or Spanish—with native-speaking peers (Montrul & Potowski, 2007; Potowski,

2007b). Additionally, studies show that dual immersion students score higher than national norms on standardized tests of academic proficiency (Lindholm-Leary, 2001; Collier & Thomas, 2004; Cobb et al., 2009; Lindholm-Leary & Block, 2011) and also demonstrate enhanced performance on attentional and executive control tasks (Nicolay & Poncelet, 2015).

Despite the impressive growth of dual immersion programs in the United States, there has been little research on the linguistic progress or language proficiency of students in these schools. For L2 learners of Spanish, a few studies have tracked the comprehension and production abilities of children in bilingual schools in their acquisition of null subjects, verb morphology and verb movement, and gender agreement, in an effort to contribute to theories of child L2 acquisition (Herschensohn et al., 2005; Pladevall Ballester, 2010, 2016) or to compare their developmental path to that of heritage children (Montrul & Potowski, 2007). For heritage speakers, input received from formal instruction, spoken and written, in the heritage language has been found to be a distinguishing factor in bilingual speakers with different proficiencies. Montrul and Potowski (2007) investigated gender-marking and agreement in English-Spanish bilingual children aged six to eleven attending a dual immersion school in Chicago. They found that, though the heritage children performed differently to monolingual Spanish children, there was no evidence of language loss with increased age, suggesting that schooling in the heritage language enables both language acquisition and maintenance. Kupisch and Pierantozzi (2010) also studied children aged six to eleven attending dual immersion schools, but in this case, they worked with heritage speakers of Italian living in Hamburg, Germany. Their findings echoed those of Montrul and Potowski (2007), in

which there was no decline in linguistic abilities with increased age, suggesting that schooling in the heritage language can prevent language loss5. Both studies acknowledged that there is still more research to be done to understand the long-term effects (into adulthood) of immersion education.

However, some preliminary studies of Korean and Chinese Sunday school programs in the United States have shown that exposure to just a few hours of heritage language schooling per week does not seem to have any serious effect on language maintenance (for a review, see Polinsky 2007). Similarly, Bylund and Diaz (2012) studied the effects of weekly Spanish heritage language classes for children in Sweden and found that the positive effects on their L1 proficiency were short term rather than long term.

For both L2 learners and heritage speakers, schooling in the second or heritage language might explain differential outcomes and possible improved performance due to three different dimensions proposed by Kupisch and Rothman (2016), originally with heritage populations in mind. The first is that some properties of the standard variety of a language, like a more sophisticated register, are only taught through formal instruction at school, though they are not necessarily mastered after instruction even in the case of monolinguals living in monolingual societies. The second is having the heritage or second language not as the object of learning but rather as the medium of instruction because learners become familiarized with and learn how to handle scholarly instructions in this language. Finally, formal school settings provide significantly more opportunity to

5 Many studies have shown that without academic support for the minority language (which is the case for most heritage children), heritage speakers experience varying degrees of heritage language loss once instruction in the majority language begins (for a review, see Montrul, 2008).

use the second or heritage language and its different registers more authentically with a greater variety of people, especially peers of the same age.

3.4 Bilingual acquisition of verb morphology

I turn now to the literature on the acquisition of verb morphology by various bilingual populations including simultaneous bilinguals, child L2 learners and heritage speakers as they relate to the extralinguistic factors of this study, namely age of acquisition and context of acquisition. This thesis investigates how age and learning environment, which vary between these different kinds of bilinguals, may modulate the development of subject-verb agreement and the access and retrieval of functional features. While various proposals have been posited in order to account for the differences noted among these groups (which will be described in more detail here), this dissertation is situated within the Distributed Morphology framework as it provides an effective model for explaining the patterns observed.

3.4.1 Simultaneous bilinguals

Studies investigating early morphosyntactic development of bilingual children acquiring English together with another more morphologically robust language have reported a developmental asynchrony between the two languages (Paradis & Genesee, 1996; Serratrice, 2001; Castro & Gavruseva, 2003). Across these studies simultaneous bilingual children appear to develop like monolingual children in each of their languages, producing bare stems in English while at the same time producing a substantial proportion of inflected verb forms in their other language. In Spanish/English

bilingualism specifically, Castro and Gavruseva (2003) investigated the use of inflected and uninflected verbs in the development of a bilingual child between ages 1;9 and 2;6. They found that the child's productions in English were overwhelmingly bare stems, but that in Spanish, verbs were almost exclusively inflected. This contrast in finiteness is very comparable to the rates reported in other studies for English monolingual children (Hoekstra & Hyams, 1998; Hyams, 2001) and Spanish monolingual children (Grinstead, 1998; Bel, 2001).

A possible explanation for more rapid acquisition of finiteness marking in Spanish than in English could be the fact that it is simply impossible to pronounce a verbal root, e.g. *camin-* 'walk', in Spanish without adding at least the word-final "word marker" morpheme *–a* to form *camina* (Harris 1991). In English, on the other hand, a morphological root *walk* is the same as the morphological stem *walk*. As noted by Pratt and Grinstead (2007), "though Spanish-speaking children seem willing to simply produce a stem, even when it does not agree with the subject, they would seem likely to be more keenly aware of word-final morphological processes than are child English speakers, simply as a function of input" (p. 357).

These results confirm the language specificity of the acquisition process. This evidence also lends support for the claims that bilingual first language acquisition entails the development of independent and parallel syntactic systems (Meisel, 1989; De Houwer, 1990; Genesee et al., 1995).

To conclude, verbal morphology is acquired by monolingual and simultaneous bilingual children in a very systematic way albeit at different language-specific rates. In

both languages, monolingual children display fairly complete acquisition and production of verbal agreement morphology by age 4. However, interpretive aspects of verbal inflectional morphology that interact with semantics, pragmatics and cognition unfold later, as will be discussed in the next section as they relate to the results of the bilingual children in this study.

3.4.2 Child L2 learners

In L2 acquisition, verbal morphology has been found to be especially vulnerable to instability, with adult L2 learners showing optionality when it comes to marking finiteness, tense or mood (for a review, see Montrul, 2004). The large body of research that has examined the development and use of morphology in adult SLA has documented, among many other significant contributions, that the developmental sequence of L1 and L2 acquisition is often quite different (Rothman, 2007). As we have seen from studies in English and Spanish acquisition, monolingual and simultaneous bilingual children pass through a period of morphological optionality (the OI stage, Wexler, 1994) but are universally successful at reaching target-like agreement morphology by age 4. As discussed in the previous section, Spanish has a more complex verbal paradigm than English with inflection for person, number, tense, aspect and mood. English learners of Spanish, therefore, must acquire important morphosyntactic differences between English and Spanish regarding not only inflection, but also word order and null subject use (Zagona, 2002; Camacho, 2013). In adult L2 acquisition, some studies hold that syntactic phenomena like word order may be in place even when L2 morphological production is variable and non-target-like, but that unlike child L1, adults don't show systematic

acquisition of person and number agreement (Lardiere, 1998; Liceras et al., 1999; Prévost & White, 2000; Bruhn de Garavito, 2003). Rather, adult L2 learners frequently alternate between finite and non-finite forms in places where finites would be expected (Prévost & White, 2000).

It has been argued that adult L2 learners' variable use of verbal inflection can be attributable to an impairment of functional features in the L2 grammar (the Failed Functional Features Hypothesis (FFFH), Hawkins and Chan, 1997), but more evidence supports the position that the grammar of L2 learners contains abstract categories and features, and that difficulties arise in the mapping from the abstract features to the corresponding surface morphology (Haznedar & Schwartz, 1997; Lardiere, 1998, 2000; Prévost & White, 2000). The FFFH considers that inflectional errors or variability results from an underlying syntactic deficit and that learners in the post-critical period are impaired in acquiring L2 uninterpretable features that do not exist in the L1. The Full Transfer/Full Access Model (FTFA) (Schwartz & Sprouse, 1996), on the other hand, assumes that all the learner's L1 functional features and Universal Grammar principles are always available, but that L1 transfer, rather than maturation or age effects from a critical period, is the cause of surface morphological variability. In her pioneering work, Lardiere (1998, 2000) examined the L2 acquisition of a Chinese-speaking adult learner of English over a decade-long period and revealed that, despite morphological variability, her grammar showed strong evidence of syntactic competence. The grammar did not appear limited in the syntactic specification of functional categories, but rather only in the mapping of morphosyntactic features to phonological realizations. Prévost and White (2000) term this morphological mismatching the Missing Surface Inflection Hypothesis

(MSIH), building on the Missing Inflection Hypothesis of Haznedar and Schwartz (1997). According to this hypothesis, L2 learners can easily acquire the abstract semantic and syntactic features of verbal morphology as well as functional categories but have difficulties in mapping these abstract features to their corresponding morpho-phonological forms in production. Thus, morphological inflection is absent only at the surface level but not at the abstract level. They propose that while in an adult monolingual grammar non-finite forms are specified as [-finite] and finite forms are [+finite], in the interlanguage grammar of a learner non-finite forms can be inserted into a node bearing the [+finite] feature because of mismatching features in the L2 grammar. Finite forms, however, appear to be fully specified as [+finite] and therefore appear in finite contexts. Additionally, they suggest that non-finite forms act as defaults because they are underspecified for finiteness. Thus, in this proposal, there are mismatching features but no syntactic deficit and 'default' is equivalent to an absence of inflection.

Various studies have examined child L2 acquisition of English verbal agreement (i.e. Johnson & Newport, 1989; Haznedar & Schwartz, 1997; Ionin & Wexler, 2002; Haznedar, 2003; Gavruseva, 2004; Paradis, 2010; Blom et al., 2012), and it is unclear whether young L2 learners pass through an OI stage like L1 learners (Prévost & White, 2000), or whether they resemble adult L2 learners in treating nonfinite forms as finites (Haznedar & Schwartz, 1997; Ionin & Wexler, 2002). However, very little is still known about the process of acquisition by child L2 learners of Spanish. Herschensohn et al. (2005) carried out a study with English L1 children learning Spanish in an immersion setting to establish the process of acquisition of syntax and verb morphology. The children, aged 7, were tested at 2-month intervals during the second half of their second

year of immersion schooling, first grade. Their results show that the L2 learners have far greater comprehension of verbal number morphology than ability to produce it, and that though the accuracy of their production increases over time with each round of testing, morphological production is largely non-target-like. Their syntax, however, is essentially target-like and appears to have been acquired by this age.[6] The authors claim their results demonstrate a child L2 acquisition process that more closely resembles adult L2 than child L1 because of the amount of non-target-like verbs. However, compared to previous studies with adult intermediate L2 learners, these child learners produce fewer non-finite forms than adult L2 learners and favor 'wrong' inflection of various types over missing inflection.

In summary, studies investigating the acquisition of verb morphology by child L2 learners across various languages have found evidence that while morphological production may be variable, the abstract semantic and syntactic features of verbal morphology as well as functional categories are in place early on in L2 acquisition, as proposed by the MSIH (Prévost and White, 2000). Just as functional categories are available from the very earliest stages of L1 acquisition (Meisel, 1994), these studies demonstrate that the same is also true in L2 acquisition (Lakshmanan, 1995). Thus, the variability observed in the inflectional morphology of child L2 learners lies in the mapping of abstract features onto their corresponding morpho-phonological forms in production.

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[6] This was determined by the authors because of the fact that the children showed hardly any errors in word order, case marking of pronouns and use of null subjects.

3.4.3 Heritage speakers

The same morphological variability found in L2 acquisition has also been found in heritage speakers (Montrul, 2011). It is important to note that these findings differ from evidence from simultaneous bilinguals in contexts of societal bilingualism, as mentioned in section 3.4.1. Heritage speakers may be either simultaneous bilinguals or sequential bilinguals, having first acquired the heritage language and then the majority language of the society (Valdés, 2000). For this reason, heritage speakers comprise a separate category in terms of child language acquisition.

Variability in heritage speaker morphology has been found not only in the domain of subject-verb agreement but also in the tense, aspect and mood paradigm (Silva-Corvalán, 1994; Potowski et al., 2009; Montrul, 2009; Montrul, 2011; Pascual y Cabo et al., 2012; Perez-Cortes, 2016). Montrul (2011) finds that though this variability may parallel that of L2 adult learners, theoretical proposals from SLA cannot account for heritage speaker grammars because their linguistic experience is different. Heritage speakers are either simultaneous bilinguals or L1 speakers of the heritage language, but usually experience reduced input conditions and limited opportunities to use the language once schooling in the majority language begins. It is this linguistic circumstance, Montrul argues, that leads to grammars that show simplification and overregularization of complex morphological patterns, possibly exacerbated by transfer from the dominant language. Perez-Cortes (2016), on the other hand, claims that a dominance shift to the majority language affects the strength of the association between functional, semantic and phonological form features in the weaker language as a result of constant inhibition, as

proposed by Putnam & Sánchez (2013). This state in which the weaker language is activated with less frequency increases the chances of dominant language transfer and reassembly of features in the heritage language. Optionality in subject-verb agreement has been noted to begin in heritage speakers as early as in the preschool years (Bedore & Leonard, 2001) and to continue through the elementary years (Jacobson, 2012; Rodriguez et al., 2017), suggesting that the shift to dominance in the majority language often begins early in linguistic development, with the introduction of mainstream majority language education.[7]

In summary, various factors have been found to contribute to the different acquisition patterns of subject-verb agreement noted in bilingual children. One of these is age of acquisition which determines whether a child is a simultaneous bilingual (exposure to both languages from birth or before the age of 2) or an L2 learner (exposure to the L2 begins later in childhood after the grammatical and lexical foundations of the L1 have been established). However, this factor alone cannot account for the variability in verb morphology. Thus, this dissertation also investigates context of acquisition and questions whether bilingual children who are exposed to Spanish only at school in the form of dual-language immersion education show differences to those who attend the same school, but have a greater amount of exposure because they are heritage speakers and also are exposed to Spanish in the home. Through the Distributed Morphology framework, this thesis delves into how these factors impact the production and comprehension of verb morphology in bilingual children, whose extended period of development provides a

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[7] Austin et al. (2017) found evidence of a transitional period for heritage children acquiring English as an L2 in majority language schooling. Heritage speakers were more likely to identify null subjects in English with verbs on which they had already acquired inflection than with bare stems.

unique window from which to observe how all children acquire the functional features of

grammar.

CHAPTER 4: RESEARCH METHODOLOGIES

This dissertation seeks to delve further into the language-specific developmental patterns of inflectional morphology in number by investigating the acquisition process of English-Spanish heritage and L2 bilingual children. I explore the comprehension-production asymmetry and children's ability to distinguish imperative clauses from declarative clauses in order to help disentangle how RIs are instantiated in early child language and also how children find meaning in morphology. Looking at this phenomenon in a bilingual population may allow for a more in-depth understanding of why subject-verb agreement appears to be inherently difficult for children to use in comprehension. Possibly, young children struggle to make semantic decisions about a sentence's subject number based on verbal inflection, regardless of whether a language has rich morphology or null subjects, but for a child acquiring two languages simultaneously the picture may be slightly different. Morphological acquisition in one language may bolster acquisition in the other, or perhaps subject-verb agreement develops at a different pace than in monolinguals due to cross-linguistic influence. Additionally, I explore how extra-linguistic factors including AoA and context of acquisition may modulate the acquisition process.

4.1 Research questions

As previously mentioned in Chapter 1 and as an initial step in addressing the aforementioned issues, this study is guided by the following research questions:

1. At which age do simultaneous heritage bilingual children acquire verbal number morphology in comprehension and production, and does this differ to monolingual peers?

I hypothesize that being bilingual should not affect the rate of acquisition of verbal morphology in production, as previous studies have shown (Paradis & Genesee, 1996; Serratrice, 2001; Castro & Gavruseva, 2003; Austin, 2009). However, keeping in mind that heritage bilinguals have been shown to produce variable morphology (Bedore & Leonard, 2001; Jacobson, 2012; Rodriguez et al., 2017), this hypothesis is supported by the fact that this group of children attends a dual immersion program and, therefore, has increased input and activation (Putnam & Sanchez, 2013) of both languages[8]. By contrast, when it comes to comprehension abilities, very little is known about bilingual development. Based on what has been shown in monolingual child development, it is expected that at age 4, children will perform more accurately in production than in comprehension in both English and Spanish (Johnson et al., 2005; Pérez-Leroux, 2005; de Villiers & Johnson, 2007; Legendre et al., 2014; Miller & Schmitt, 2014). This may be due to young children's difficulty with explicit semantic understanding of inflection (Naigles, 2002). By age 5, though, it is expected that children will perform similarly in both production and comprehension in their dominant language, but will continue to show variability in their non-dominant language because as previous research has shown, child L2 learners (Herschensohn, 2007; Meisel, 2011) and heritage children in the U.S. (i.e. Bedore & Leonard, 2001) display continued morphological variability in Spanish throughout the elementary years.

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[8] Some studies have found evidence of delay in bilingual children, particularly the non-dominant language, due to reduced input (Blom, 2010; Hoff et al., 2012).

2. Does AoA (initial exposure to Spanish at age 3 or at age 5) affect the emergence of verbal number morphology in comprehension and production in Spanish among child L2 learners?

It has been proposed that the pivotal moment in development at which qualitative differences in L2 morphosyntactic production can be detected is the age of 4 because it is by this point that the basic grammatical and lexical foundations of a first language are in place (Meisel, 2011; Unsworth, 2016). Thus, it is hypothesized that AoA will have an effect on the development of subject-verb agreement between children acquiring Spanish from age 3 and those acquiring Spanish from age 5. Based on findings from Rothman et al. (2016) in which younger child L2 learners took longer to acquire the passive construction than older child L2 learners, it is expected that the children acquiring Spanish from age 5 will perform as accurately as those acquiring Spanish from age 3 even though they've had fewer years of exposure to the L2. This may be due to more mature cognitive and metalinguistic abilities or a more thoroughly established L1 to act as a foundation for the L2.

3. Do heritage speakers, who have earlier and greater amount of exposure to Spanish, display more accuracy in their comprehension and production of verbal number morphology than L2 learners? Does immersion education compensate for early exposure?

Though both groups of children in this study attend dual-language programs, the child L2 learners are, generally, only exposed to Spanish at school, while the heritage children have exposure to Spanish not only at school, but also at home and in their community. This additional reinforcement of Spanish for heritage children in the form of formal education, has been shown to be a distinguishing factor in increased proficiency

levels among heritage speakers (Montrul & Potowski, 2007; Montrul, 2008).

Additionally, the heritage speakers have been exposed to both English and Spanish from

birth whereas the L2 learners began their acquisition of Spanish at either age 3 or age 5.

Thus, it is hypothesized that for the heritage children who receive a greater and earlier

amount of input in Spanish, knowledge of agreement morphology should emerge sooner

than for L2 acquirers who are only exposed to Spanish during school hours and began

their acquisition process later in development.

4. Do bilingual children resort to default morphology to express subject-verb
   agreement in number?

It is hypothesized that bilingual children should have acquired subject-verb

agreement in, at least, their dominant language by the age of 5 and will show variability

before then. Working within the Distributed Morphology framework, it is predicted that

this variability will be expressed by default morphology (in Spanish: 3rd person singular

as proposed by Grinstead (1998) or infinitive forms as proposed by Liceras et al. (2006)

and McCarthy (2006); in English: the root or infinitive of the verb) when 2L1 and L2

children have not yet fully acquired the target inflectional morphology. This is because

learners produce default morphological forms when they have difficulty selecting the

target form or when its syntactic features are underspecified and cannot be matched with

a phonological form.

Based on the default morphology of each specific language, singular morphology

should take longer to acquire in English and plural morphology should take longer to

acquire in Spanish. This is because third person singular is the only marked form in the English verb morphology paradigm (Johnson et al., 2005), whereas in Spanish, third person singular is the only unmarked form, or default, making it one of the first forms to be produced by Spanish monolingual children (Grinstead, 1998; Bel, 2001). Additionally, both Marrero and Aguirre (2003) and Forsythe (2015) have shown that plurality appears later in acquisition and that nominal plural emerges before verbal plural. Studies in monolingual children have shown that the ability to use inflectional marking on the verb to infer subject number (either plural or singular) does not emerge until after age 5 in both English (Johnson et al., 2005; de Villiers & Johnson, 2007) and Spanish (Pérez-Leroux, 2005; Miller & Schmitt, 2014). In previous studies in both English and Spanish, older children (5 and 6 year olds) performed better on the marked member of the verbal paradigm. For Spanish this was 3rd person plural (Pérez-Leroux, 2005; Miller & Schmitt, 2014; Forsythe, 2015) and for English this was 3rd person singular (Johnson et al., 2005). For bilingual children, if singular is the default in Spanish, it may be the case that singular is then acquired sooner in English due to cross-linguistic influence. A bilingual child who must acquire both a weak and a robust inflectional system, may acquire the marked forms in the weaker system more rapidly because of the added support of the more robust paradigm. Bootstrapping effects such as these, in which the acquisition of a linguistic feature in one language aids the acquisition of a feature in the other language, have been found in syntactic structures in bilingual children (Gawlitzek-Maiwald & Tracy, 1996; Bernardini & Schlyter, 2004)

5. Does the overt value of the null subject parameter in English affect agreement in Spanish?

In Spanish, the presence of an overt subject should provide additional support for comprehension of subject-verb agreement. Though Pérez-Leroux (2005) did not find that the additional support of an overt subject helped 4 year old Dominican children perform more accurately in subject-verb agreement comprehension, Miller & Schmitt (2014) found that 4 year old Mexican children and 5 year old Chilean children showed improved performance when the agreeing verb was accompanied by an overt subject, rather than a null subject. The bilingual children in this study are heritage speakers of Spanish living in the U.S. and child L2 learners of Spanish whose L1 is English. As English is the majority language in this case and English is an overt subject language, it is possible that due to cross-linguistic influence or frequency of activation (Putnam & Sánchez, 2013) these groups of bilingual children may over rely on the expression of overt subjects in Spanish (Jacobson, 2012). Thus, it is expected that the presence of an overt subject in Spanish will help improve children's ability to use inflectional marking on the verb to infer subject number in Spanish comprehension.

6. Do bilingual children understand the syntax and morphology of imperatives in Spanish?

In Spanish, the third person singular default and second person singular imperative lack overt inflection except for the thematic vowel of the verb and are homophonous. It has thus been proposed that these unmarked forms realize the RI stage in null subject languages (Salustri and Hyams, 2003, 2006; Perales et al., 2005; Pratt & Grinstead, 2007; Ezeizabarrena, 2012). As Alcázar & Saltarelli (2014) posit, imperative

clauses are just as syntactically complex as declaratives or interrogatives, and the imperatives that appear in early child language carry the same semantic and referential value as in the adult grammar (Liceras et al., 2006). Though they may be homophonous, RIs lack functional content (Wexler, 1994) whereas imperatives are indeed inflected for second person singular. Therefore, in Spanish, if bilingual children can distinguish between imperative and declarative sentences, we will have evidence that they understand that the syntax and morphology of the imperative carry illocutionary force and that they are not relying on third person singular morphology as a default.

7. Does comprehension of imperatives emerge before comprehension of verbal number morphology in bilingual children?

It is hypothesized that bilingual children will display the ability to comprehend imperatives before they can comprehend verbal number morphology. They should have representational knowledge of imperative subject-verb agreement in comprehension in both of their languages from very early on because imperatives are found among monolingual children's earliest verb utterances alongside null subject declaratives and comprise a large part of a child's early input (Gathercole et al., 1999; Orfitelli & Hyams, 2012). In English, Orfitelli & Hyams (2012) showed that monolingual children as young as 2;6 could distinguish between the imperative and the declarative in a comprehension task, but very little is known about how early this ability appears in Spanish acquisition.

If in early language development, children have comprehension of imperatives but not verbal number morphology (which has been shown to appear around age 5 in both English and Spanish acquisition), we will have evidence that syntax is acquired

before morphology because children would show understanding of the illocutionary force of imperatives without relying on their verbal morphology.

4.2 Participants

In an effort to track the acquisition process for bilingual children, this is a cross-sectional study with a total of 200 participants divided into various groups. The bilingual children were recruited from a Spanish immersion preschool in New Jersey and a dual-language charter school in Hoboken. 21 children in Pre-K3 (11 HL [mean age=3;8, SD=3.91] and 10 L2 with AoA of 3 [mean age=3;8, SD=4.7); 23 children in Pre-K4 (10 HL [mean age=4;9, SD=4] and 12 L2 with AoA of 3 [mean age=4;8, SD=3.3]); 35 children in Kindergarten (11 HL [mean age=5;8, SD=3.1], 7 L2 with AoA of 3 [mean age=5;6, SD=2.4], 19 L2 with AoA of 5[mean age=5;9, SD=4.3]); and 42 children in 1st grade (10 HL [mean age=6;9, SD=4.7], 6 L2 with AoA of 3[mean age=6;5, SD=1.5], 27 L2 with AoA of 5[mean age=7;0, SD=4]). Parents were asked to complete a language background questionnaire with details about the children's language use and exposure since birth. In order for the heritage speakers to qualify for the study, they needed to be simultaneous bilinguals and have been exposed to both English and Spanish before the age of 2[9]. The decision to only include simultaneous heritage speakers was made to attempt an analysis of a bilingual group of children whose AoA is equivalent to that of a monolingual child.

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[9] Due to the lack of agreement on what age range constitutes 2L1 (for discussion, see Unsworth & Blom, 2010), this study has chosen to follow the criterion that in order for two languages to qualify as L1s, neither grammar must have been established before beginning regular exposure to the other language (Schwartz, 2004; Unsworth, 2007). Thus, the age of 2 has been set as the delimiting age.

The L2 learners were children from English speaking families whose first age of exposure to Spanish at school was either 3 (in preschool) or 5 (in Kindergarten). At time of testing, the children with AoA of 3 had 6 months -1 year of Spanish exposure in Pre-K3, 1-2 years of Spanish exposure in Pre-K4, 2-3 years of exposure in Kindergarten and 3-4 years of exposure by 1st grade. The children with AoA of 5 had, at time of testing, 6 months of Spanish exposure in Kindergarten, and 1 year and 6 months of exposure in 1st grade. As previously mentioned, the heritage speakers were exposed to Spanish in the home from before the age of 2 and had the same number of years of schooling in the heritage language as their L2 peers. A total of 4 heritage children had parents who reported that they did not speak English until beginning daycare or preschool at age 2 or 2;6. An English monolingual comparison group consisted of children of the same ages, recruited from three preschools in New Jersey and through personal contacts. There were 12 children in Pre-K3 (mean age=3;8, SD=5), 10 children in Pre-K4 (mean age=4;8, SD=4.9), 8 children in Kindergarten (mean age=5;9, SD=3.4), and 10 children in 1st grade (mean age=7;0, SD=3.8). Some of these children were exposed to a home language other than English, but none spent more than 20% of their time in an environment with the second language. A comparison group of monolingually raised Spanish children of the same ages was recruited from a summer camp in Madrid, Spain[10]. In this group, all the children attended Spanish schools where they began English lessons at age 2 or 3 (an average of 1 hour per day) and all parents reported that learning English was of great

[10] Due to IRB restrictions, parents could not be asked country of origin on the language background questionnaire. Parents were asked what variety of Spanish they spoke, but many left this question blank or gave vague answers such as 'Latin American Spanish' or 'US Spanish'. Thus, there was no specific or evident variety of Spanish for the comparison group of Spanish-dominant children. No differences have been noted to exist in the production of subject-verb agreement morphology or null subjects in the Spanish of Madrid, Spain (Aguirre, 2011; Camacho, 2013), and so this seemed a suitable comparison group.

importance for their children's future. Some also had German or French lessons at school. The main home language for all the children was Spanish, but some families also had one parent who spoke German, French or English. There were 11 children in Pre-K3 (mean age=4;1, SD=2.5), 10 children in Pre-K4 (mean age=4;8, SD=4.7), 9 children in Kindergarten (mean age=6;0, SD=3.3), and 9 children in 1_{st} grade (mean age=7;0, SD=6.5). A few children were excluded from analysis for being too fidgety to complete the tasks including one 3 year old child from the English monolingual group and one 3 year old from the L2 learners group.

The Spanish immersion preschool school is located in New Jersey and offers programs for children ages 2;6 to first grade. The preschool programs for ages 2;6 to 4 are 100% immersion taught by a staff of native teachers of Spanish from Latin American countries. For children in pre-kindergarten through 1_{st} grade, one hour of English literacy is provided every day by a native English teacher but all other subjects and activities, including recess and lunchtime, are led in Spanish. From my classroom observations, the children are consistently encouraged and reminded to interact in Spanish with their teachers and classmates but revert to English with their peers during playtime and spontaneous interactions. Roughly 50% of the students are heritage speakers of Spanish and the other 50% are children who come from English monolingual families.

The dual-language charter school is located in Hoboken, NJ and offers programs for Kindergarten through 8_{th} grade. The school provides a completely bilingual environment in which most teachers and staff speak both English and Spanish, and signage and wall decorations are also in both languages. In Kindergarten and 1_{st} grade children are exposed to a 90:10 program in which they spend 90 percent of their day in

Spanish, learning content such as math and social studies as well as how to read in that language. The remaining 10 percent of the day is conducted in English. The 90:10 split lasts until 2nd grade at which point the percentage shifts gradually until a 50:50 split is reached in fifth grade. The majority of students are L2 learners of Spanish from English monolingual families or from families who speak other languages. A small percentage of students are heritage speakers of Spanish.

4.3 Procedure

Children's proficiency in nominal morphology in each language was assessed using a modified version of the Bilingual English Spanish Assessment, BESA (Peña et al., 2014)[11] and parents were asked to complete a language background questionnaire for each child which included information such as age of first exposure and current language use. There were three tasks in this experiment: a production task, a comprehension task, and a forced choice task. The first was a fill-in-the-blanks elicited production task. The second was a picture matching task to elicit comprehension ability, and the third was a forced choice task for a contextually appropriate utterance. Two versions of each task were created, one in Spanish and one in English, and all were delivered via a PowerPoint presentation presented on a 13-inch screen laptop. All the bilingual children received the Spanish tasks first and then the English tasks in the same 20 minute session. The experimenter spoke to the participants in the language in which the experiment was being carried out. Monolingual participants were administered the task in English only or Spanish only.

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[11] Specifically, children were tested on their knowledge of plural nominals.

4.4 Materials

4.4.1 Fill in the Blanks Task

The fill in the blanks task consisted of 8 experimental items and 4 fillers. The participants were shown two images, one of a singular action and one of a plural action. They heard the accompanying sentence for the first image and were asked to complete the sentence with a verb for the second image. Half of the experimental items showed a singular subject performing an action in the present simple tense and the other half showed plural subjects to elicit both singular and plural subject-verb agreement in the third person. 12 regular verbs, with -ar, -er, and -ir conjugations, were chosen for representing a range of morphological forms that commonly occur in children's input both at home and in the classroom. The filler items also showed two images, but were designed to elicit the passive tense. Participants' responses were audio and video recorded, and coded for type of morphological production. These included 1) accurate morphology, 2) 3rd person singular morphology, 3) infinitive forms or 4) other morphology (first or second person instead of third, incorrect theme vowels, incorrect tense or mood markers).

The following examples illustrate the types of sentences used in both the Spanish and the English task. 12(a) is an example of singular verb morphology elicitation. 12(b) shows plural verb morphology elicitation

 12a)
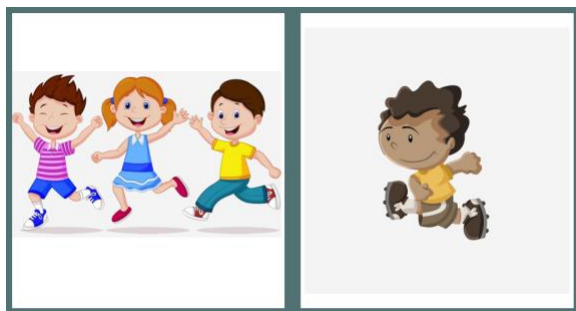
Experimenter in Spanish: Aquí los niños corren todos los días y aquí Alex también. ¿Qué hace Alex? Alex …

Experimenter in English: Here, the children run every day and here Alex does too. What does Alex do? Alex …

12b)

Experimenter in Spanish: Aquí Marco juega todos los días y aquí sus amigos también. ¿Qué hacen sus amigos todos los días? Ellos …

Experimenter in English: Here, Marco plays every day and here his friends do too. What do his friends do every day? They …

4.4.2 Picture Matching Task

The picture matching task consisted of 16 experimental items and 4 fillers. Participants were shown two images at the same time, one of a singular subject performing an action and the other of a plural subject performing the same action. They heard an accompanying sentence recorded by a 'mommy' and were asked to choose which image the mommy was talking about. Half of the experimental sentences (8) were

plural and half (8) were singular. Of these 8 plural and 8 singular sentences, 4 contained a null subject (even in English) and 4 contained an overt subject. All the stimuli were designed to elicit third person singular and plural morphology. As in the production task, a set of 20 regular verbs, with -ar, -er, and -ir conjugations, were chosen for representing a range of morphological forms that commonly occur in children's input both at home in the classroom

The following examples illustrate the types of sentences used in both the Spanish and the English task. 13(a) is an example of a singular sentence with an overt subject. 13(b) shows a singular sentence with a null subject. 13(c) shows a plural sentence with an overt subject. 13(d) shows a plural sentences with a null subject.

13   (a)

Accompanying audio in Spanish: '¡El niño toma agua!'

Accompanying audio in English: 'The child drinks water!'

(b)

Accompanying audio in Spanish: '¡Come la manzana!'

Accompanying audio in English: 'Eats the apple!'

(c)

Accompanying audio in Spanish: '¡Los niños corren la carrera!'

Accompanying audio in English: 'The children run the race!'

(d)

Accompanying audio in Spanish: '¡Recogen los juguetes!'

Accompanying audio in English: 'Pick up the toys!'

All of the items were counterbalanced, and the expected choices were also counterbalanced between Choice A and Choice B. The filler items showed two images, one of a single child and one of two children looking at each other while performing an action with the intention of eliciting comprehension of second person morphology. Participants' responses were audio and video recorded, and coded for accuracy.

4.4.3 Forced Choice Task

The forced choice task consisted of a series of still photographs showing a father and his children with eight experimental items and four fillers. 12 regular verbs, with -ar, -er, and -ir conjugations, were chosen for representing a range of morphological forms that commonly occur in children's input both at home and in the classroom. In Spanish, the images showed the father with just one child and in English, the images showed him with both children[12]. In the experimental items, the father was shown to be either addressing the children directly or to be observing them from a distance. In each item, participants heard two recorded options, one declarative and one imperative. Then, participants were told the experimenter did not know what the father was saying in the photograph. They were asked what the father had said in the image by choosing which of the options matched the context better. It was expected that the imperative sentences would be chosen as the better match for the images in which the father was directly addressing the children, and the declarative sentences would be a better match for the images in which the father was observing the children. All of the images and sentences were singular in Spanish and plural in English, and Choice A and Choice B were counterbalanced.

The following examples illustrate the imperative condition used in the task in X(a) and the declarative condition used in 14(b):

[12] This design choice was due to the morphology of the imperative in English matching third person plural, and in Spanish matching third person singular.

14 (a)

English task   Spanish task

Choice A: 'Clean the table!' or '¡Limpia la mesa!'

Choice B: 'The children clean the table!' or '¡El niño limpia la mesa!'

(b)

English task   Spanish task

Choice A: 'Drink water!' or '¡Toma agua!'

Choice B: 'The children drink water!' or '¡El niño toma!'

Participant responses were audio and video recorded and coded for expected response. See appendix 9 for a list of experimental stimuli. The filler items had a similar structure to the experimental ones, but the sentences were true or false statements with the aim of checking that the participants understood the task and were focusing on the sentences presented to them.

4.4.4 Summary

In this chapter I have presented the research methodology of this study including the 200 participants, the materials (three tasks: a fill in the blanks task, a picture matching

task and a forced choice task) and their procedure. In the following chapter, I will analyze

the results of these three tasks. Each section will present the descriptive results first,

followed by the statistical analysis and a preliminary interpretation of the results. An

analysis of how these findings relate to the research questions guiding this dissertation

will be offered in Chapter 6.

CHAPTER 5: RESULTS

5.1 Introduction

This chapter examines the results of the screening task (BESA) and the three experimental tasks described in chapter 4, completed by five participant groups: heritage simultaneous bilinguals (HL), L2ers with AoA of 3 (L2-AoA 3), L2ers with AoA of 5 (L2-AoA 5), Spanish-dominant children (SD) and English monolinguals (ME). As explained in the previous chapter, the objective of these tasks was to assess the development of subject-verb agreement in bilingual children. By comparing heritage speakers (simultaneous bilinguals) to L2 learners with different ages of Spanish acquisition (at age 3 and at age 5), this dissertation explores the extent to which AoA and context of acquisition play a role in modulating linguistic performance. Additionally, the contrast between third person declarative and second person imperative morphology contributes to debates about the instantiation of RIs (Perales et al., 2005; Liceras et al., 2006; Pratt & Grinstead, 2007) and the access and retrieval of functional features in early language development (i.e. Meisel, 1994; Lakshmanan, 1995).

In the following sections, the results for each task will first be presented in Spanish and in English separately. Then, the results for the various tasks will be compared to each other as they relate to the research questions that guide this thesis. The main findings show that there is generally an effect of AoA and age across tasks in both languages, but not necessarily context of acquisition. The pattern of acquisition of subject-verb agreement differs across groups depending on various linguistic and extra-linguistic factors.

5.2 BESA: Nominal Morphology

To recall, first all the children completed the nominal morphology portion of the BESA (which had 5 task items adapted from Peña et al. (2014)). Children's ability to produce nominal morphology in both English and Spanish was assessed because previous studies have shown that acquisition of nominal morphology precedes that of verbal morphology in monolingual children (Marrero and Aguirre, 2003; Forsythe, 2015).

In order to assess possible group differences, the data were analyzed in R version 1.1.5019 (R Development Core Team, 2012) using a linear regression to examine BESA scores as a function of group (HL, L2-AoA 3, L2-AoA 5, ME, SD) and age. The predictor 'group' was dummy coded with SD participants set as the reference level in Spanish and ME participants set as the reference level in English.

In Spanish, the SD group performed most accurately ($\beta = 0.60$; SE = 0.08; z = 7.41; p = 0.99) and the L2ers with AoA of 5 performed least accurately ($\beta = -1.13$; SE = 0.05; z = -20.6; p = 0.42), but there was no significant difference between groups (see Figure 2). There was a main effect of age ($\beta = .03$; SE = .001; z = 22.1; p < .001) as accuracy in all groups increased with age. In English, all groups performed similarly to each other and to the ME comparison group ($\beta = 0.23$; SE = 0.05; z = 5.11; p = 0.12). There was a slight effect of age ($\beta = .03$; SE = .002; z = 17.1; p < .036) since the L2ers with AoA of 5 were tested only between the ages of 5 and 7, and they were already performing at ceiling in this age range (see Figure 3). Table 1 shows us the mean scores and standard deviations in each group. In both languages and in all groups, accuracy is lower in the earlier stages of acquisition and was either at ceiling or nearly at ceiling by 1st grade. Even the children with AoA of 5 had mean scores near ceiling in Spanish by

1st grade which suggests that the plural /s/ marker of nominal morphology is acquired

relatively quickly.

Table 3 BESA scores for nominal morphology out of 5 by group

Group	Grade	Spanish Mean	Spanish SD	English Mean	English SD
HL	PreK-3	2.91	2.20	3.17	1.70
HL	PreK-4	4.5	0.50	5	0
HL	Kinder	4.3	0.64	4.8	0.40
HL	1st	4.6	.049	5	0
L2	PreK-3	2.89	1.45	3.56	1.43
L2	PreK-4	3.08	1.26	4.33	1.18
L2 - AoA 3	Kinder	4.71	0.45	4.86	0.35
L2 - AoA 3	1st	5	0	5	0
L2 - AoA 5	Kinder	3.32	1.17	5	0
L2 - AoA 5	1st	4.41	0.82	5	0
ME	PreK-3	N/A	N/A	4.18	1.12
ME	PreK-4	N/A	N/A	4.9	0.30

ME	Kinder	N/A	N/A	5	0
ME	1st	N/A	N/A	4.9	0.30
SD	PreK-3	4.36	0.98	N/A	N/A
SD	PreK-4	5	0	N/A	N/A
SD	Kinder	5	0	N/A	N/A
SD	1st	5	0	N/A	N/A

Fig 2. Spanish BESA scores as a function of age and group
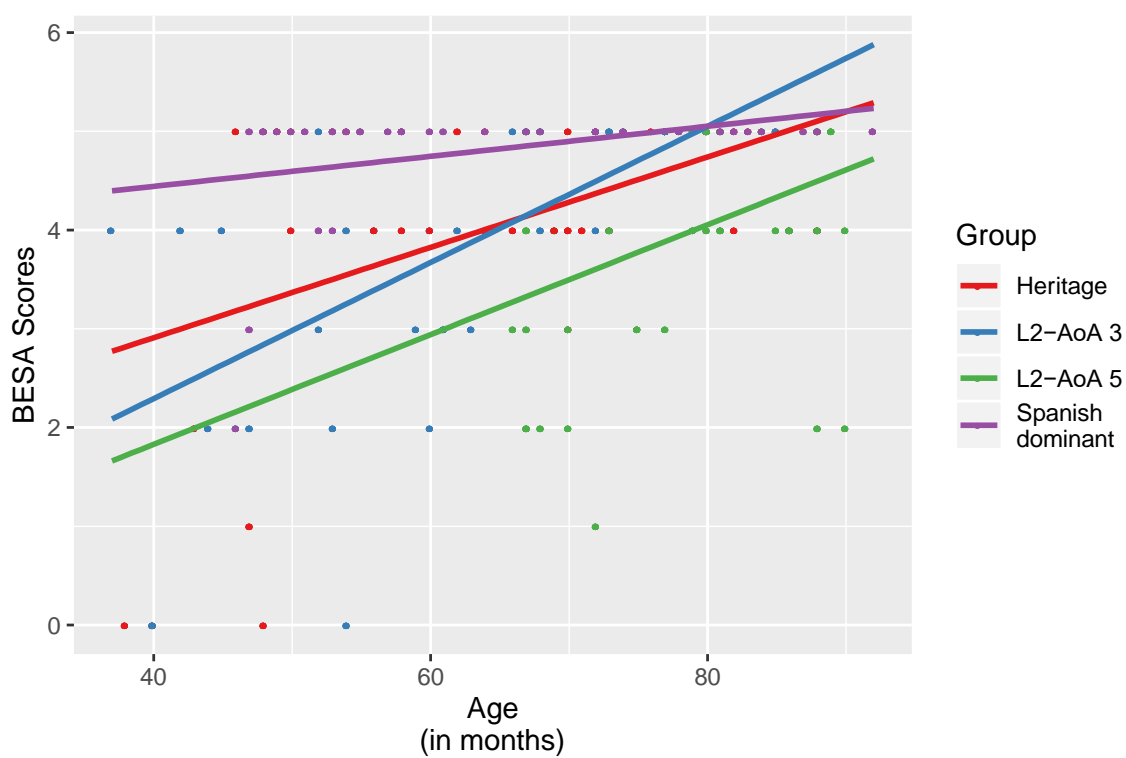
Fig 3. English BESA scores as a function of age and group
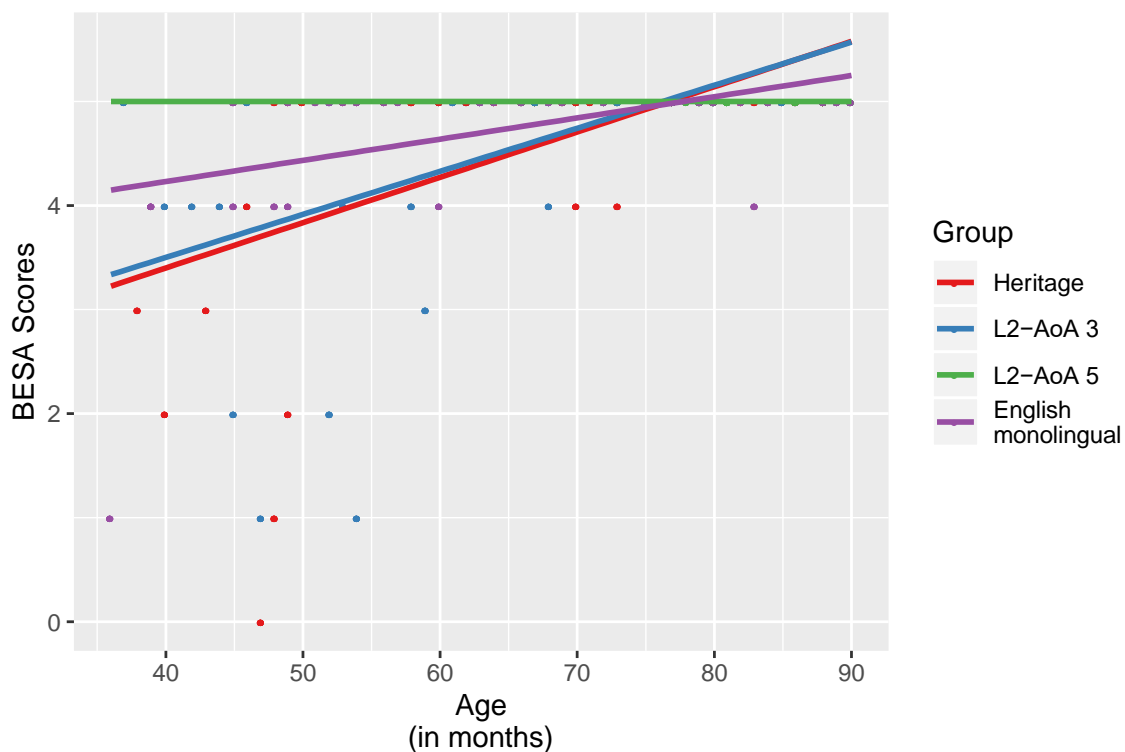
5.3 Fill in the blanks task

Table 4 below shows the mean accuracy scores of all the children by group and AoA in both English and Spanish. From this table we can see that Spanish dominant children perform at ceiling by PreK-3 whereas English monolingual children do not reach ceiling until PreK-4 or Kindergarten. For the bilingual children, accuracy is higher in English than in Spanish across all grades.

Table 4 Mean production accuracy by group and grade on Fill in the Blanks Task (on both singular and plural conditions)

Group	Grade	Spanish Mean	English Mean
HL	PreK-3	39%	70%
HL	PreK-4	68%	99%
HL	Kinder	58%	97%
HL	1st	87%	100%
L2	PreK-3	35%	79%
L2	Prek-4	44%	93%
L2 - AoA 3	Kinder	79%	98%
L2 - AoA 3	1st	90%	100%
L2 - AoA 5	Kinder	33%	97%
L2 - AoA 5	1st	56%	99%
ME	Prek-3	N/A	79%
ME	Prek-4	N/A	93%
ME	Kinder	N/A	97%
ME	1st	N/A	100%

SD	PreK-3	98%	N/A
SD	PreK-4	98%	N/A
SD	Kinder	100%	N/A
SD	1st	100%	N/A

5.3.1 Fill in the blanks task - Spanish

The data were analyzed using a GLMM to examine accuracy (0,1) as a function of group (HL, L2-AoA 3, L2-AoA 5, ME, SD), age, and condition (singular, plural). Given the categorical nature of the participants' responses (accurate/non-target-like), the data were modeled using GLMMs with a binomial linking function. The predictor 'group' was dummy coded with SD participants set as the reference level. Main effects and higher order interactions were tested using nested model comparisons. Age was centered with the mean age (5;7) set at 0.

In Spanish, the analysis yielded a main effect of group ($\chi_2(3) = 127.83$, $p < .001$). The SD group performed more accurately than the HL and both L2 groups ($\beta = 1.91$; SE $= 0.32$; z $= 5.95$; p $< .001$). The HL and L2-AoA 3 groups performed similarly to each other ($\beta = 0.03$; SE $= 0.29$; z $= -.12$; p $= .90$) and the L2-AoA 5 group has the lowest accuracy ($\beta = 0.26$; SE $= 0.33$; z $= .07$; p $= .93$) (see Figure 4). There was a main effect of age ($\chi_2(1) = 40.44$, $p < .001$) and an age by condition interaction ($\chi_2(1) = 4.07$, $p < 0.04$), but no main effect of condition ($\chi_2(1) = 0.36$, $p = 0.55$). Thus, the model with the interaction was retained. Accuracy across all groups increased with age. Though accuracy

increased with age in both conditions, the effect of age was greater in the plural condition than in the singular condition, as seen in Figure 5. The heritage and L2 groups achieved a higher mean accuracy on the singular conditions at an earlier age than on plural conditions, whereas the Spanish-dominant children performed at ceiling on both conditions by the ages tested here.

Fig 4. Overall mean accuracy on Fill in the Blanks Task in Spanish as a function of age and group
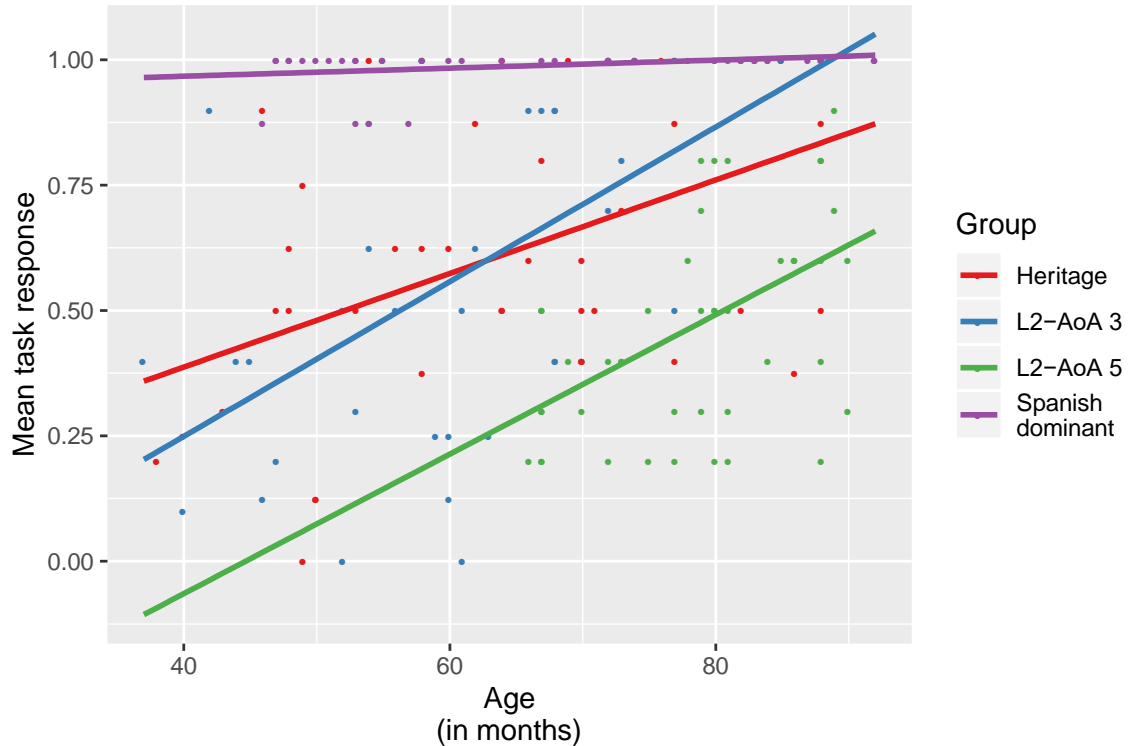
Fig. 5 Mean accuracy in Spanish on plural and singular conditions by group and age
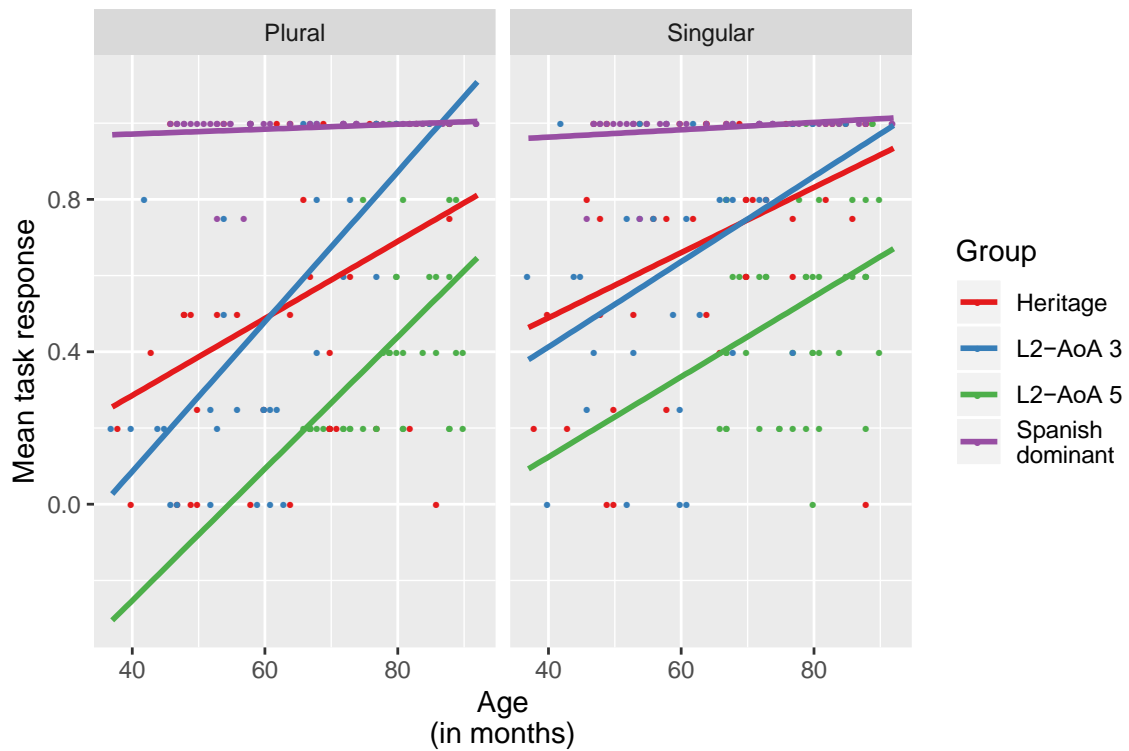
In order to explore possible factors that may have led to the unexpected difference in performance between the heritage simultaneous bilinguals and the Spanish-dominant children (both exposed to Spanish from birth), further analysis was conducted to assess the effect of Spanish output within the heritage group. Two output variables were extracted from parents' responses on the language background questionnaires: primary home language and the language the child was most comfortable speaking. The data were analyzed using a GLMM to examine accuracy (0,1) as a function of age, primary home language (Spanish, English, bilingual), and language the child was most comfortable speaking (Spanish, English, both equally). Given the categorical nature of the participants' responses (accurate/non-target-like), the data were modeled using GLMMs with a binomial linking function. The predictors 'home language' and 'language child is

most comfortable speaking' were dummy coded with Spanish set as the reference level. Main effects and higher order interactions were tested using nested model comparisons. Age was centered with the mean age (5;7) set at 0.

The analysis yielded a main effect of primary home language ($\chi_2(2) = 20.38$, $p < .001$). The heritage children whose primary home language was English performed less accurately than those whose language was Spanish or bilingual ($\beta = -2.74$; SE $= 0.74$; z $= -3.66$; p $< .001$) (see Figure 6). The heritage children whose parents reported they felt more comfortable speaking Spanish performed more accurately than those who felt more comfortable speaking English or felt equally comfortable speaking both ($\beta = 4.14$; SE $= 1.15$; z $= 3.61$; p $< .001$) (see Figure 7). There was a main effect of age ($\chi_2(1) = 10.08$, $p < .001$), but no interactions. As seen in both Figures 6 and 7, children who felt more comfortable speaking English and whose primary home language was English performed significantly less accurately on the fill in the blanks task. In other words, children who produced or spoke more English at home and overall had less target-like third person singular and plural verb morphology in Spanish production.

Fig. 6 Mean accuracy as a function of age and primary home language (as reported by parents)
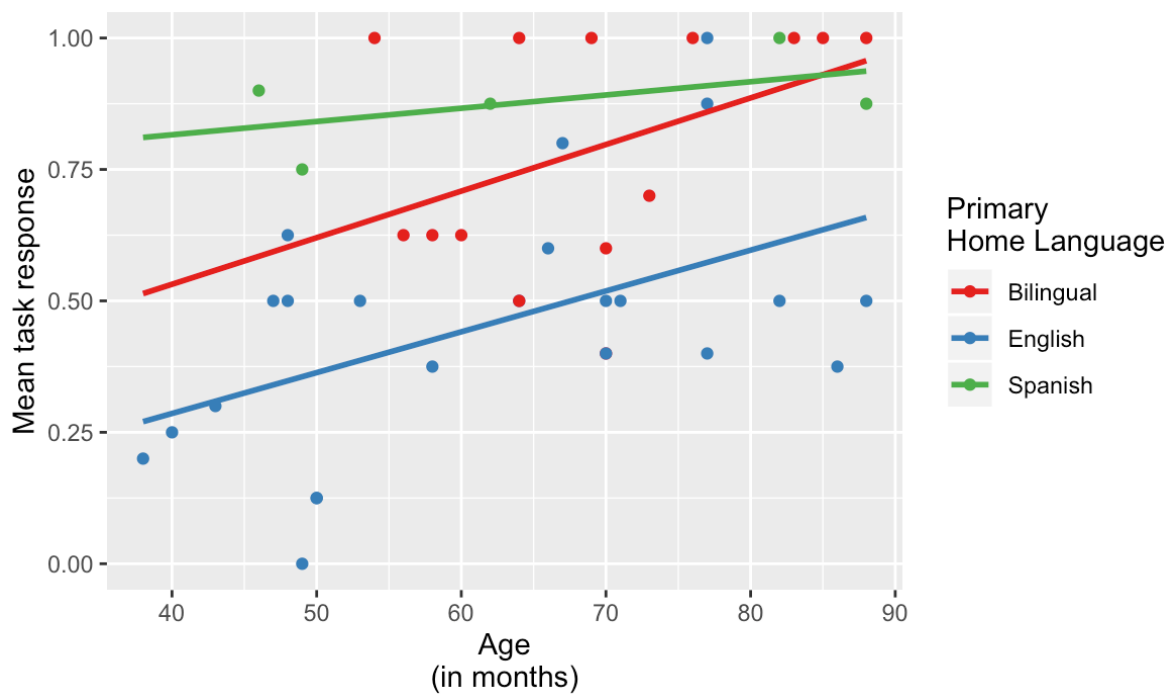
Fig. 7 Mean accuracy as a function of age and language child was most comfortable speaking (as reported by parents)
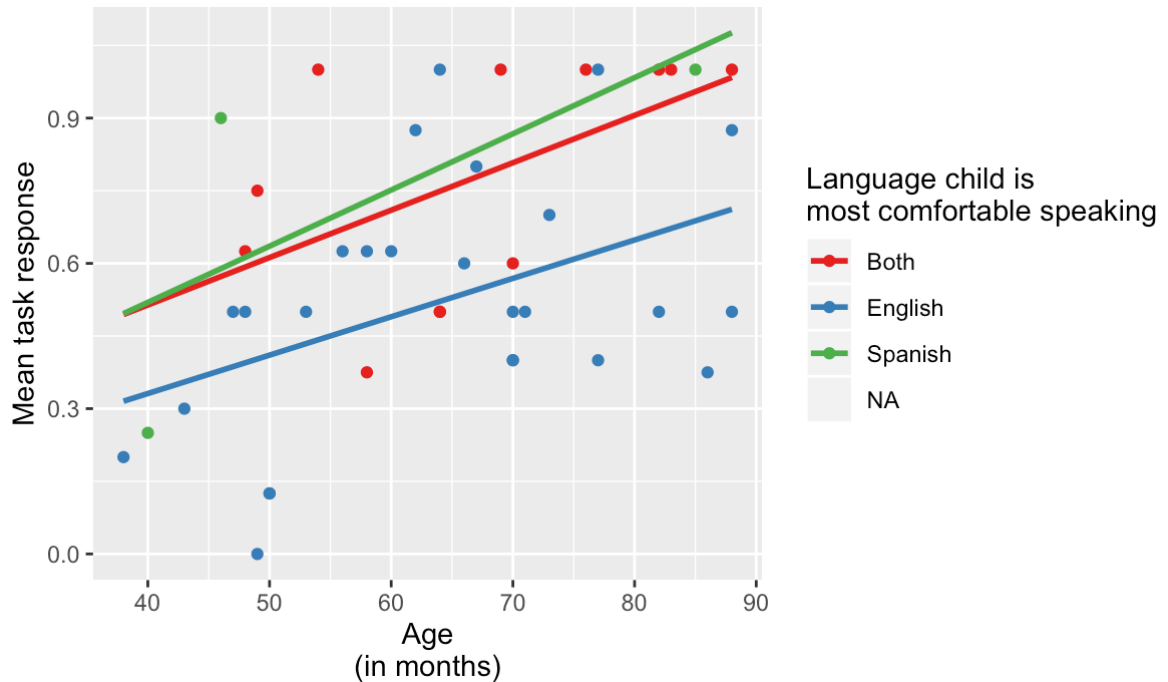
A further GLMM was conducted to determine what kind of non-target like morphology children produced when they did not produce accurate morphology. Non-target responses were coded into three categories: infinitives (e.g. 'el niño comer'), third person singular (e.g. 'los niños corre'), and other morphology such as person/number/tense mismatches (e.g. 'el niño dormiste'). The model examined mean response accuracy as a function of group (HL, L2-AoA 3, L2-AoA 5, ME, SD), age, and category type (infinitive, 3rd person singular, other). Age was centered with the mean age (5;7) set at 0.

The analysis yielded a main effect of non-target like category type ($\chi_2(2) = 53.24$, $p < .001$) such that the third person singular was produced significantly less than the other two categories ($\beta = -1.00$; $SE = 0.15$; $z = -6.73$; $p < .001$). There was no effect of age ($\chi_2(1) = 2.05$, $p = 0.15$) or group ($\chi_2(3) = 1.45$, $p = 0.69$), but there was a group by type interaction ($\chi_2(9) = 27.85$, $p < .001$) (see Figure 8) such that the effect of error type

varied across groups. As seen in Figure 8, the least common type of non-target response in all groups, especially in the Spanish dominant group, was third person singular. Figure 9 shows how children's non-target productions change as they get older. In particular, infinitive responses decrease over time as third person singular and other morphology such as number, person or tense mismatches increase for all the bilingual groups except the heritage speakers who only show an increase in 3rd person singular, but not other morphology. Spanish-dominant children have very few non-target responses and only at the very earliest age.

Fig. 8 Percent of non-target responses by type and group
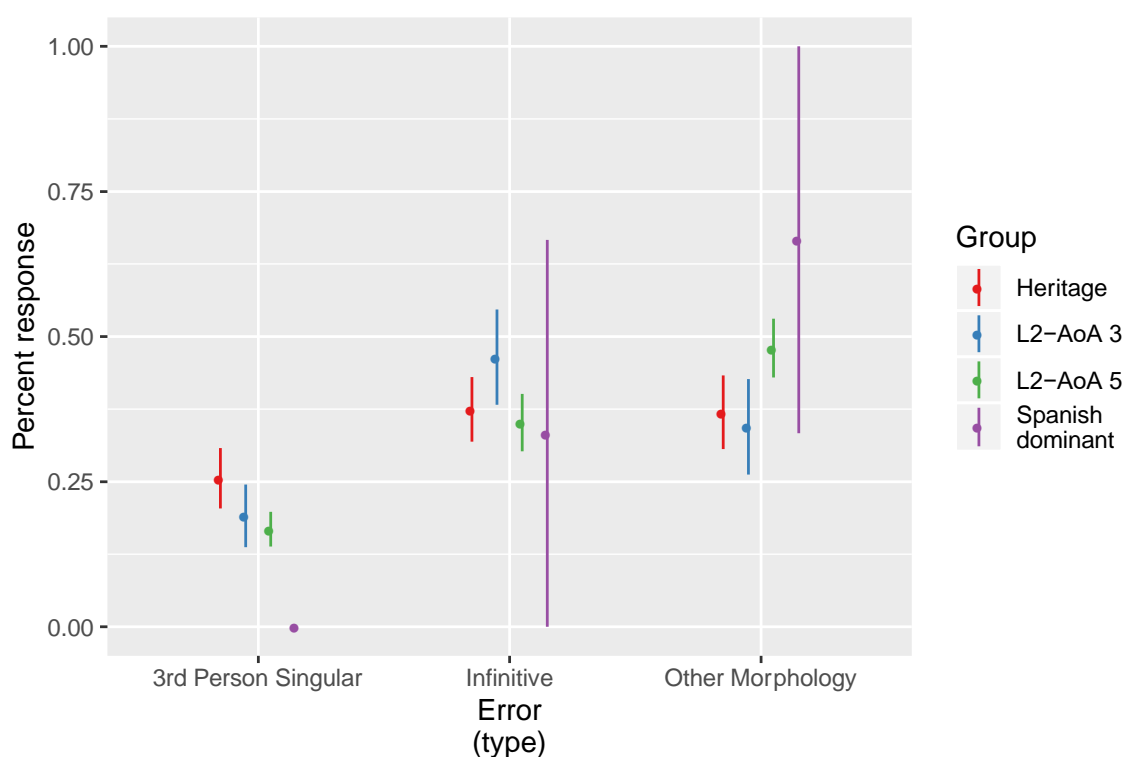
Fig. 9 Percent of non-target responses by type, group and age
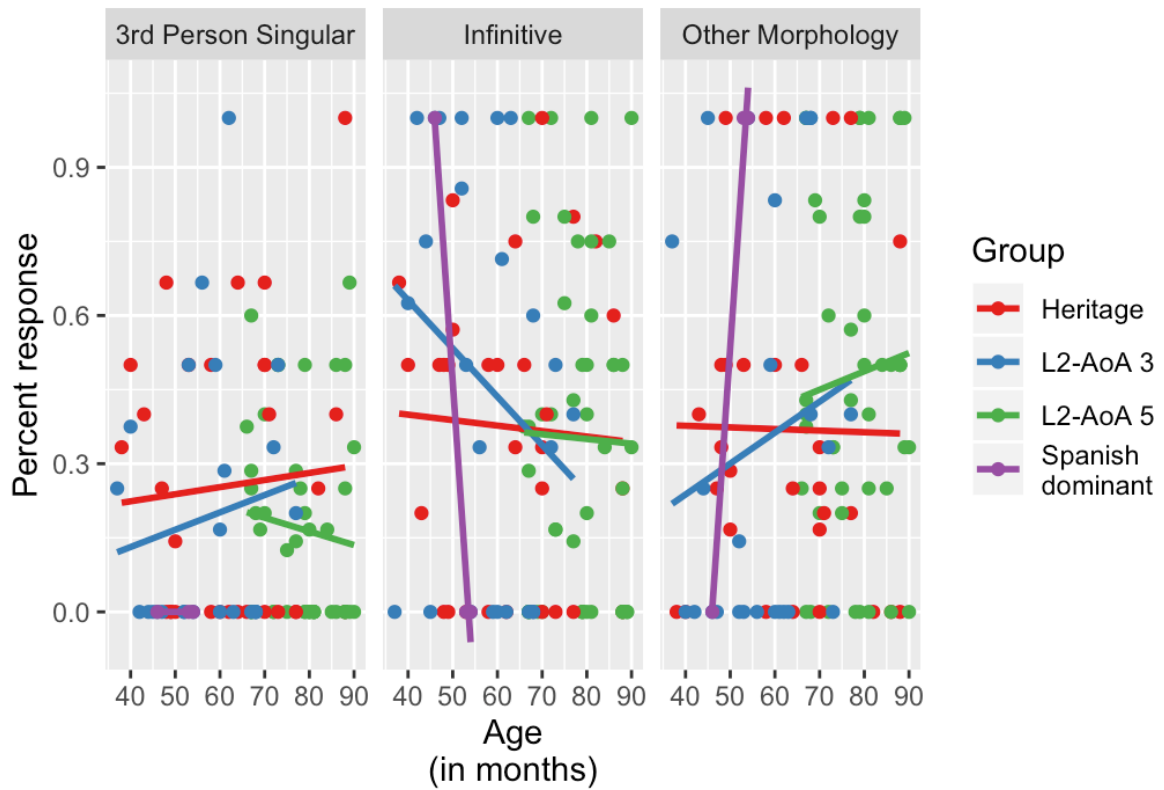
5.3.2 Fill in the blanks task - English

The same GLMM was used for the English responses of both bilingual groups and the EM group. The predictor 'group' was dummy coded with ME participants set as the reference level. Main effects and higher order interactions were tested using nested model comparisons. Figure 10 reports the overall mean production accuracy by age and group. There was no effect of group ($\chi_2(3) = 1.72$, $p = 0.63$), but there was a main effect of age ($\chi_2(1) = 10.02$, $p < .001$), and a main effect of condition ($\chi_2(1) = 17.85$, $p < .001$). There were no higher order interactions. All four groups performed similarly, and

accuracy increased with age for all groups. As seen in Figure 11, the plural condition was acquired earlier than the singular condition.

Fig. 10 Mean production accuracy by group and age on Fill in the Blanks Task in English (across both conditions)
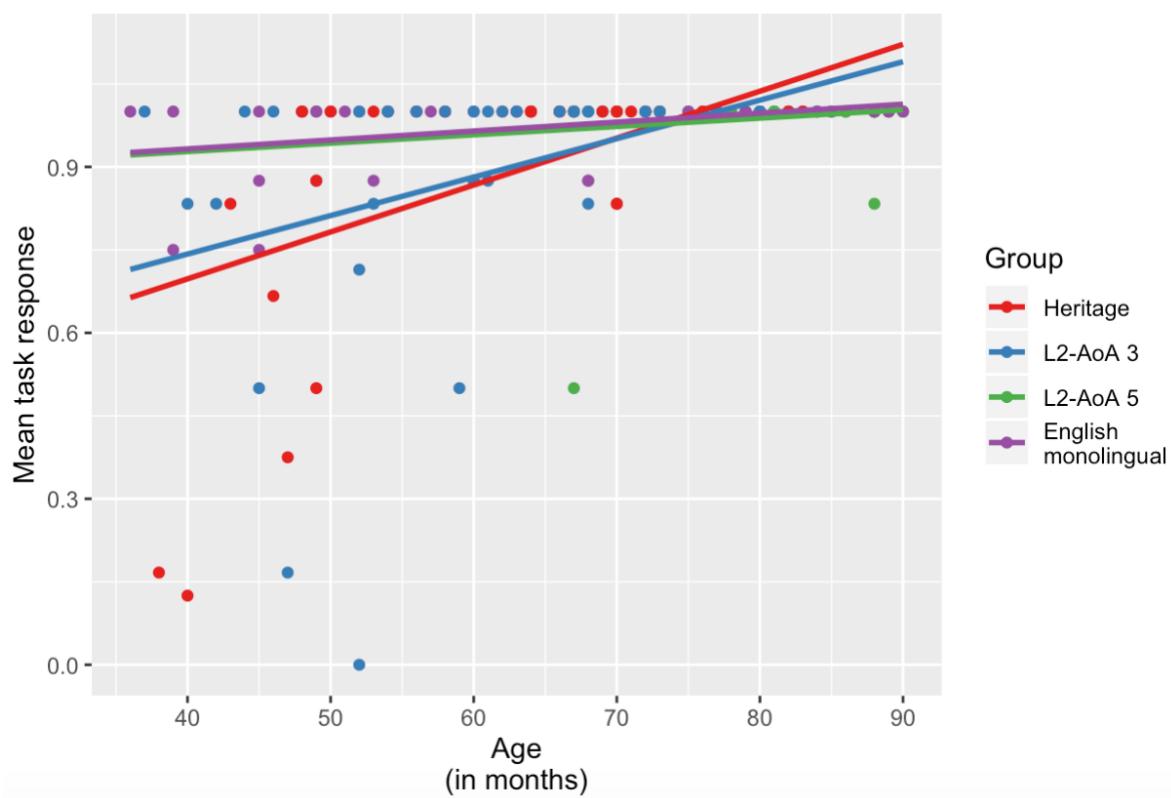
Fig. 11 Mean accuracy in English on plural and singular conditions by group
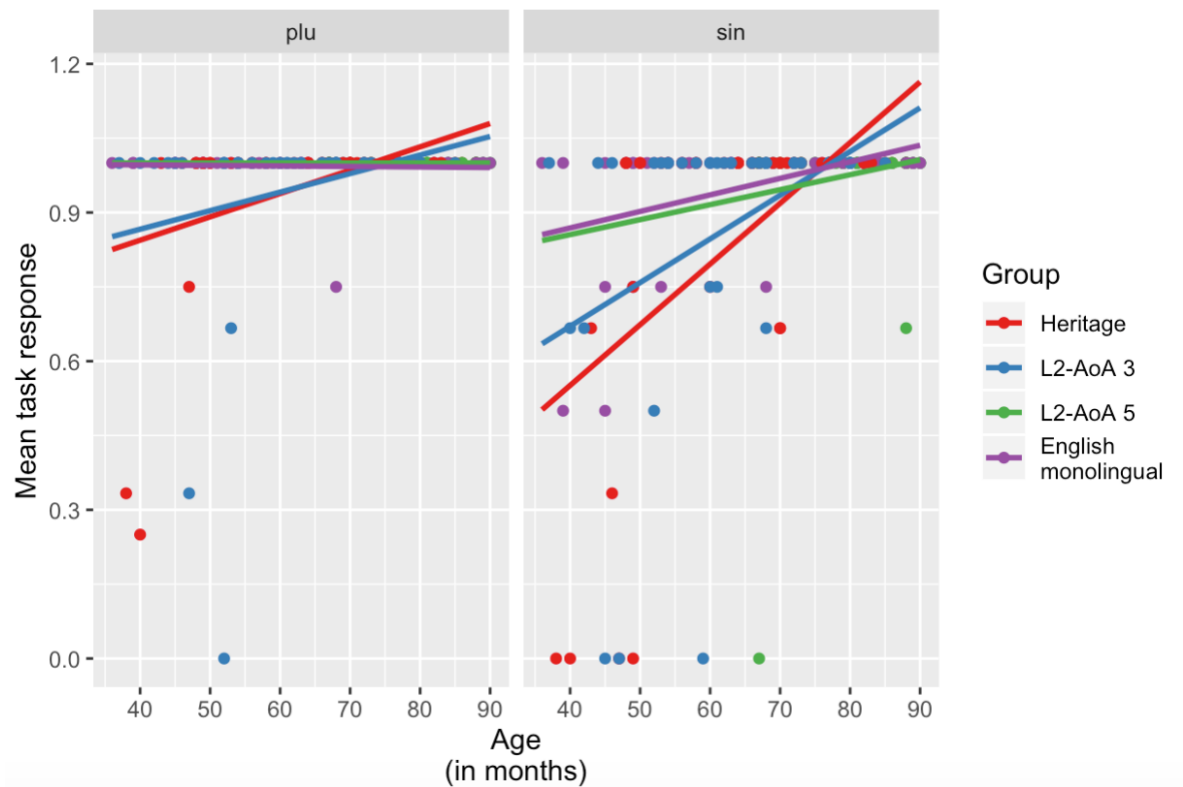
5.4 Picture matching task

The data were analyzed using a GLMM to examine accuracy (0,1) as a function

of group (HL, L2 - AoA 3, L2 - AoA 5, ME, SD), age, and condition (singular null,

singular overt, plural null, plural overt). Given the categorical nature of the participants'

responses (accurate/non-target-like), the data were modeled using GLMMs with a

binomial linking function. The predictor 'group' was dummy coded with SD participants

for the Spanish analysis and with ME participants for the English analysis. The Spanish

analysis also included the predictor condition 'distractor' which was set as the reference

level. Distractors in this task were designed to elicit children's understanding of second

person singular morphology (i.e. tu cantas). Main effects and higher order interactions

were tested using nested model comparisons. Age was centered with the mean age (5;7) set at 0.

5.4.1 Picture matching task - Spanish

In Spanish, the analysis yielded a main effect of group ($\chi_2(3) = 9.34$, *p < 0.03*). The SD group performed more accurately than the HL and both L2 groups ($\beta = 1.50$; SE = 0.21; z = 7.06; p < .001). There was a main effect of age ($\chi_2(1) = 76.23$, *p < .001*), but no effect of condition ($\chi_2(4) = 5.23$, *p = 0.26*). There was an age by condition interaction ($\chi_2(4) = 66.22$, *p < .001*), therefore the model containing the interactions was retained. Figure 12 provides a view of the children's performance overall accuracy. As seen in Figure 13, the effect of each condition varied as children's ages increased in that accuracy on some conditions was higher in the earlier ages. Items in the singular null condition were acquired earlier and more quickly for all groups than items in all other conditions. For the SD group, accuracy in the earliest ages was highest in the second person distractors, the singular null and the singular overt conditions. Table 5 below reports the mean comprehension accuracy by grade in each group in both Spanish and English.

Fig. 12 Overall mean comprehension accuracy in Spanish by age and group
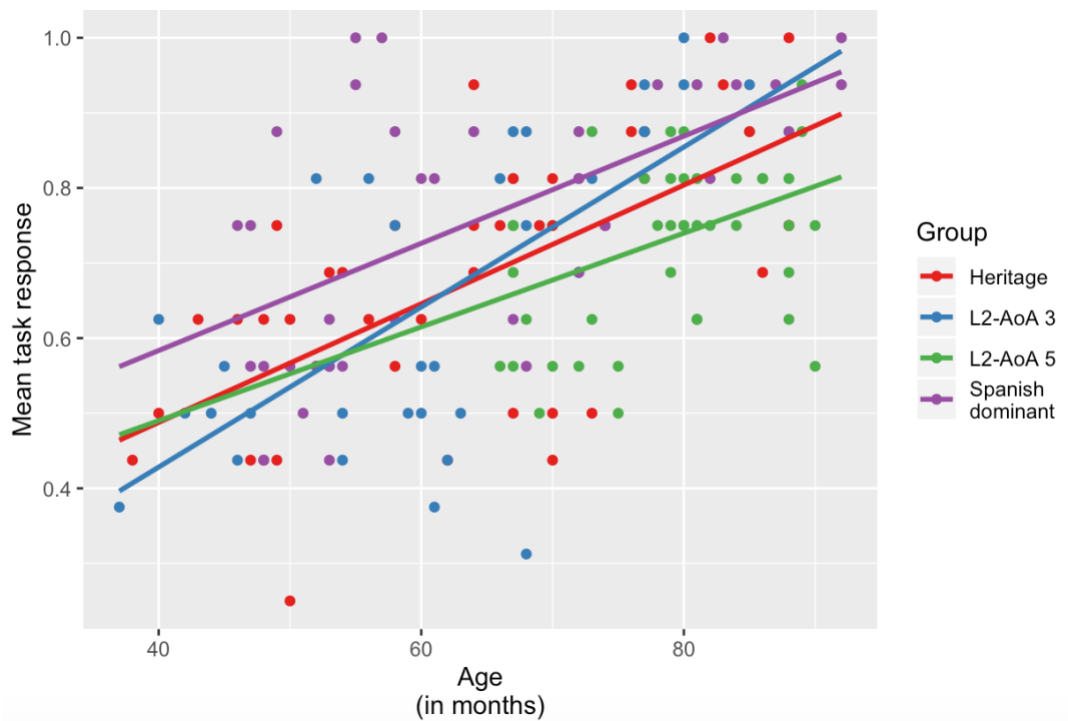
Fig. 13 Mean accuracy in Spanish on plural and singular conditions by age and group
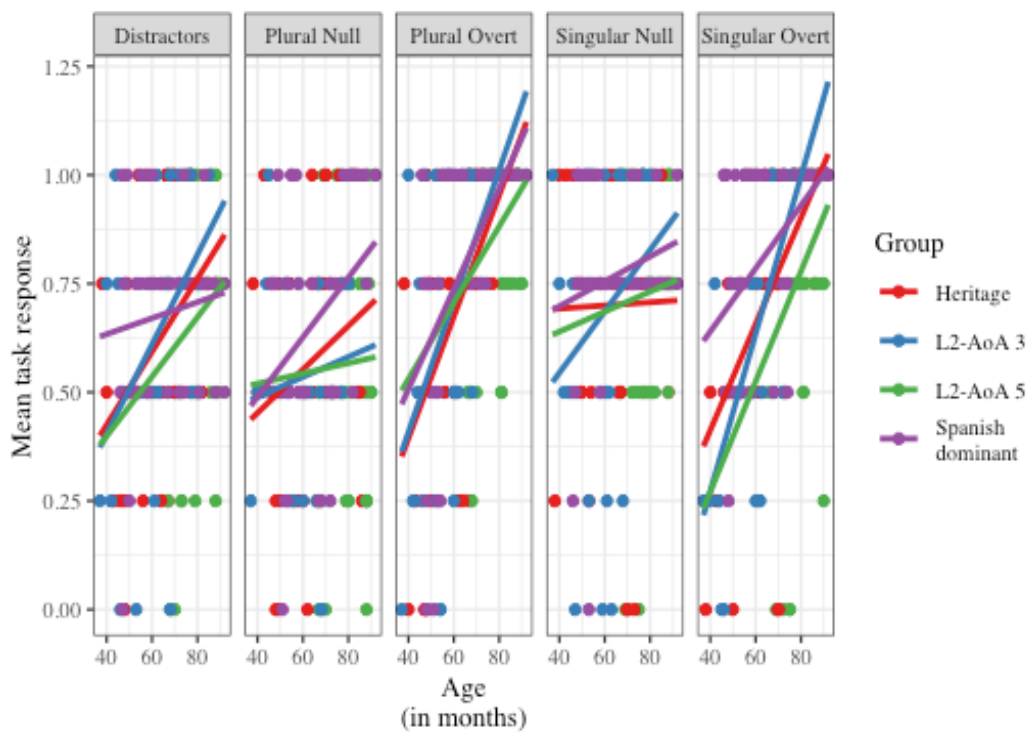
Table 5 Mean comprehension accuracy by group and grade on the Picture Matching

Task (on both singular and plural conditions) in Spanish and English

Group	Grade	Spanish Mean	English Mean
HL	PreK-3	52%	43%
HL	PreK-4	68%	69%
HL	Kinder	66%	74%
HL	1st	87%	99%
L2	PreK-3	54%	46%
L2	Prek-4	54%	57%
L2 - AoA 3	Kinder	73%	84%
L2 - AoA 3	1st	93%	93%
L2 - AoA 5	Kinder	67%	78%
L2 - AoA 5	1st	77%	93%
ME	Prek-3	N/A	56%
ME	Prek-4	N/A	71%
ME	Kinder	N/A	78%

ME	1st	N/A	85%
SD	PreK-3	60%	N/A
SD	PreK-4	81%	N/A
SD	Kinder	74%	N/A
SD	1st	92%	N/A

5.4.2 Picture matching task - English

In English, the analysis yielded a main effect of group ($\chi_2(3) = 20.84$, *p < 0.001*), a main effect of age ($\chi_2(1) = 64.41$, *p < .001*) and a borderline effect of condition ($\chi_2(1) = 3.73$, *p = 0.05*). There was a group by age interaction ($\chi_2(3) = 8.29$, *p < .04*), therefore the model containing the interaction was retained. The ME group and L2-AoA 5 group performed similarly to each other ($\beta = 1.71$; SE = 0.31; z = 5.41; p < .001), and the HL and L2-AoA 3 groups performed similarly to each other ($\beta = 0.29$; SE = 0.32; z = .91; p = .35) (Figure 14). The ME group shows earlier accuracy in comprehension, but the HL and L2-AoA 3 groups show a more rapid rate of acquisition of comprehension accuracy. The L2-AoA 5 group performs similarly to their monolingual peers because they were older (ages 5 to 7) at initial age of testing. As seen in Figure 15, items in the plural condition appear to be acquired earlier than items in the singular condition.

Fig. 14 Mean comprehension accuracy by group and age on the Picture Matching Task

in English (on all conditions)
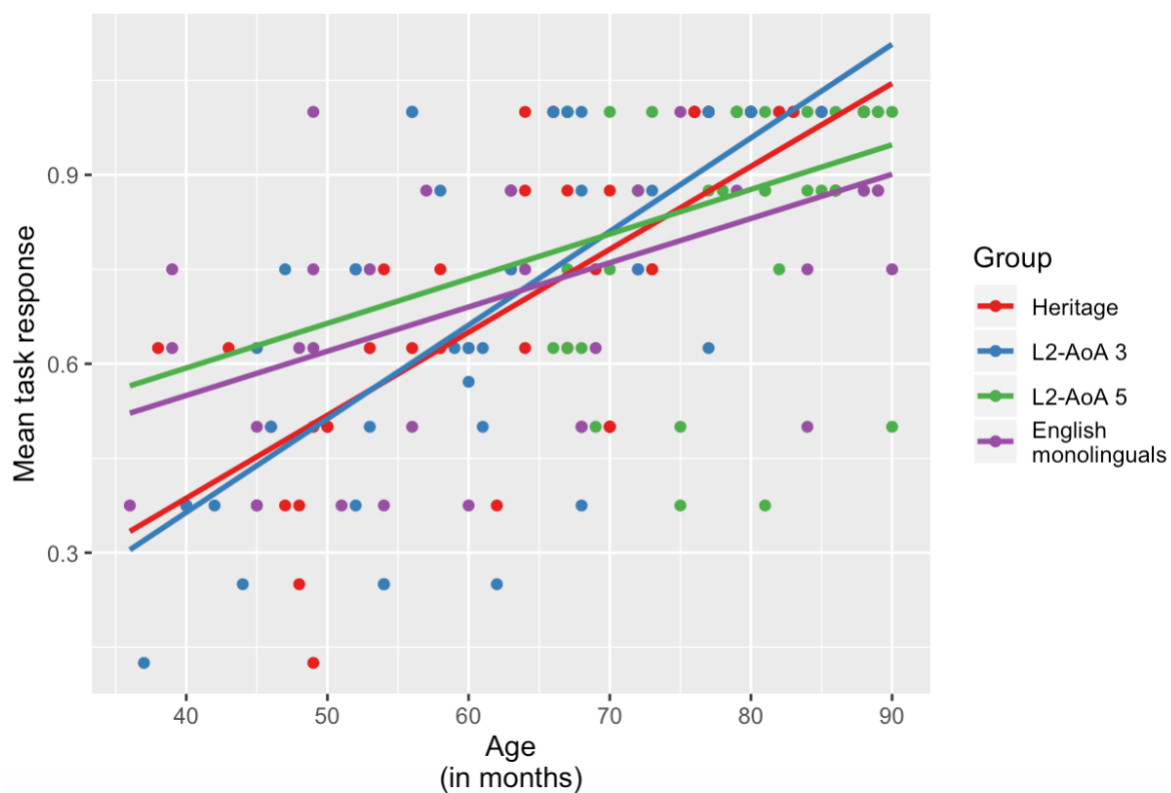
Fig. 15 Mean comprehension accuracy on each condition by group and age on the

Picture Matching Task in English
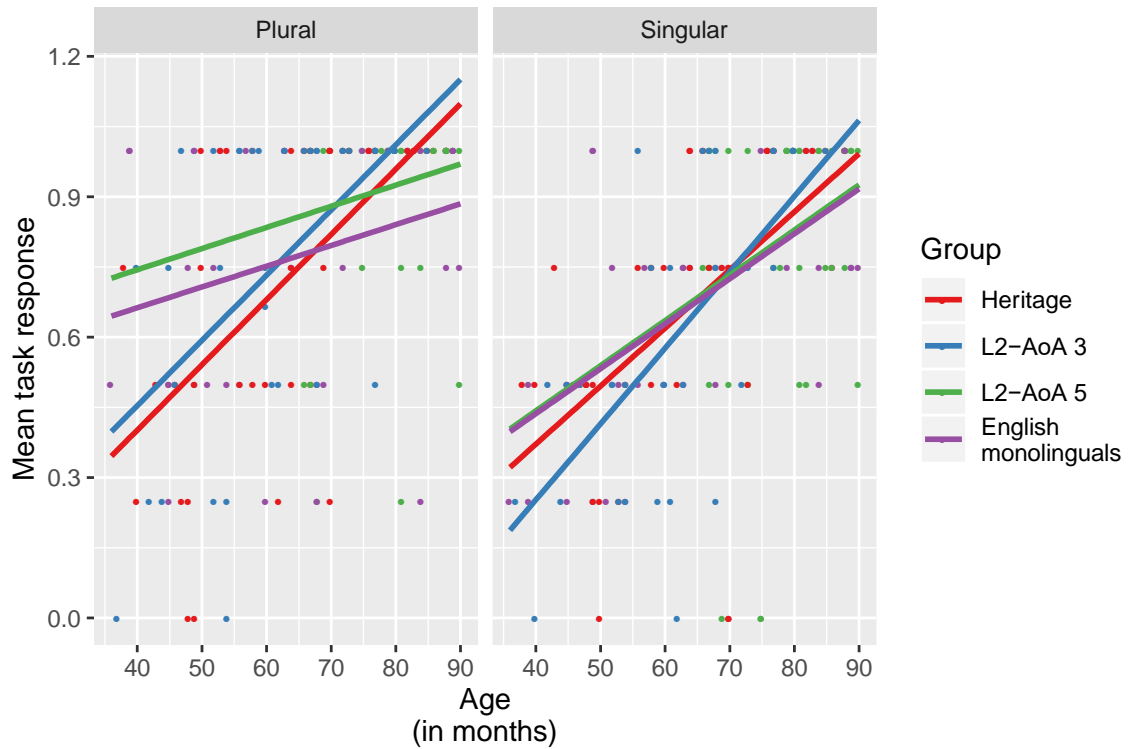
5.5 Task comparisons: Fill in the Blanks Task and Picture Matching Task

In order to assess possible differences in the children's production and comprehension abilities, proportion of accurate responses was calculated. The data were analyzed using a GLMM to examine mean accuracy as a function of age and task (fill in the blanks (production), picture matching task (comprehension)). Age was centered with the mean age (5;7) set at 0. Task was sum coded (1, -1) such that the parameter estimate provided an assessment of the main effect. The same model was fit by subject random intercept for each group (HL, L2 - AoA 3, L2 - AoA 5, ME, SD) in Spanish and English.

5.5.1 Task comparison - Spanish

In Spanish, the analysis for the heritage group yielded a main effect of age (β = .008; SE = .001; z = 4.43; p < .001). There was no effect of task (β = .028; SE = .017; z = 1.69; p = 0.09) and no task by age interaction (β = -0.00; SE = .001; z = -0.74; p = 0.46). Similar results were obtained in the analysis for the L2ers with AoA of 3. There was a main effect of age (β = .013; SE = .002; z = 5.15; p < .001). There was no effect of task (β = .023; SE = .025; z = 0.93; p = 0.36) and no task by age interaction (β = -0.00; SE = .002; z = -1.36; p = 0.19). The analysis for the L2ers with AoA of 5 yielded a main effect of task (β = .17; SE = 0.03; z = 6.79; p < .001) and a main effect of age (β = .009; SE = .002; z = 4.27; p < .001). There was no task by age interaction (β = -0.00; SE = .002; z = -2.02; p = 0.04). Finally, the analysis for the Spanish-dominant group yielded a main effect of task (β = -0.10; SE = 0.01; z = -8.84; p < .001), a main effect of age (β = .003; SE = .000; z = 4.85; p < .001), and a task by age interaction (β = .003; SE = .000; z = 3.86; p < .001) (see Figure 16). As seen in Figure 16, production accuracy significantly preceded comprehension accuracy for the Spanish-dominant group and, so, the effect of age differed across tasks. However, for the L2ers with AoA of 5 the reverse pattern is seen in which comprehension accuracy significantly preceded production accuracy. The heritage group and L2ers with AoA of 3 performed very similarly to each other. With no difference between their mean accuracy on each task, their comprehension and production abilities developed at the same rate. See Figure 17 for all the groups' performance on each task.

Fig.16 Mean responses in Spanish in the comprehension and production tasks by group

Fig. 17 Mean responses in Spanish by group and age in the comprehension and

production tasks
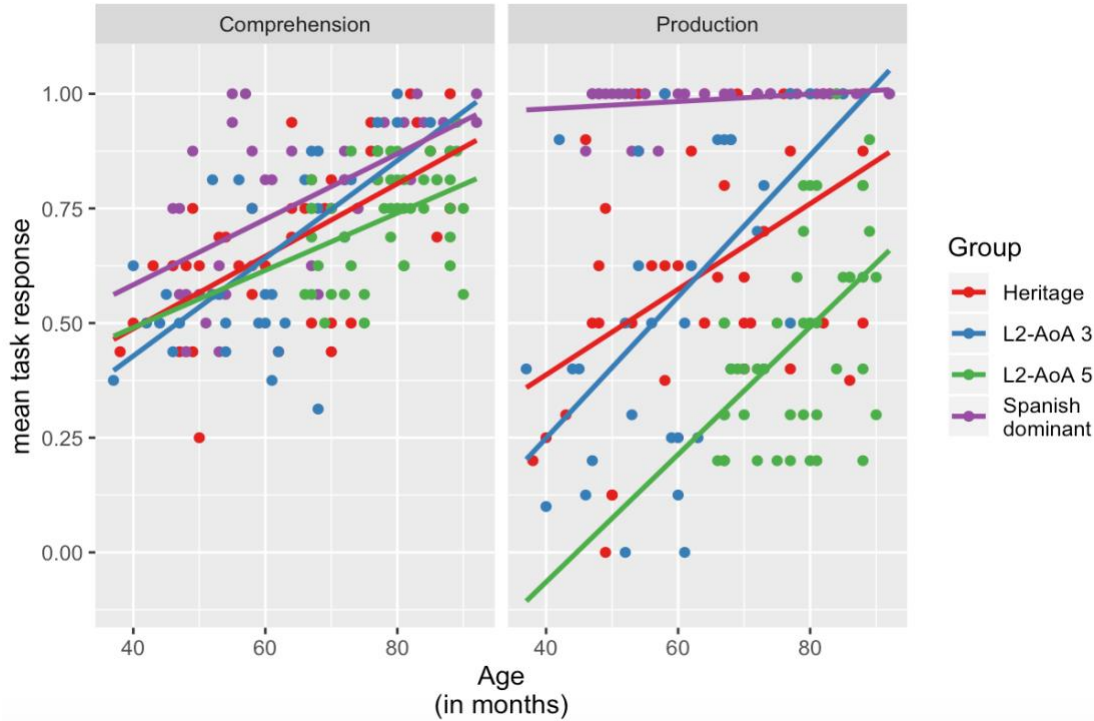
5.5.2 Task comparison - English

In English, the analysis for the heritage group yielded a main effect of task (β = -0.12; SE = 0.02; z = -6.53; p < .001) and a main effect of age (β = .009; SE = .001; z = 6.84; p < .001). There was no task by age interaction (β = -0.00; SE = .001; z = 0.09; p = 0.93). Similar results were obtained in the analysis for the L2ers with AoA of 3. There was a main effect of task (β = -0.113; SE = .024; z = -4.65; p < .001) and a main effect of age (β = .008; SE = .002; z = 4.26; p < .001). There was no task by age interaction (β = -0.00; SE = .002; z = .98; p = 0.33). The analysis for the L2ers with AoA of 5 yielded a main effect of task (β = -0.13; SE = 0.17; z = -7.31; p < .001), but no effect of age (β = .002; SE = .002; z = 1.21; p = 0.23) and no task by age interaction (β = 0.00; SE = .001; z

= 0.44; p = 0.66). Finally, the analysis for the English monolingual group yielded a main effect of task (β = -0.14; SE = 0.01; z = -14.6; p < .001), a main effect of age (β = .003; SE = .001; z = 4.83; p < .001), and a task by age interaction (β = .002; SE = .001; z = 3.17; p < .001) (see Figure 18). As seen in Figure 18, production accuracy significantly preceded comprehension accuracy for the English monolingual group and, so, the effect of age differed across tasks. For the L2ers with AoA of 5, production accuracy also significantly preceded comprehension but there was no effect of age because by the ages they were tested (ages 5-7) they had already reached ceiling in their production accuracy and there was not much change in this age range in their comprehension accuracy either. The heritage group and L2ers with AoA of 3 performed very similarly to each other. Their production accuracy also preceded their comprehension accuracy, but both developed at about the same rate and thus there was no task by age interaction as seen in the monolinguals. See Figure 19 for all the groups' performance on each task.

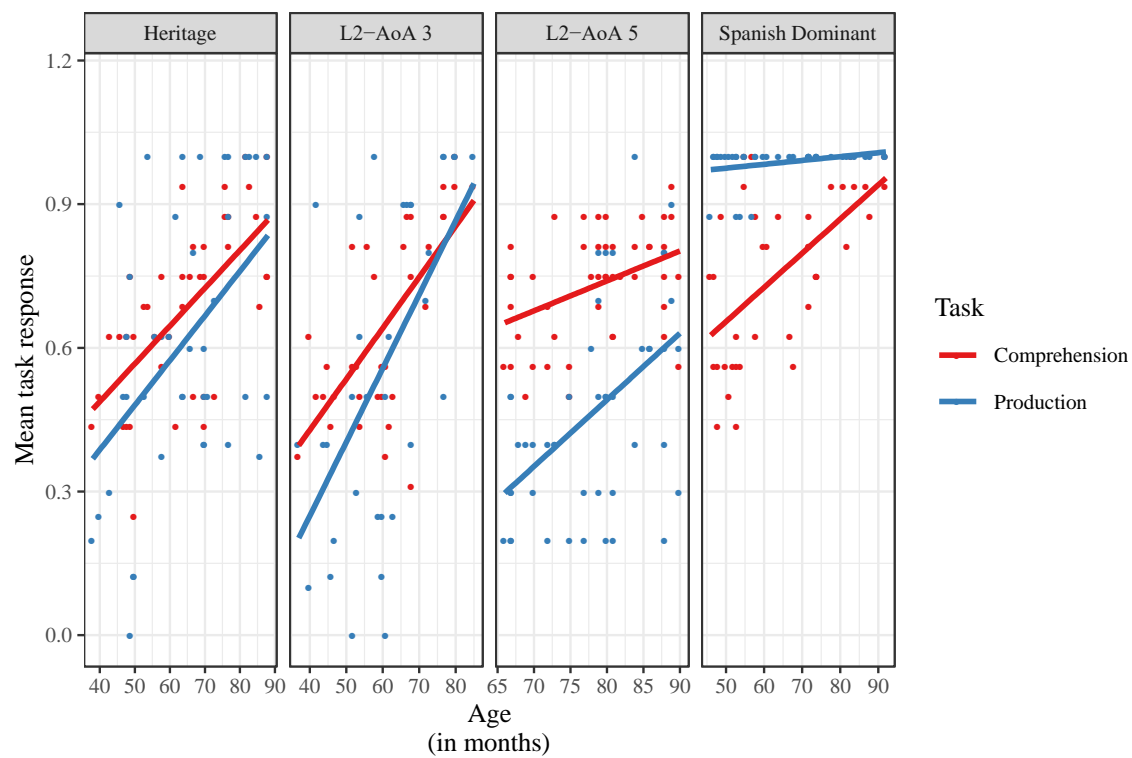*Fig. 18 Mean responses in English in the comprehension and production tasks by group*
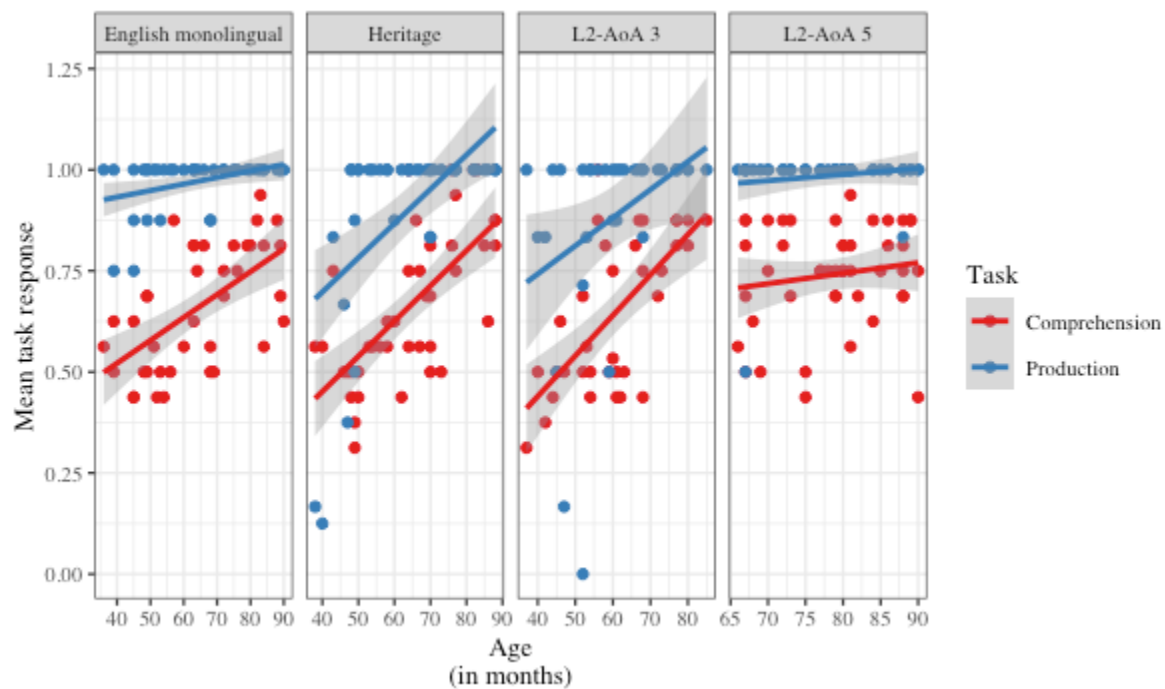
Fig. 19 Mean responses in English by group and age in the comprehension and

production tasks
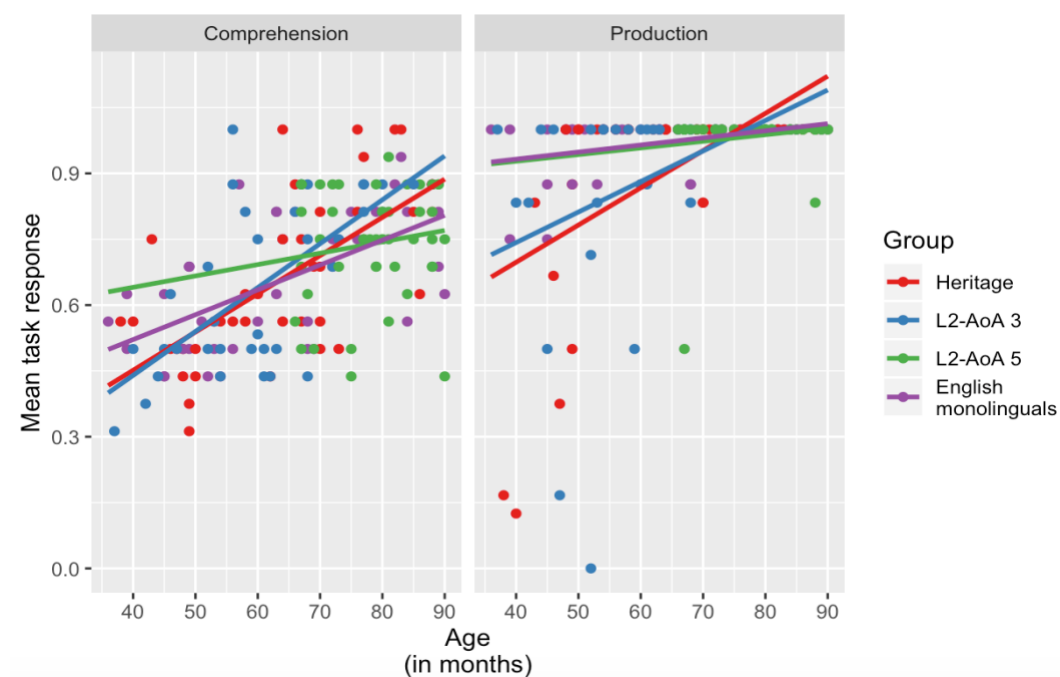
5.6 Task 3: Forced Choice Task

The data were analyzed using a GLMM to examine accuracy (0,1) as a function of group (HL, L2 - AoA 3, L2 - AoA 5, ME, SD), age, and condition (imperative, declarative). Given the categorical nature of the participants' responses (accurate/non-target-like), the data were modeled using GLMMs with a binomial linking function. The predictor 'group' was dummy coded with SD participants set as the reference level for the Spanish analysis and ME participants were set as the reference level for the English analysis. Main effects and higher order interactions were tested using nested model comparisons. Age was centered with the mean age (5;7) set at 0.

5.6.1 Forced Choice Task - Spanish

In Spanish, the analysis yielded a main effect of group ($\chi_2(3) = 13.41$, *p < 0.004*). The L2-AoA 5 group performed least accurately of all the groups ($\beta = -0.33$; SE = 0.16; z = -2.12; p < .03). (see Figure 20). There was a main effect of condition ($\chi_2(1) = 11.88$, *p < .001*), but no effect of age ($\chi_2(1) = 0.89$, *p = 0.34*) and no higher order interactions. Accuracy did not significantly increase with age for any of the groups. As seen in Figure 21, group responses varied greatly on each condition.

Fig. 20 Mean overall responses by group and age on the Forced Choice Task in Spanish
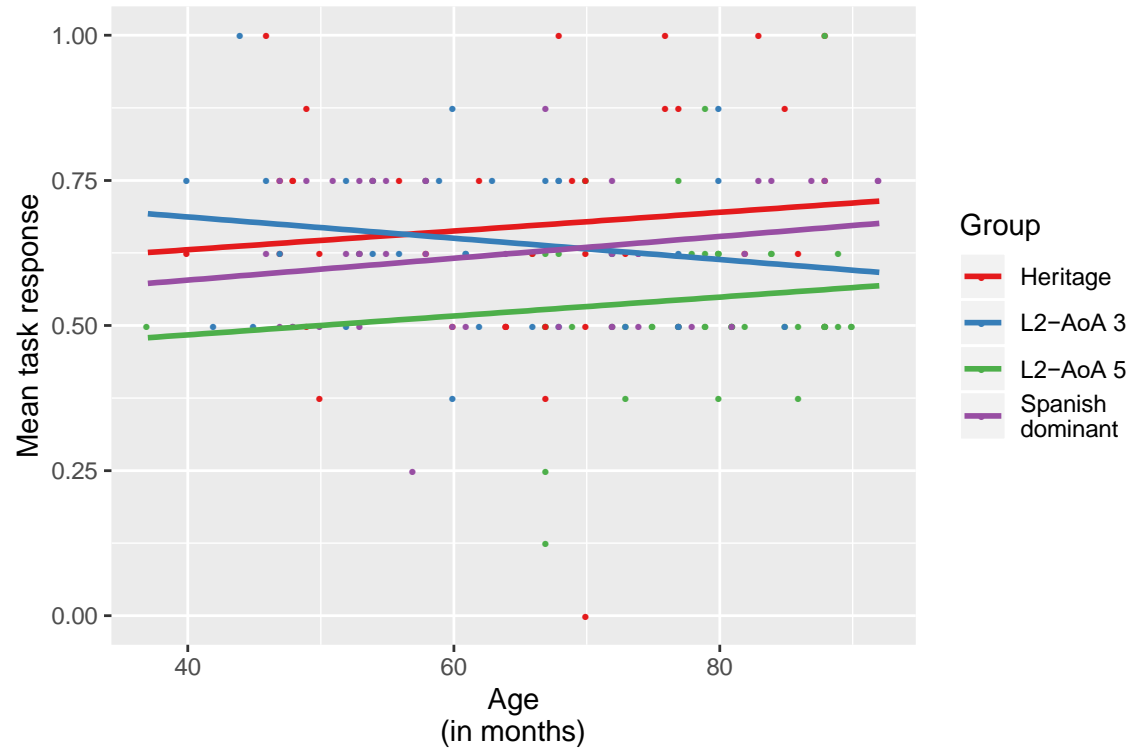
Fig. 21 Mean responses in Spanish on imperative and declarative conditions by group,

age and condition
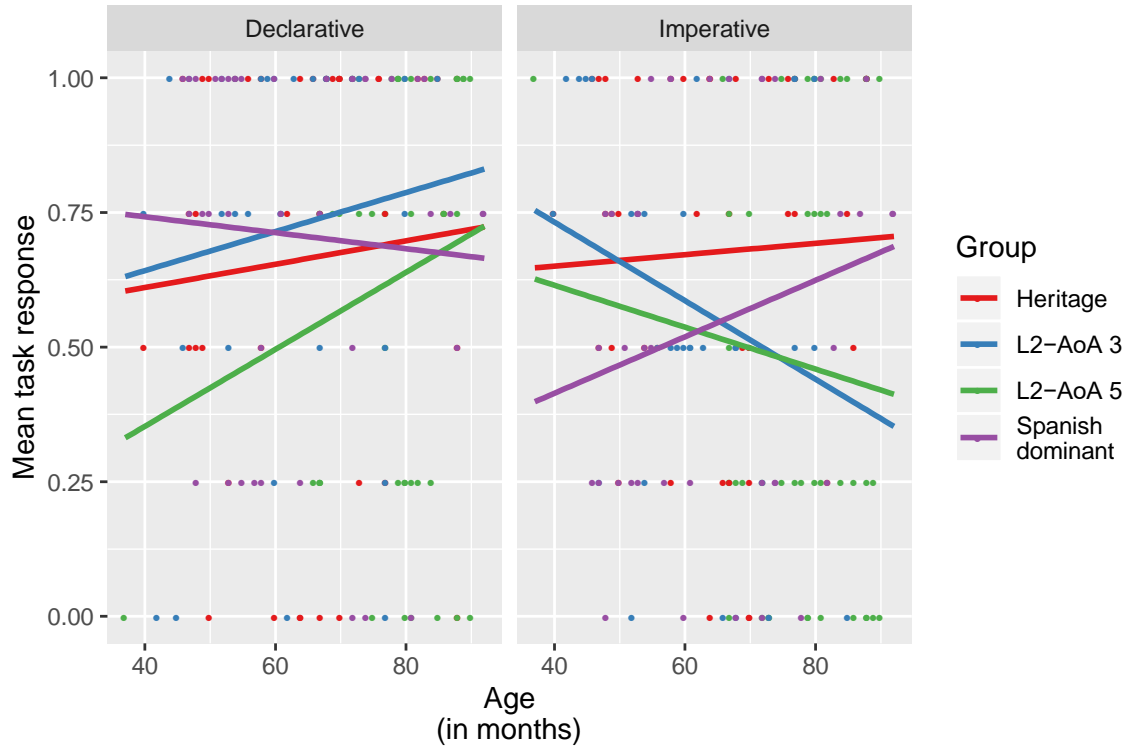
5.6.2 Forced Choice Task - English

In English, the analysis yielded a main effect of group ($\chi_2(3) = 9.62$, *p < 0.02*). There was also a main effect of age ($\chi_2(1) = 5.19$, *p < .02*), but no effect of condition ($\chi_2(1) = 1.77$, *p = 0.18*). There was a group by age interaction ($\chi_2(3) = 8.25$, *p < .04*), a group by condition interaction ($\chi_2(4) = 14.16$, *p < .006*), an age by condition interaction ($\chi_2(1) = 13.13$, *p < .001*), and a 3 way interaction ($\chi_2(3) = 10.95$, *p < .01*). Thus, the model containing the interactions was retained (see Figure 22). As seen in Figure 22 below, the effect of age as well as the effect of condition both differed across groups. The effect of condition also differed as ages increased. The 3 way interaction is visible in

Figure 22 as the effect of condition differed across groups as age increased. As children's ages increased, there was a decline in accuracy on the declarative condition only for the L2ers with AoA of 5, whereas for all other groups accuracy increased. On the imperative condition, as age increased accuracy only increased for the heritage group whereas accuracy declined for all other groups. See Figure 23 for the groups' overall accuracy on the task.

Fig. 22 Mean responses in English on imperative and declarative conditions by age, group and condition
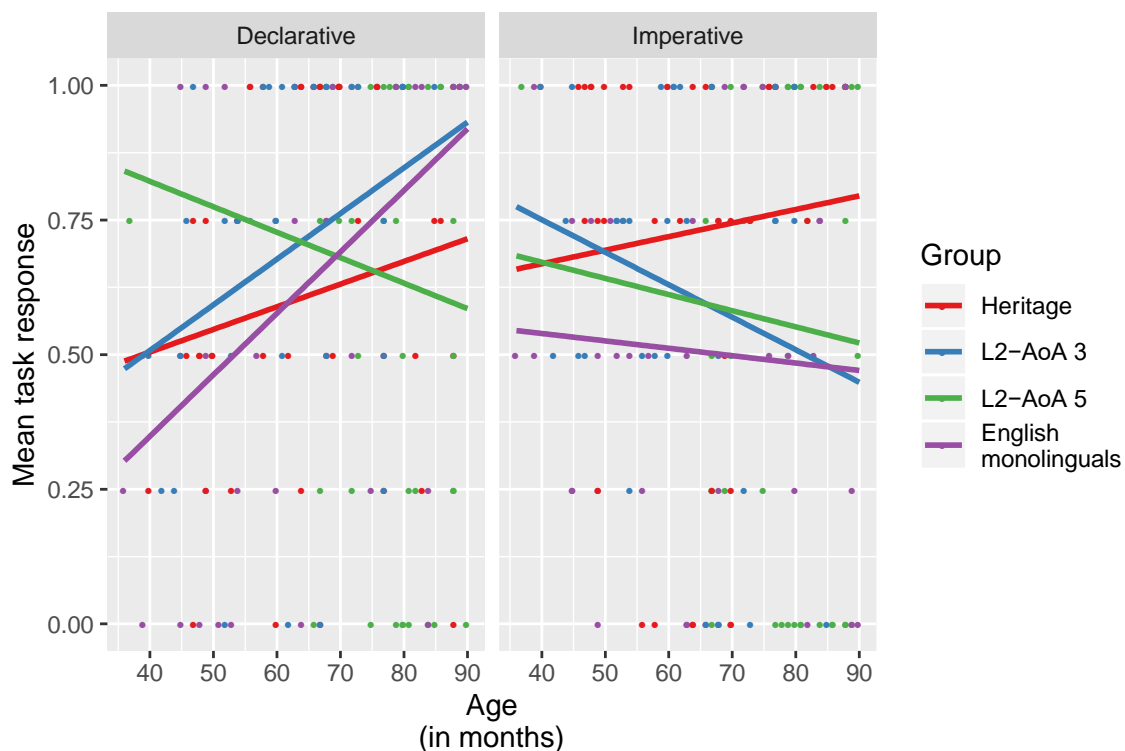
Fig. 23 Mean overall responses by group and age on the Forced Choice Task in English
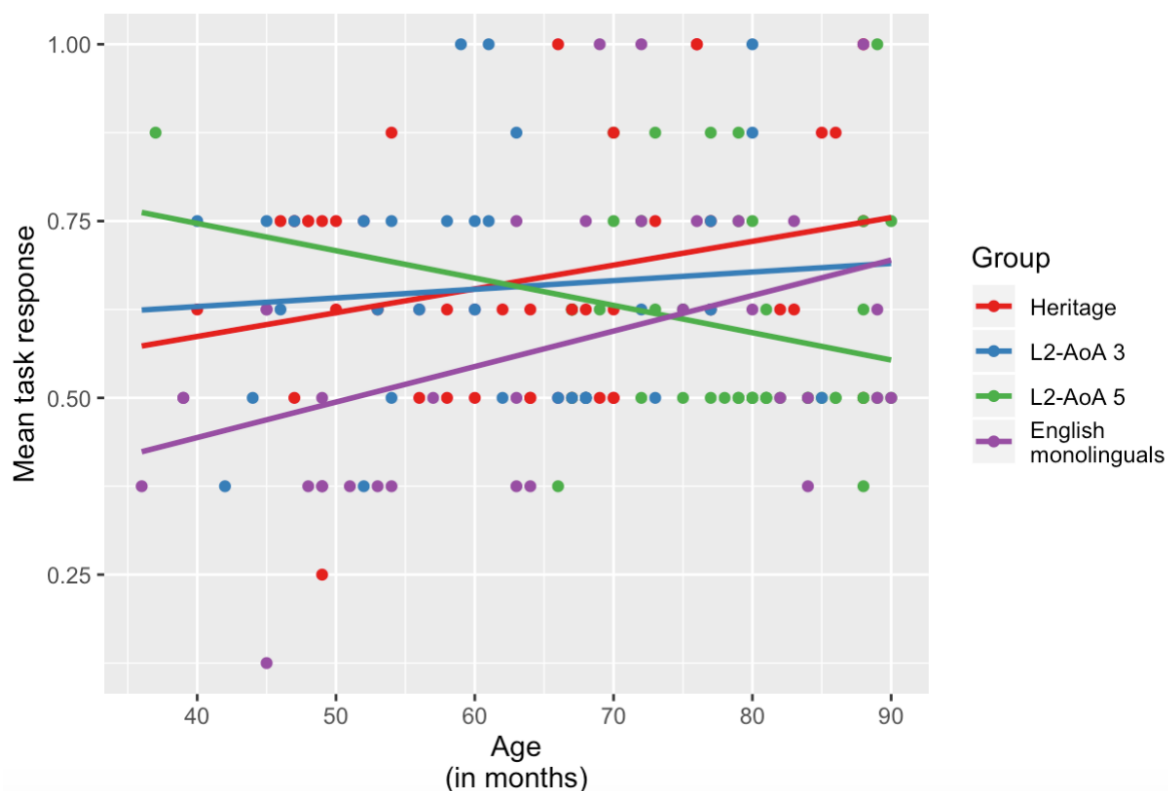
In kindergarten, and especially in 1st grade in English, many of the children reported, in the imperative condition, that the speaker was not being nice or polite and should not tell the child to do something in that way. The parent should have asked the child to 'please eat their dinner' or 'can you eat your dinner please?' Therefore, though many children showed they understood the illocutionary force of the context by making these types of comments, they chose the declarative option instead as it sounded less rude or demanding. This explanation from children was given across all groups, monolinguals and bilinguals alike. This may explain the decline in accuracy in the children's responses as they got older.

5.7 Task comparison: Picture Matching Task and Forced Choice Task

In order to assess possible differences in the children's comprehension abilities of third person singular and plural morphology on the picture matching task and their judgments of imperative and declarative morphology on the forced choice task, proportion of accurate responses was calculated. The data were analyzed using a GLMM to examine mean accuracy as a function of age and task (picture matching task (comprehension), forced choice task (judgments)). Age was centered with the mean age (5;7) set at 0. Task was sum coded (1, -1) such that the parameter estimate provided an assessment of the main effect. The same model was fit by subject random intercept for each group (HL, L2 - AoA 3, L2 - AoA 5, ME, SD) in Spanish only.

In Spanish, the analysis for the heritage group yielded a main effect of age (β = .005; SE = .002; z = 3.13; p < .003). There was no effect of task (β = -0.01; SE = .018; z = -0.92; p = 0.36), but there was a task by age interaction (β = -0.00; SE = .001; z = -2.55; p < 0.01). The analysis for the L2ers with AoA of 3 yielded a main effect of task (β = -0.04; SE = .020; z = -2.19; p < .001), a main effect of age (β = .004; SE = .001; z = 3.02; p < .004), and a task by age interaction (β = -0.01; SE = .001; z = -4.28; p < .001). The analysis for the L2ers with AoA of 5 yielded a main effect of task (β = -0.06; SE = 0.02; z = -3.22; p < .002) and a main effect of age (β = .003; SE = .002; z = 2.49; p < .015). There was no task by age interaction (β = -0.00; SE = .002; z = -1.46; p = 0.15). Finally, the analysis for the Spanish-dominant group yielded a main effect of task (β = -0.08; SE = 0.02; z = -4.92; p < .001), a main effect of age (β = .005; SE = .001; z = 4.20; p < .001), and a task by age interaction (β = .003; SE = .001; z = -2.45; p < .02) (see

Figure 24). As seen in Figure 24, the performance of each group differed. For the

Spanish-dominant group, there was an effect of task as ages increased in which accuracy

on the picture matching task increased much more with age than accuracy on the forced

choice task though their performance overlaps on both tasks in the earliest ages. For the

L2ers with AoA of 5, accuracy increased with age on both tasks, but the effect was much

greater in the picture matching task than on the forced choice task. For the L2ers with

AoA of 3, accuracy on the picture matching task increased with age whereas accuracy on

the forced choice task decreased with age. Finally, for the heritage group, performance on

each task did not differ from each other, but the effect of task did differ as ages increased

in that accuracy on the picture matching task increased with age at a faster rate than on

the forced choice task. See Figure 25 for all the groups' performance on each task.

Fig. 24 Mean accuracy in Spanish on both tasks by group
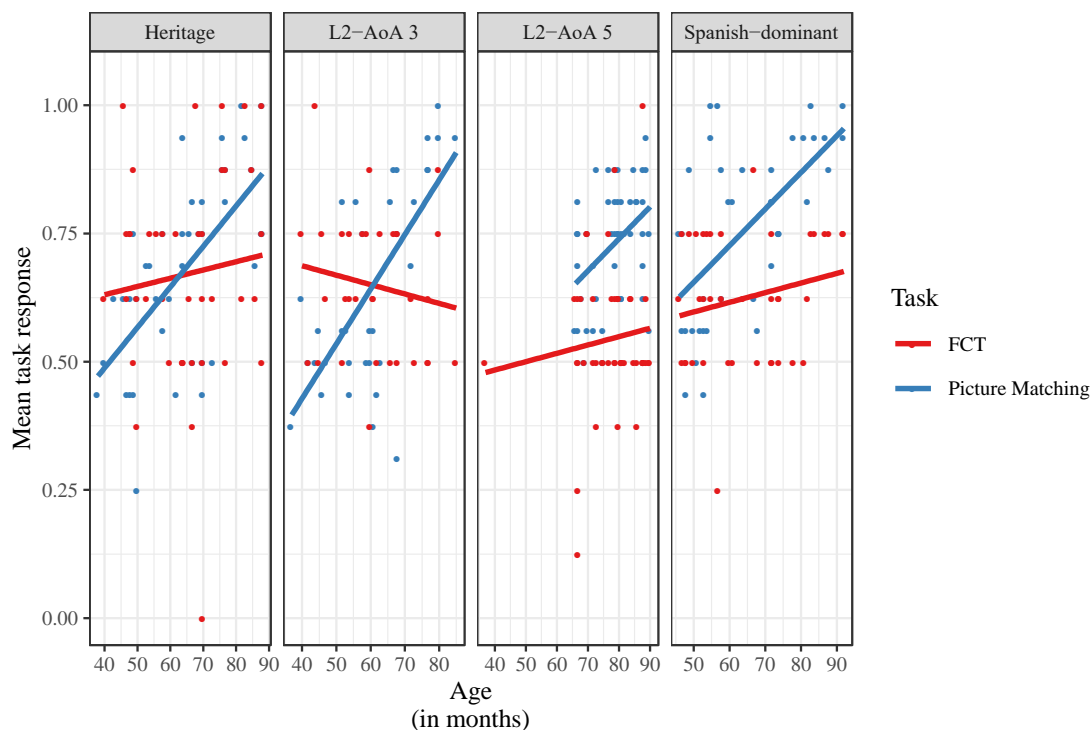
Fig. 25 Mean accuracy in Spanish on each task by group
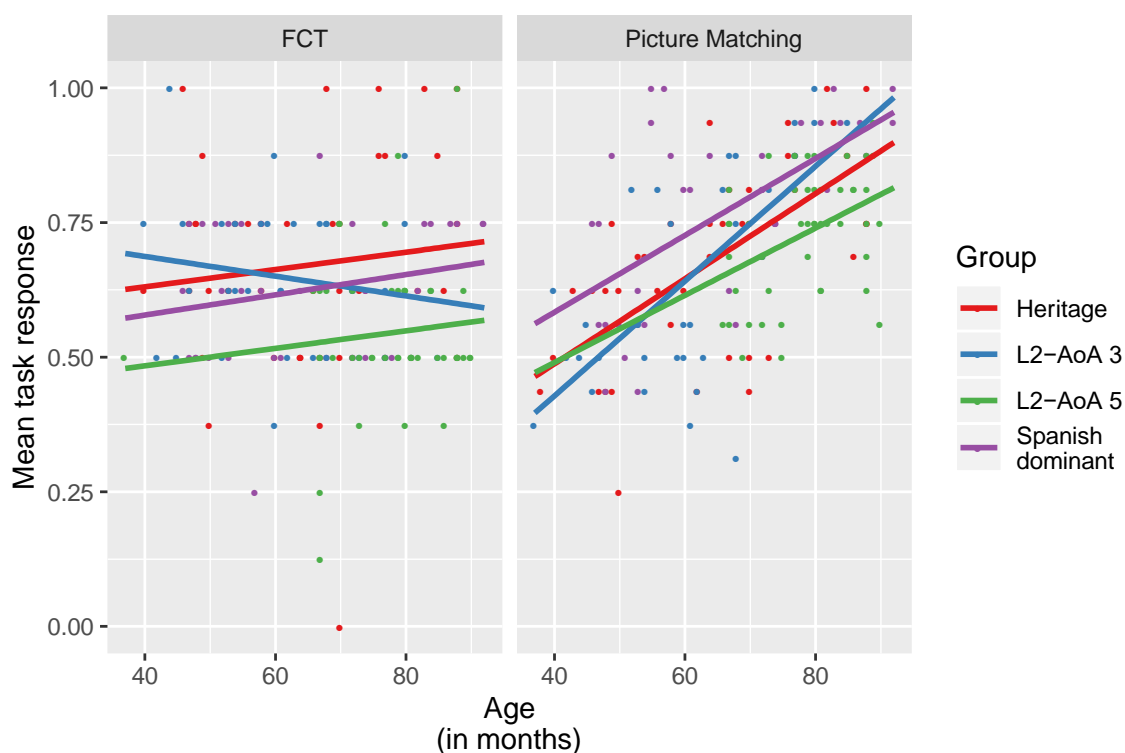
5.8 Summary section

This section has examined the results obtained in the three experimental tasks completed by heritage simultaneous bilinguals, L2 learners with AoA of 3 and L2 learners with AoA of 5, English monolinguals in the U.S. and Spanish-dominant children in Spain. Analysis of these data has confirmed that age of acquisition and context of acquisition modulate the groups' performance across tasks in different ways. The results from each task are summarized in Tables 10-19 below.

The following chapter will provide a more elaborate discussion of these results, addressing some of the crucial factors that may affect bilingual children's development of subject-verb agreement in both comprehension and production in their two languages.

Table 6 BESA summary of results

Group	Spanish	English
Spanish dominant children	performance at ceiling	N/A
English monolinguals	N/A	performance at ceiling
Heritage bilinguals	reached ceiling at 80 months	reached ceiling at 70 months
L2ers with AoA of 3	reached ceiling at 80 months	reached ceiling at 70 months
L2ers with AoA of 5	reached ceiling at 90 months	performance at ceiling

Table 7 Spanish Fill in the Blanks summary of results (oral production)

Group	Overall accuracy	Singular/Plural	Non-target responses	External factors
Spanish dominant children	performance at ceiling	equal accuracy on both	very few instances	
Heritage bilinguals	reached 90% at 90 months	singular acquired first	more infinitives and other morphology than 3rd person singular	highest accuracy for children whose home language is Sp and are more comfortable speaking Sp
L2ers with AoA of 3	reached 90% at 80 months	singular acquired first	more infinitives and other morphology than 3rd person singular	
L2ers with AoA of 5	reached 60% at 90 months	singular acquired first	more infinitives and

			other morphology than 3rd person singular	

Table 8 English Fill in the Blanks summary of results (oral production)

Group	Overall accuracy	Singular/Plural
English monolinguals	performance at ceiling	plural is acquired first[13]
Heritage bilinguals	reached ceiling at 70 months	plural is acquired first
L2ers with AoA of 3	reached ceiling at 70 months	plural is acquired first
L2ers with AoA of 5	performance at ceiling	plural is acquired first

Table 9 Spanish Picture Matching summary of results (oral comprehension)

Group	Overall accuracy	Condition	Condition
Spanish dominant children	reached ceiling at 80-90 months	singular null acquired first	sing and pl overt acquired fastest
Heritage bilinguals	reached 90% at 90 months	singular null acquired first	sing and pl overt acquired fastest
L2ers with AoA of 3	reached 90% at 80 months	singular null acquired first	sing and pl overt acquired fastest
L2ers with AoA of 5	reached 80% at 90 months	singular null acquired first	sing and pl overt acquired fastest

Table 10 English Picture Matching summary of results (oral comprehension)

Group	Overall accuracy	Condition
English monolinguals	reached 90% at 90 months	plural acquired first

13 The monolingual children reached ceiling around 48 months (4;0) and in the months tested prior, plural morphology had higher accuracy than singular morphology.

Heritage bilinguals	reached ceiling at 85 months	both acquired equally
L2ers with AoA of 3	reached ceiling at 85 months	plural acquired first
L2ers with AoA of 5	reached 90% at 80 months	plural acquired first

Table 11 Spanish task comparison (Picture Matching and Fill in the Blanks) summary of results

Group	Overall results
Spanish dominant children	production significantly precedes comprehension
Heritage bilinguals	comprehension and production develop at the same rate
L2ers with AoA of 3	comprehension and production develop at the same rate
L2ers with AoA of 5	comprehension significantly precedes production

Table 12 English task comparison (Picture Matching and Fill in the Blanks) summary of results

Group	Overall results
English monolinguals	production significantly precedes comprehension
Heritage bilinguals	production precedes comprehension
L2ers with AoA of 3	production precedes comprehension
L2ers with AoA of 5	production significantly precedes comprehension

Table 13 Spanish Forced Choice Task summary of results

Group	Overall accuracy	Condition
Spanish dominant children	begin at 60% at 40 months, then accuracy increases	equal accuracy on both
Heritage bilinguals	begin at 67% at 40 months, then	equal accuracy on both

	accuracy increases	
L2ers with AoA of 3	begin at 70% at 40 months, then accuracy declines	higher accuracy on declaratives
L2ers with AoA of 5	stay at 50%	higher accuracy on declaratives

Table 14 English Forced Choice Task summary of results

Group	Overall accuracy	Condition
English monolinguals	begin below 50% at 40 months, then accuracy increases	declarative accuracy increases
Heritage bilinguals	begin at 60% at 40 months, then accuracy increases	equal accuracy on both
L2ers with AoA of 3	begin at 67% at 40 months, then accuracy declines	declarative accuracy increases
L2ers with AoA of 5	accuracy declines	accuracy on both declines

Table 15 Spanish task comparison (Picture Matching (PMT) and Forced Choice Task

(FCT)) summary of results

Group	Overall results
Spanish dominant children	accuracy on both tasks about equal at 40 months
Heritage bilinguals	accuracy on FCT precedes accuracy on PMT
L2ers with AoA of 3	accuracy on FCT precedes accuracy on PMT
L2ers with AoA of 5	accuracy on PMT higher than accuracy on FCT

CHAPTER 6: DISCUSSION

6.1 Introduction

In this dissertation, children participated in three tasks to elicit their production (a fill in the blanks task), comprehension (a picture matching task) and judgments (a forced choice task) of third person singular and plural subject-verb agreement. Here, I will discuss the findings in more detail, specifically addressing the research questions and hypotheses that guided this investigation. The first section analyzes the developmental path of subject-verb agreement between the ages of 3 and 7, and how AoA and context of acquisition modulate this trajectory. Then, I examine the children's differing patterns of acquisition regarding default morphology and the role of the null subject parameter in order to elucidate how agreement features are accessed in bilingual grammars. Finally, I take into consideration the role of imperative syntax and morphology in understanding the development of the RI stage in early language.

6.2 The role of AoA and context of acquisition in the development of subject-verb agreement

In order to analyze the developmental pattern of subject-verb agreement in child L1, 2L1 and L2, this dissertation addressed the role of certain extralinguistic factors, namely age of acquisition and context of acquisition, through a comparative analysis of different groups of children. The aim of this analysis was to reveal how AoA and context of acquisition could lead to underlying differences in the access and retrieval of functional features in language contact situations. The first three research questions posed

in this dissertation -reproduced below for the readers' convenience-, tackled precisely this issue:

1. At which age do simultaneous heritage bilingual children acquire verbal number morphology in comprehension and production, and does this differ from monolingual peers?

2. Does AoA (initial exposure to Spanish at age 3 versus at age 5) affect the emergence of verbal number morphology in comprehension and production in Spanish among child L2 learners?

3. Do heritage speakers, who have earlier and greater amount of exposure to Spanish, display more accuracy in their comprehension and production of verbal number morphology than L2 learners? Does immersion education compensate for early exposure?

It was hypothesized that being bilingual would not affect the rate of acquisition of verb morphology and that the heritage bilinguals in this study would perform on par with monolingual peers in each language (as previous studies of simultaneous bilinguals have shown, i.e. Castro & Gavruseva, 2003) due to the increased input and activation (Putnam & Sanchez, 2013) of Spanish in the dual language school. It was also hypothesized that there would be an effect of AoA such that older L2 learners (with AoA of 5) would have an advantage over younger starters in terms of speed of acquisition (i.e. Lichtman, 2016; Rothman et al., 2016). Additionally, it was hypothesized that knowledge of agreement morphology would emerge sooner in heritage children than L2 learners because of their greater and earlier amount of exposure to Spanish.

As reflected in the children's performance on the BESA production task for nominal morphology, both bilingual and monolingual children produce the plural morphological marker for nouns (/s/ in English; /s/ or /es/ in Spanish). In English, though bilingual children show more variability early on, all children reach ceiling by 75 months of age (6;3). In Spanish, heritage and L2 children also show more variability than Spanish-dominant children, but simultaneous heritage and L2 children with AoA 3 reach ceiling by 80 months (6;6) which is not long after they perform at ceiling in English. L2 children with AoA of 5 perform above chance right from the very beginning of their acquisition, suggesting that the establishment of nominal morphology in their L1 or their level of metalinguistic awareness provides a foundation on which to acquire nominal morphology more rapidly in the L2 (Schwartz, 2003; Unsworth, 2007). This evidence from bilingual children adds to previous studies showing that acquisition of nominal morphology precedes that of verbal morphology in monolingual children (Marrero and Aguirre, 2003; Forsythe, 2015).

Having shown all the children's ability to produce accurate nominal morphology with relative ease, we can now turn to the results of the fill-in-the-blanks task which elicited children's abilities to produce third person singular and plural verbal morphology in both English and Spanish. In English, monolingual children are above 90% accurate in their production of third person inflection at 40 months (3;3). Simultaneous heritage bilinguals and Spanish L2 learners with AoA of 3 reach the same level of accuracy (above 90%) at 65 months (5;4). These results may be expected from the simultaneous bilinguals as previous research on the acquisition of null subjects and null objects has shown that bilingual children may take longer than monolinguals to acquire certain areas

of grammar when they are faced with competing evidence for what the underlying representation should be for an overlapping structure (Muller & Hulk, 2001; Goldin, forthcoming). Additional studies have found evidence of delay in bilingual children due to reduced input of each language (Blom, 2010; Hoff et al., 2012). However, the results from the L2 learners with AoA of 3 are more surprising when considering that until just 6 months prior to testing, these children were exposed only to English. The introduction of a second language (Spanish) at age 2;5 or 3;0 seems to have been early enough in their chronological development to slightly alter the path of English development from that of monolingual English speakers, supporting the claim that the period in which a child's L1 grammar develops can last up to age 4 (Unsworth & Blom, 2010). To further support this, L2 learners with AoA of 5, tested between the ages of 5 and 7, perform at ceiling, suggesting that their L1 grammar is established by the time of exposure to the L2 and that their English verbs are not influenced by the introduction of Spanish verb possibilities. For simultaneous bilinguals and L2 learners with AoA of 3, the greater amount of verbal morphological possibilities presented as competing evidence in the input from both English and Spanish may result in an extended period of development.

In Spanish, we see a different pattern of results for all the bilingual groups. Spanish dominant children perform at ceiling by 45 months (3;8), in line with previous findings that Spanish monolinguals produce accurately inflected verbs, especially in the present indicative, as early as age 2 (Grinstead, 1998; Bel, 2001; Aguado-Orea, 2004). The heritage bilinguals and L2 learners with AoA of 3 perform similarly to each other, but we see an interesting pattern emerge. Around 60 months (5;0) both groups begin to produce accurate third person singular and plural morphology at above chance level. In

contrast to their English performance however, the L2ers with AoA 3 do not reach ceiling until 90 months (7;5) and the heritage bilinguals do not reach ceiling within the age range tested. What factors predict that the L2 learners' performance surpasses that of the heritage bilinguals who have been exposed to Spanish from birth? Several explanations could be proffered. Firstly, the L2ers only acquire Spanish in a setting of formal instruction and explicit instruction could play a role in their development of verb morphology. Secondly, greater cognitive maturity at the time of introduction of Spanish (age 3) may play a role in providing extra support and a foundation on which to acquire the L2 (Schwartz, 2003; Unsworth, 2007), something that the simultaneous bilinguals do not have. Looking at the steady pattern of acquisition of the L2 learners with AoA of 5 can also provide further insight. By 90 months (7;5), one and a half years after beginning exposure to Spanish, these children perform above chance and do not lag far behind the other groups of bilinguals. They show a faster rate of acquisition than the heritage simultaneous bilinguals. Thus, if older age of onset confers an advantage in terms of speed of acquisition (i.e. Muñoz, 2008), it could be that the lack of language competition in the first three years of life of the L2ers with AoA of 3 leads to faster learning and the ability to surpass the heritage bilinguals who have experienced competition from birth.

In the picture-matching task, we also saw group differences in each language in the development of children's comprehension of third person singular and plural morphology. In English, monolinguals and L2ers with AoA of 5 perform very similarly to each other and both reach 90% accuracy at approximately 85 months (7;1). Heritage and L2ers with AoA 3 also perform similarly to each other, reaching 90% accuracy at about 77 months (6;4). These results in comprehension corroborate those from production

in showing that L2ers with AoA of 3 behave as simultaneous bilinguals do in performing with lower accuracy than monolinguals before 60 months (5;0). This may be due to competing input from two languages, as proposed by Muller & Hulk (2001), which may cause bilingual children to take longer than monolinguals in acquiring some aspects of grammar. The development of the English grammar of L2ers with AoA of 5, on the other hand, is not impacted in any way by the introduction of Spanish at age 5. However, as the acquisition timeline continues, we see that the younger bilinguals' accuracy surpasses that of the monolinguals and L2ers with AoA of 5 so that they reach ceiling approximately 7 months earlier. It may be that exposure to two L1s before the age of 4 leads to bootstrapping effects in comprehension in the dominant language that is not evident for later learners whose L1 grammar is established before exposure to the L2. As in previous studies that have found bootstrapping effects in syntactic structures in bilingual children (Gawlitzek-Maiwald & Tracy, 1996; Bernardini & Schlyter, 2004), here we have a case in which the robust inflectional system of Spanish may boost the early bilingual child's acquisition of the marked forms in English's weaker paradigm.

In Spanish, the Spanish-dominant children performed as expected based on previous studies (i.e. Perez-Leroux, 2005), performing at chance in the earliest ages and reaching 90% accuracy just before 85 months (7;1). All three bilingual groups performed less accurately than the Spanish-dominant group overall, but their steady increase in accuracy is indicative of their grammatical knowledge and representation of third person singular and plural morphology. The L2ers with AoA 3 appear to show a faster rate of acquisition and converge with the Spanish-dominant children just before 85 months (7;1). Just as in the production task, this group's performance surpasses that of the heritage

bilinguals who have been exposed to Spanish from birth. In comprehension, we see again that older age of onset may lead to greater speed of acquisition and, thus, a surpassing of the performance of the simultaneous heritage bilinguals.

A comparison of performance in both production and comprehension shows us that English monolingual and Spanish-dominant children behave as expected in each of their respective languages. Their production accuracy significantly precedes their accuracy in comprehension. Indeed, the bilingual groups pattern in this way as well in English, their dominant language. However, in Spanish we see different patterns emerge for each group. For heritage speakers and L2ers with AoA of 3, comprehension and production develop at the same rate with comprehension accuracy slightly higher throughout the acquisition process. For L2ers with AoA of 5, comprehension significantly precedes production which is an almost reverse pattern to the Spanish-dominant children.

In light of these findings, I return to my research questions to discern how AoA and context of acquisition modulate the development of subject-verb agreement in bilingual children. Returning to my first research question, my original hypothesis was only partially borne out. Previous studies have shown that heritage bilinguals produce variable verb morphology in the heritage language as early as the preschool years, specifically when exposure to majority language education begins and input in the heritage language reduces (Bedore & Leonard, 2001; Blom, 2010; Hoff et al., 2012; Jacobson, 2012; Rodriguez et al., 2017). Studies in child L2 acquisition have found similar results (Herschensohn et al., 2005). It was hypothesized, however, that due to greater amounts of input and increased activation of Spanish (Putnam & Sanchez, 2013)

in the dual language school from an early age, the heritage simultaneous bilingual children in this study would show a pattern of development more similar to that of bilinguals in non-heritage contexts in which verb morphology emerges along the same timeline as monolinguals in each respective language (Paradis & Genesee, 1996; Serratrice, 2001; Castro & Gavruseva, 2003; Austin, 2009). The data indicate that this is indeed the case for their comprehension abilities in both English and Spanish in which their development follows the same trajectory as the English monolingual and Spanish dominant comparison groups. In production, though, we see that their subject-verb agreement accuracy follows its own path. In English, it takes slightly longer to develop, though it converges with monolingual abilities relatively quickly. In Spanish, however, their subject-verb agreement accuracy takes significantly longer to develop and does not converge with the abilities of Spanish-dominant peers in the age range tested. This is despite having been exposed to Spanish in the home from birth and having received formal education in Spanish from an early age. Previous proposals in heritage grammar development struggle to account for this unexpected finding.

Many studies have found that variability in verb morphology, and indeed in many aspects of grammar, is common in heritage speakers when they attend majority language schools (i.e. Jacobson, 2012; Rodriguez et al., 2017). As exposure to and use of the heritage language becomes reduced, heritage grammars undergo transfer from the dominant language (Montrul, 2009, 2011) or feature reassembly due to varying levels of activation (Putnam & Sánchez, 2013). Though the heritage children in this study have increased, rather than decreased, activation of the heritage language in the form of formal education, the results indicate that this alone may not be enough to predict higher target-

like verb morphology in production. Two other determinant factors that seem to modulate the children's performance on the fill in the blanks task were the primary home language (whether it was English, Spanish or both equally) and which language the children felt more comfortable speaking, as reported by parents. Heritage children in homes where English was the primary language showed the lowest accuracy as well as children who were more comfortable speaking in English.

On the language background questionnaire, parents reported speaking to the children in Spanish as much as possible, that the use of Spanish was encouraged in the home through books, TV, games and FaceTime with relatives, and that maintaining Spanish was an important family value (the most common reasons given by parents for encouraging Spanish acquisition in their children were for identity and connection with family members, as well as improved career opportunities in the future) (see Appendix 5 for a summary of each groups' relevant demographic information). Despite all this, they also reported that most of the children interacted in English with their siblings and preferred speaking in English with their parents. The majority of parents reported that their children were more comfortable speaking in English (n=26), less stated the children were equally comfortable speaking in both (n=13) and even fewer that the children more comfortable speaking in Spanish (n=3). Additionally, the data combined from the experimental tasks in both languages show that these simultaneous bilinguals were English dominant. Thus, though this group of simultaneous heritage bilinguals may receive great amounts of Spanish input from parents, grandparents or other family members, teachers, and school resources (i.e books and videos), they most likely use English more when it comes to speaking (production) and this may result in less accurate

productive abilities in Spanish. Within the group, those with greater *use* of Spanish (those whose primary home language was either Spanish or bilingual, and those who were more comfortable speaking in Spanish or equally comfortable in both) showed to have more target-like production. Consistent with the Output Hypothesis (as originally proposed by Swain (1985, 1993) for SLA), children's use of or output in Spanish played an important role in this study. In adult L2, learners test hypotheses about the second language in their output and make modifications in response to interaction, clarification or confirmation requests by their interlocutors. While this has not been specifically studied in child L2 or 2L1, one other study has shown that language experience (which includes *both* input and output variables) modulates the linguistic performance of heritage bilingual children (Sánchez, Goldin, Hur, Jiménez, López Otero, Austin, ms)[14]. Thus, amount of *input* may not be as determinant a factor as amount of use or *output*.

My second research question addressed whether AoA (initial exposure to Spanish at age 3 or age 5) would have an effect on the emergence of verbal number morphology in child L2 learners and some very interesting patterns emerged. There was indeed an effect of AoA in both English and Spanish, in comprehension and production. Firstly, the introduction of Spanish at age 3 altered the English acquisition path for the younger starters such that they showed more variability than monolinguals in both comprehension and production until around 65-70 months at which point their production accuracy converged with monolinguals and L2ers of AoA 5, and their comprehension accuracy actually surpassed that of these other two groups. The English of the L2ers with AoA 5

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[14] In L1 acquisition, studies such as the seminal work by Hart and Risley (1995) have shown that interaction with adults (which includes opportunities for children to produce language, not only be exposed to it) is essential to language development in infancy and is a predictor for children's later vocabulary growth rate, vocabulary use, and IQ test scores.

was not altered, though, and their developmental trajectory followed that of their monolingual peers. These results provide evidence that a child's grammar is not fully established until age 4, as previous researchers have claimed (Unsworth & Blom, 2010; Meisel, 2011; Unsworth, 2016). In Spanish, we also saw an effect of AoA. The productive accuracy of the younger starters was significantly higher than the L2ers with AoA of 5 in the age range in which they overlapped (about 70 to 90 months, kindergarten and first grade). Their comprehension accuracy was also higher, but the difference here was much smaller. In other words, for the older learners, comprehension accuracy significantly preceded production accuracy, but for the younger starters these two abilities developed at the same rate.

These findings provide some insight into child L2 development and the role of AoA. The developmental trajectory of the L2ers with initial exposure to Spanish at age 3 performed more like the heritage children who were simultaneous bilinguals and had been exposed to Spanish from birth. The L2ers with initial exposure to Spanish at age 5, however, exhibited acquisition of comprehension before production, contrary to what has been found in L1 and other child L2 learners in which production precedes comprehension (for a review, see Tasseva-Kurktchieva, 2015). Thus, the data combined from production and comprehension in English and Spanish suggest that the age of 4 may indeed be the crucial point at which we begin to see differences in morphological development (Meisel, 2011; Unsworth, 2016). As suggested by Schwartz (2003, 2004), the L2ers whose initial exposure to Spanish began after age 4 behave more like adult L2 learners in which comprehension precedes production.

The third research question addressed whether heritage bilinguals, with earlier and greater amount of exposure to Spanish, would display more accuracy in comprehension and production than L2 learners, but my hypothesis was only partially borne out. In Spanish, they did confer an advantage over L2ers with AoA of 5, though the difference in their accuracy was much higher in production than in comprehension in which their differences were slight. The accuracy of the L2ers with AoA 3, however, actually surpassed that of the heritage bilinguals in both comprehension and production. Therefore, having earlier exposure to Spanish (from birth) and greater amount of exposure (at home *and* school, not only school) did not necessarily lead to higher accuracy in verb morphology. Perhaps here, again, we see that social and affective factors may play a larger role than those measured in this dissertation. Another possibility is that both groups had similar amounts of Spanish *output*, despite the heritage children having greater Spanish *input* due to home exposure, and amount of output may be a greater predictor than amount of exposure.

6.3 Pattern of acquisition

Taking a more fine-grained look at the performance of the children on each of the tasks in this experiment gives us the opportunity to address research questions 4 and 5 regarding the pattern of acquisition and the access and retrieval of functional features. To recall, these questions were:

4. Do bilingual children resort to default morphology to express subject-verb agreement in number?

5. Does the overt value of the null subject parameter in English affect agreement in Spanish?

It was hypothesized that the bilingual groups would resort to default morphology, expressed in Spanish as 3rd person singular (as proposed by Grinstead (1998), Liceras et al. (2006) and McCarthy (2006)), and in English as the root of the verb. Under the Distributed Morphology framework, learners produce default morphological forms when they have difficulty selecting the target form or when its syntactic features are underspecified and cannot be matched with a phonological form. It was hypothesized that singular morphology would take longer to acquire in English and plural morphology would take longer to acquire in Spanish, and that bilingual children may show bootstrapping effects by which the marked forms in the weaker system (English) could be acquired more rapidly because of the added support of the more robust paradigm (Spanish).

For RQ 5, it was hypothesized that the presence of an overt subject should provide additional support for comprehension of subject-verb agreement in Spanish because the bilingual children may over rely on the expression of overt subjects due to cross-linguistic influence (Hulk & Muller, 2000) or frequency of activation (Putnam & Sanchez, 2013) of English.

In the previous section, I presented a discussion of the children's overall mean accuracy in production and comprehension. I can now turn to an analysis of what kind of non-target morphology the children produced in Spanish, the non-dominant language, when they could not retrieve an exact match between morphosyntactic features and

phonological forms, allowing further insight into the process of bilingual development. Rather than simply remain silent, children mostly provided responses for all of the fill in the blanks items. Their non-target responses were coded into three categories based on the previous literature (Grinstead, 1998; Liceras et al., 2006; McCarthy, 2006): infinitives (e.g. 'el niño <u>comer</u>'), third person singular (e.g. 'los niños <u>corre</u>'), and other morphology such as person, number and tense mismatches (e.g. 'el niño <u>dormiste</u>')

The results indicate that, though there are group differences, infinitives and 'other morphology' were more common non-target-like productions for all groups than 3rd person singular, which had been the original hypothesis following Grinstead (1998) and Liceras et al. (2006) for monolingual Spanish and McCarthy (2006) for L2 Spanish. 3rd person singular has been proposed as the default because it is the only unmarked form in the paradigm, one of the first forms and the most commonly produced in early monolingual Spanish (Grinstead, 1998; Bel, 2001). Learners may default to 3rd person singular when they have difficulty retrieving an input-like inflectional form or when they have not fully acquired the inflectional morphology associated with a set of features (Austin & Sanchez, 2018). The results of this study, however, suggest that heritage simultaneous bilinguals and child L2 learners may resort to other strategies.

20%-25% of all the bilingual children's non-target productions were third person singular, with heritage children producing the most of all groups. The L2ers with AoA of 3 produced the greatest amount of infinitives (nearly 50% of all non-target responses), but the heritage and L2ers with AoA of 5 were not far behind with around 35% of their non-target productions being infinitives. The percentages were similar for production of other morphology (person/number/tense mismatches) for which L2ers with AoA of 5 had

the greatest percentage (nearly 50%). Heritage and L2ers with AoA of 3 gave about 35% of non-target responses in this category.

Liceras et al. (2006) noted that the production of non-finite verbs with a 3rd person referent is small and lasts for a very short period in monolingual Spanish acquisition. In line with Austin (2017), a somewhat similar pattern can be observed in the development of all the bilingual groups in that infinitive production gradually decreases as all the children get older in favor of other types of non-target morphology. As children's ages increase, we see more instances of underspecified morphology (3rd person singular or person/number/tense mismatches) than missing morphology (infinitives). Under the DM model, default morphological forms are inserted when an exact match between morphosyntactic features and phonological forms cannot be retrieved. These defaults usually appear as less-inflected forms substituted for more-inflected ones (Halle & Marantz, 1993).

It is difficult, therefore, to say whether bilingual children in this case rely on default morphology because they have not yet acquired the target form or if, instead, they reach for non-default inflection mismatches when they cannot activate a target form already acquired (Austin & Sanchez, 2018). Putnam and Sánchez (2013) proposed that heritage speakers have target-like syntactic competence, but experience difficulty in retrieving input-like morpho-phonological forms in their heritage language when they are not activated by frequent use. This cannot explain the patterns observed in this study, however, because the children attend dual language schools and use Spanish every day at school (though, as detailed in parental responses on the language background questionnaire, many use primarily English in the home). Perhaps it is that for these

bilinguals, both heritage and L2ers, who receive formal education in Spanish from an early age, the default is instantiated by the infinitive rather than 3rd person singular due to frequency or explicit instruction in the input, something that would not occur in monolingual acquisition.

RQ4 made several predictions about whether singular or plural morphology would be more easily acquired based on language-specific defaults. It was predicted that in English, singular morphology would take longer to emerge since it is the only marked form of the paradigm. Indeed as expected, in comprehension, the monolingual and L2ers with AoA of 5 performed above chance in the earliest ages only on the items in the plural condition of the picture matching task. They were also consistently more accurate on the plural condition as they got older. For the younger bilinguals, heritage and L2ers with AoA of 3, there was no difference in their performance on the singular and plural conditions. Thus, while in the early ages the heritage and L2ers with AoA of 3 had lower accuracy than the other groups, bootstrapping effects (Gawlitzek-Maiwald & Tracy, 1996; Bernardini & Schlyter, 2004) may be visible after 70 months (5;8) when their comprehension accuracy surpasses the other groups in both singular and plural conditions. The very same pattern emerges in production in that all children take longer to produce accurate third person singular /s/ than the plural bare, in line with previous studies (Forsythe, 2015). Additionally, heritage and L2ers with AoA of 3 show more variability in the early ages, but converge with the other two groups at around 70 months (5;8).

In Spanish, it was expected that singular morphology would be more easily acquired than plurality. This prediction was borne out in production, but not necessarily

in comprehension. Spanish dominant children produced both singular and plural verbs with nearly 100% accuracy from the earliest ages tested. For all the bilingual groups, accuracy on items in the singular condition of the fill in the blanks task was higher in the earliest stages of acquisition, but accuracy on items in the plural condition increased at a faster rate and in the older ages, there was no difference between the two. On the picture matching task, accuracy was higher in the early ages on both singular conditions only for the Spanish-dominant children. The bilingual groups only had higher accuracy on items in the singular null condition and not in the singular overt condition. It may be that verb productions with a null subject are more common in the input (in general, statistical evidence points to the fact that Spanish speakers of all dialects favor the use of null subjects rather than overt ones in oral production (Flores-Ferrán, 2007). For bilingual children whose input is divided between English and Spanish and whose overall amount of exposure to Spanish is inherently less, the fact that null subjects are more common in the input could have a greater effect. Thus, it appears that singular morphology is indeed acquired earlier than plural morphology (Marrero and Aguirre, 2003; Forsythe, 2015), for both Spanish-dominant and bilingual children.

In response to RQ 5, I turn to children's mean accuracy results on the picture matching task in Spanish, in which no main effect of condition was found. To recall, the task presented items to the children in four conditions: a singular verb with a null subject, a singular verb with an overt subject, a plural verb with a null subject and a plural verb with an overt subject. The bilingual children performed similarly to the Spanish-dominant children, though with lower accuracy overall, and performance generally across conditions was similar. There was, however, an age by condition interaction indicating

that the effect of age varied across condition so that items in the singular null condition were acquired earlier than items in the other conditions. Accuracy on the singular and plural overt conditions reached above 90% accuracy by 80 months in all groups, whereas accuracy was far lower in both null conditions at the same age.

Because the Spanish-dominant children outperformed the bilingual children, one cannot speculate that higher accuracy on the overt subject conditions is an indication of an overreliance on the overt subject for bilingual children due to English or of an ongoing shift in U.S. Spanish as proposed by Jacobson (2012). Rather, the presence of the overt subject seems to provide additional comprehension support for all children, not in the earliest stages of acquisition, but as they get older and begin to perform above chance. Previous studies have found mixed results when it comes to determining whether the presence of an overt subject aids in comprehension (Pérez-Leroux, 2005; Miller & Schmitt, 2014). The results obtained here provide evidence that the overt subject may aid in increased subject-verb comprehension, but only after 60 months (5;0) when children begin to perform above chance.

Previous studies sought to explain the developmental production/comprehension asymmetry in English by proposing that children do not rely exclusively on /s/ inflection to determine the number of the subject because English declaratives always carry an overt subject. Thus, the features that trigger agreement cannot stand alone to carry meaning in comprehension when there is no extra support for meaning from the subject number (Johnson et al., 2005; Villiers & Johnson, 2007). In Spanish, in which the subject number is recoverable by means of the verb, other researchers have determined that there is simply a developmental gap due to cognitive maturity or, possibly, task complexity,

and that children seem to produce and recognize grammatical structures before they understand their meaning (Naigles, 2002; Pérez-Leroux, 2005; Soderstrom, 2008).

In this dissertation, with RQ 5, I address the development of bilingual children's ability to rely on the verb morphology for meaning and what this could tell us about how agreement features are accessed. The findings show that Spanish dominant children's ability to extract meaning from verb morphology alone takes time to develop and that the presence of an overt subject provides additional support or clues to determine the subject number. Bilingual children show the same. The exception to this is the fact that at the earliest ages tested, when children perform at chance on the task overall, all groups perform above chance on items in the singular null condition (e.g. come la manzana). This presents an interesting dilemma given that items in this precise condition provided the least clues to subject number (and therefore meaning) since there was a null subject and third person singular is the only bare or unmarked form in the paradigm. Why is this the easiest condition for children to acquire? It may be the most common in the input (as per Flores-Ferran, 2007). It may be due to the fact that 3rd person singular is indeed the default morphology (i.e. Grinstead, 1998) and therefore the first to be acquired in comprehension. What is evident is that singular morphology is more easily acquired in comprehension than plural morphology, in line with previous studies showing the same to be true in production (Marrero and Aguirre, 2003; Forsythe, 2015).

6.4 The role of imperative syntax and morphology

To complement the aforementioned concerns regarding the access and retrieval of functional features, this dissertation also aims to contribute to the debate over the

development of RIs, syntax and morphology in early childhood. The final two research questions posed -reproduced below for the readers' convenience-, addressed these issues:

> 6. Do bilingual children understand the syntax and morphology of imperatives in Spanish?
>
> 7. Does comprehension of imperatives emerge before comprehension of verbal number morphology in bilingual children?

It was hypothesized that children would be able to understand that the syntax and morphology of the imperative carry illocutionary force (Alcázar & Saltarelli, 2014), and that these differ from third person singular morphology as a default. It was also hypothesized that comprehension of imperatives would emerge before comprehension of verbal number morphology, thus providing evidence that syntax is acquired before morphology because imperatives carry a more complex syntactic operation than the agreement features of verb morphology do. Imperatives are found among monolingual children's earliest verb utterances (Gathercole et al., 1999; Orfitelli & Hyams, 2012), but little is known about how they develop in early childhood. This experiment aims to shed light on this process.

I turn first to the children's performance on the forced choice task in English, their dominant language. Overall accuracy (the ability to distinguish between declarative and imperative statements) of all groups improved as age increased, with the exception of the L2ers with AoA 5 who were not tested until ages five to seven. This group showed a decrease in accuracy with age. As previously mentioned, this decline may be due to the fact that many children reported, in the imperative condition, that the speaker was not

being nice or polite and should not tell the child to do something in that way. The parent should have asked the child to 'please eat their dinner' or 'can you eat your dinner please?' These comments demonstrate an understanding of the illocutionary force of the context, but hard-driven social norms such as 'say please' ultimately led children to show a preference for the declarative option in these cases. When looking more closely at children's preferences in each condition we see that accuracy declined with age in the imperative condition for all groups except the heritage bilinguals whose accuracy continued to increase with age. As heritage children, it may be possible that both English and Spanish imperatives in their input differ due to cultural differences, having bilingual parents or parents with English as a second language[15]. If more direct imperatives are present in the heritage children's input, then perhaps in English 'saying please' is not as determinant a factor as it is for children from English monolingual homes. In the declarative condition, accuracy increased with age for all groups except of course for the L2ers with AoA of 5 whose accuracy overall decreased with age.

In Spanish, different patterns emerged. Overall accuracy on the task increased with age for all groups except the L2ers with AoA of 3. In each condition, accuracy increased with age for some and decreased for others. For the heritage children, their performance mimicked their performance in English and accuracy increased in both conditions. This group demonstrated a clear sense of the contextual differences between declarative and imperative morphology in both languages. In the imperative condition, both groups of L2 children showed decreased accuracy with age. This too may be due to

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[15] Studies in pronoun acquisition have shown that children of bilingual parents who are native speakers of a null subject language under attrition and second language speakers tend to produce more pragmatically inappropriate pronouns than monolinguals. Therefore, the children's input differs to that of monolinguals (For a review, see Sorace & Serratrice, 2009).

the children's Spanish input, which came only from teachers at school. After several informal classroom observations, I noted the use of imperatives in the classroom was infrequent with teachers opting for more inclusive language over the more direct imperative. Imperatives were used even less in the elementary classes than in the preschool setting. Some examples included teachers saying to a child 'vamos a sentarnos'/ '*let's sit down*' rather than 'sientate'/ '*sit down*' or 'hay que escribir el nombre'/ '*one must write one's name*' rather than 'escribe tu nombre'/ '*write your name*.' If imperatives are not common in the input of children learning Spanish as an L2 in a school setting (as it has been shown to be in the input of L1 children (Orfitelli & Hyams, 2012)), it is not surprising that L2 children would show preference for declarative statements.

In sum, it is possible there were task effects that mediated the responses of all the children in both languages who made selections on the forced choice task based on social norms of politeness or a dislike for the directness of the imperative. This may have been the sense some younger children had as well, but they may have been unable to express, metalinguistically, their exact reason beyond that it 'just didn't sound right.' The L2ers, English monolinguals and Spanish-dominant children may be more sensitive to these social norms and, perhaps, the early bilinguals (heritage and L2ers with AoA of 3) are more flexible in this respect because their performance differed from the rest. In both English and Spanish the heritage and L2ers with AoA of 3 performed at around 60% accuracy on the forced choice task in the earliest ages, when they perform below chance on the Picture Matching task. At about 60 months (5;0) they begin to perform equally on both tasks (60-65% accuracy), leaving a period between 3;0 and 5;0 during which they

can distinguish between declarative and imperative morphosyntax, but cannot distinguish between singular and plural verb morphology. This is further corroborated by the fact that accuracy on the second person singular distractor items on the picture matching task increased with age for all groups, but no differently to third person singular and plural. Previous studies have shown that second person in the paradigm may be acquired earlier than third person (Forsythe, 2015; Miller & Schmitt, 2014), but in this study this was not the case for either the Spanish-dominant group or the bilinguals.

Thus, the data provide evidence that early bilinguals, both simultaneous and those exposed to L2 Spanish before the age of 4, do indeed understand the syntax and morphology of imperatives in Spanish and that their comprehension of imperatives emerges before comprehension of verbal number morphology. This supports the proposals posited by Rizzi (1993/1994) and extended by Wexler (1994, 1998) that functional categories including T and Agr are available from the very beginning of the acquisition process and that all sentences have a CP, even though due to maturational issues, young learners may truncate the structure of the clause at any node below the CP layer. This may lead to the RIs we see in early child language production. However, if even children produce RIs, the data show that young learners have representational knowledge of imperatives, which involve movement in the CP layer and syntax as complex as that of declaratives and interrogatives (Alcázar & Saltarelli, 2014). Thus, the syntactic representation and functional categories are established, but the fact that children take longer to accurately distinguish singular and plural morphology supports the claim that agreement morphology (the spell out of feature checking) may not be meaning-bearing within the linguistic system (Chomsky, 1995). This could be further

supported by the fact that as children's ages increased, they performed more accurately in the Spanish picture matching task on items with overt subjects that provided more clues as to the subject number than simply the verb morphology.

In returning to the debate over how RIs are instantiated in Spanish, whether they are second person imperative (Salustri and Hyams, 2003, 2006; Pratt & Grinstead, 2007; Ezeizabarrena, 2012) or not because child imperatives carry the same semantic and referential value as in the adult grammar (Liceras et al., 2006; and see also Orfitelli & Hyams, 2012 for English), it could be posited with the data from this dissertation that RIs are not instantiated by the imperative. This is evidenced by young children's representational knowledge of the syntax, finiteness and illocutionary force of imperatives.

6.5 Concluding remarks

In this chapter, I discussed the empirical findings reported in Chapter 5 with the objective of addressing the research questions that motivated and guided this dissertation. After reviewing the research questions, hypotheses and factors under investigation, I argued that various factors (including AoA and amount of language output) modulate the development of subject-verb agreement in bilingual children and that all children have access to functional categories from the start of acquisition, evidenced by the fact that their representational syntactic knowledge emerges before their understanding of morphology.

In the next chapter I address the most relevant contributions of this dissertation. To conclude, Chapter 7 also addresses the limitations encountered and presents several suggestions for future research in bilingual language development.

CHAPTER 7: CONCLUSION

7.1 Introduction

This dissertation has investigated the acquisition of subject-verb agreement in Spanish-English bilingual children aged 3 to 7, as well as in comparison groups of English monolinguals and Spanish-dominant children. The aim was to contribute to our understanding of the acquisition process, particularly in the access and retrieval of functional features, because an analysis of the grammar of young Spanish-English bilinguals, who have an extended period of development, allows unique and valuable insight into the acquisition of syntax and inflectional morphology. The study also examined the impact of age of acquisition and context of acquisition on bilingual children's comprehension, production and judgments across three experimental tasks.

This chapter will summarize the major findings of the study and discuss their implications for theories of bilingualism and as well as for bilingual education and dual language programs in the United States. The following sections will also address the study's limitations, as well as suggestions for future research based on the results presented throughout this dissertation.

7.2. Summary of main findings and implications

The results of this dissertation revealed that the acquisition of subject-verb agreement in bilingual children follows a different path to children who are monolingual English speakers and to those who are Spanish-dominant, and is modulated by age of acquisition, but not necessarily context of acquisition. Children's performance on the BESA demonstrated that nominal morphology was acquired with relative ease and speed by all groups, adding to the literature showing that acquisition of nominal morphology precedes that of verbal morphology in monolingual children (Marrero and Aguirre, 2003; Forsythe, 2015). However, different trajectories became apparent in their verbal morphology.

Firstly, evidence for AoA effects were found in both the English and Spanish production results of the L2 groups. In English, L2ers with AoA of 3 performed more similarly to the heritage bilinguals who had been exposed to Spanish from birth, showing lower accuracy than English monolinguals until age 65 months (5;4), while L2 learners with AoA of 5 performed at ceiling. These findings suggest that the period in which a child's L1 grammar develops can last up to age 4 and that it may be established by the age of 5 (Unsworth & Blom, 2010; Meisel, 2011; Unsworth, 2016). In Spanish, the L2ers with AoA of 5 showed a faster rate of acquisition than the L2ers with AoA of 3, who in turn showed a faster rate of acquisition than the simultaneous bilinguals. These results were in line with previous studies that have shown that older age of onset confers an advantage in terms of speed of acquisition (Lichtman, 2016; Rothman et al., 2016; Muñoz, 2008), perhaps due to the lack of language competition that earlier bilinguals experience in the first years of life.

In comprehension as well, we saw that the L2ers with AoA of 3 behaved more like the simultaneous heritage bilinguals in English and that their accuracy in fact surpassed that of the English monolinguals and L2ers with AoA of 5 so that they reached ceiling approximately 7 months earlier. Exposure to two L1s before the age of 4 may have led to bootstrapping effects in the dominant language (Gawlitzek-Maiwald & Tracy, 1996; Bernardini & Schlyter, 2004), where the robust inflectional system of Spanish may boost the early bilingual child's acquisition of the marked forms in English's weaker paradigm. There was no evidence of this for the L2ers with AoA of 5 and an older age of onset of Spanish. In Spanish comprehension, all three bilingual groups performed less accurately than the Spanish-dominant group overall, but their steady increase in accuracy indicates grammatical knowledge and representation of third person singular and plural morphology.

A comparison of performance in both production and comprehension showed that, as expected, for English monolingual and Spanish-dominant children production accuracy significantly precedes accuracy in comprehension. Indeed, the bilingual groups patterned in this way as well in English, their dominant language. However, in Spanish, we again saw AoA effects. For heritage speakers and L2ers with AoA of 3, comprehension and production developed at the same rate with comprehension accuracy slightly higher throughout the acquisition process. For L2ers with AoA of 5, comprehension significantly preceded production, which is an almost reverse pattern to the Spanish-dominant children.

While it is clear that AoA plays a role in the acquisition of subject-verb agreement and that the age of 4 seems to be a pivotal developmental moment at which we begin to

see differences in both languages, the results of the role of context of acquisition were less clear. This is because simultaneous heritage bilinguals and L2ers with AoA of 3 behaved very similarly to each other in all the tasks, despite the heritage speakers having had more years of exposure to Spanish (from birth rather than starting at age 3) and having greater amount of exposure to Spanish (at home and at school, rather than only at school). In order to find an explanation for these unexpected findings, two further factors were extracted from parents' responses on the language background questionnaire which pertained to the amount of Spanish the children *produced* overall (these were the child's primary home language (whether it was English, Spanish or both equally) and which language the children felt more comfortable speaking). These factors were found to be predictors for heritage children's production accuracy such that children who were more comfortable speaking in English and lived in homes where English was the primary language showed the lowest accuracy. Thus, while L2ers with AoA of 3 and heritage bilinguals differed in their amount of Spanish input (due to the additional home exposure of the heritage speakers), they may have had similar amounts of Spanish *output*, and following along the lines of previous proposals about the role of output in SLA (Swain, 1985, 1993), amount of output may be a greater predictor than amount of exposure in early bilingual children.

In addition to the role of extralinguistic factors, this dissertation also addressed bilingual children's pattern of acquisition and what this could tell us about the access and retrieval of functional features. In analyzing children's non-target-like productions, the findings revealed that 3rd person singular was not the most common or default form used, as had been hypothesized following previous proposals in Spanish L1 and L2

acquisition (Grinstead, 1998; Liceras et al., 2006; McCarthy, 2006). Rather, infinitives and other morphology (person/number/tense mismatches) appeared at a much higher rate, suggesting that for these bilingual children in a dual language school, the default may be instantiated by the infinitive rather than 3rd person singular due to frequency or explicit instruction in the input. These bilinguals may rely on default morphology because they have not yet acquired the target form or because they reach for non-default inflection mismatches when they cannot activate a target form already acquired (the DM Model: Halle & Marantz, 1993; see Austin & Sanchez, 2018 for an analysis of the acquisition of inflection using the DM framework).

To further this issue, children's ability to distinguish between declarative and imperative verb forms was also tested because their morphology is homophonous (in English: 3rd person plural and 2nd person imperative; in Spanish: 3rd person singular and 2nd person imperative), but their syntactic structures differ (Alcázar & Saltarelli, 2014). It has also been proposed that the second person imperative instantiates the RI stage found in early monolingual Spanish (Salustri and Hyams, 2003, 2006; Pratt & Grinstead, 2007; Ezeizabarrena, 2012). The heritage bilinguals demonstrated a clear sense of the contextual differences between declarative and imperative morphology in both languages, while the other groups showed decreased accuracy with age in Spanish (though the L2ers with AoA of 3 performed similarly to the heritage bilinguals in the earliest ages). This decline may have been due to the fact that many children reported, in the imperative condition, that the speaker was not being nice or polite and should not tell the child to do something in that way, demonstrating an understanding of the illocutionary force of the context, but a preference for the declarative option because of social norms of politeness

or a dislike for the directness of the imperative. Heritage children may be exposed to more imperative forms in their home input and cultural differences may account for their higher accuracy on the forced choice task.

In a comparison with performance on the picture matching task, the results showed a period between 3;0 and 5;0 during which early bilinguals (heritage and L2ers with AoA of 3) can distinguish between declarative and imperative morphosyntax, but cannot distinguish between third person singular and plural verb morphology. This is further corroborated by the fact that accuracy on the second person singular distractor items on the picture matching task increased with age for all groups, but no differently to third person singular and plural. These data support proposals that functional categories including T and Agr are available from the very beginning of the acquisition process (Rizzi, 1993/1994; Wexler, 1994, 1998). It could be posited with the data from this dissertation that RIs are not instantiated by the imperative as evidenced by young children's representational knowledge of the syntax, finiteness and illocutionary force of imperatives. Additionally, third person singular (homophonous to second person imperative) is also not the default form in production for these bilingual children.

To conclude, these findings have implications for theories of bilingualism, bilingual education and dual language programs. First, functional features appear to be available from the very start of the acquisition process for L1, 2L1 and L2. Within the context of subject-verb agreement, all children demonstrate representational syntactic knowledge before understanding of morphological distinctions (singular and plural). While certain external factors modulate language development, this seems to remain constant across the bilingual and monolingual groups tested in this study. Thus, while L1,

2L1 and L2 children may follow different paths of acquisition, we have further evidence that syntax precedes morphology.

Secondly, the findings have implications for educators who work with bilingual children in the preschool and elementary classroom. We have evidence that Spanish subject-verb agreement may develop differently in L2 children due to their learning in an instructed context (possibly leading to fewer imperatives and greater use of infinitives in the input). We also have evidence that children's output plays perhaps a more important role than input in their language development. Teachers should be aware that greater opportunities for speaking, both at home and at school, lead to stronger abilities and higher accuracy. Finally, bootstrapping effects were found in the English comprehension of the early bilingual children (heritage and L2 with AoA of 3) which provides educators with evidence that a child's two languages can support each other and that learning in one language can provide a strong foundation for learning in the other.

7.3 Limitations

It is important to acknowledge that this dissertation inherently faced some practical and task limitations. Firstly, while parents completed a detailed language background questionnaire about the children's historical and daily language exposure and use, not enough could be known about the children's input in the home in terms of imperatives as well as null and overt subjects, which could have had an effect on their performance. For heritage children, it is reasonable to assume that having bilingual parents or parents with English as a second language means their input is not exactly comparable with the input received by monolingual peers, as has been shown in previous

studies (i.e. Sorace & Serratrice, 2009). Additionally, it was not possible to know the variety of Spanish spoken by all the families of the heritage children. IRB limitations prohibited asking parents on the language background questionnaire to provide birthplace or country of origin and, thus, an alternative question was included, asking parents to provide 'variety of Spanish spoken'. While some parents did provide country of origin here, many left this blank or stated they spoke 'US Spanish' or 'Latin American Spanish' without specifying any particular region. As a result, differences between heritage children in their Spanish input could not be addressed, though this kind of heterogeneity in studies with heritage speakers is common (i.e. Perez-Cortes, 2016) due to the nature of heritage bilingualism (Valdés, 2000).

Another limitation was the possibility of task effects on the forced choice task that asked children to distinguish between declarative and imperative clauses. These task effects discussed previously in Chapter 6, section 5.3, may have mediated the responses of all the children in both languages. Their selections on the forced choice task may have been made based on social norms of politeness or a dislike for the directness of the imperative, rather than their true judgment of the grammaticality of imperatives and declaratives. This was apparent, not in the early years, but as children's ages increased, specifically in kindergarten and first grade.

Finally, the analysis of the data could have benefited from a larger pool of L2ers with AoA of 3 in kindergarten (n=7) and first grade (n=6) as compared to the groups. Additionally, in kindergarten and first grade the L2ers with AoA of 5 were comprised of much larger numbers (kindergarten: n=19; first grade: n= 27). However, the data were analyzed using age as a continuous variable which helped to defuse this difference in

sample size by grade and the total group count of L2ers with AoA of 5 (n=46) was comparable in size to that of the other groups (HL: n=42; L2 AoA 3: n=35; ME: n=40; SD: n=39). Despite these limitations, the data discussed still managed to capture representative developmental trends in different groups of bilingual children and contribute to our understanding of the factors that modulate the acquisition of subject-verb agreement.

7.4 Future research and concluding remarks

The findings from this dissertation lead to the possibility for further inquiry into the differences and similarities in child L1, L2 and 2L1 acquisition. One of the contributions of this study is the proposal that amount of children's *output* in the heritage language may be a greater predictor of their productive abilities than their amount of exposure or input. While much research has identified the role of quantity and quality of input in the development of a bilingual child's languages (i.e. Montrul & Potowski, 2007; Potowski, 2007b; Putnam and Sánchez, 2013; Kupisch and Rothman, 2016), very little is known about the importance of output. The results of this study show that a rich language environment in the form of a dual language education and large quantities of input at home and at school do lead to successful grammatical knowledge, but this alone may not be enough for more accurate subject-verb agreement in production. Thus, future research should address the role of bilingual children's quality and quantity of speaking or interactions in the heritage language.

Future investigations should also explore subject-verb acquisition in children learning English as a second language, either by immersion in the United States or in a dual language program in a Spanish speaking country. This study identified that social factors such as home language and comfort speaking Spanish may influence heritage children's subject-verb agreement accuracy in Spanish production. Being that English is a higher prestige language than Spanish in the U.S. and around the world (and is also more readily accessible in music, television, media and entertainment), home language and preference for speaking English could be factors that are less influential for children acquiring English. In addition to this external factor, a comparative analysis of subject-verb acquisition in English and in Spanish could provide a window into the language-specific properties of syntax and morphology.

Although the findings of this dissertation have provided invaluable information about the development of subject-verb agreement in L1, 2L1 and L2 acquisition, they have also raised a number of questions about the role of certain external factors mentioned in this chapter. While the scope of this dissertation limited the exploration of some of these variables, addressing them in future research would broaden our understanding of bilingual language development.

APPENDIX 1: Parental consent form - English

PARENTAL INFORMED CONSENT

You are invited to participate in a research study that is being conducted by Michele Goldin who is a doctoral fellow in the Department of Spanish and Portuguese at Rutgers University. The purpose of this research is to determine the grammatical development of bilingual children who attend a Spanish immersion or dual-immersion school in the United States.

Approximately 200 subjects will participate in the study, and each individual's participation will last approximately 30 minutes spread across two separate sessions set a week apart.

The study procedures include the following:

       -First, participants will complete a fill-in-the-blanks production task in which they'll be shown an image of a person doing an action (such as walking, jumping, or eating) and they will be asked to complete sentences that describe the pictures.

       -The second task will be a picture-matching task. In this task the participants will be shown two images (for example, in one image there will be one child drinking water and in the other image there will be a group of children drinking water) and then listen to a recorded sentence. They will then be asked to choose which picture they think best matches the sentence.

       -Finally, participants will take part in a forced choice task to gather information about grammatical intuitions. Participants will see one image (such as a mother watching her children play on the playground) and then hear two characters speak recorded sentences. They will then be asked to choose which character 'said it better'.

       -Additionally, children's parents will be asked to complete a Language Background Questionnaire (in English). This questionnaire will include questions about the child's acquisition and use of Spanish and English.

This research is confidential. Confidential means that the research records will include some information about you/your child and this information will be stored in such a manner that some linkage between your/your child's identity and the response in the research exists. Some of the information collected about you/your child includes cultural background, parents' language background and use, language use at home, and age of language acquisition. Please note that we will keep this information confidential by limiting individual's access to the research data and keeping it in a secure location. Audio and video data will be stored in a password protected account and paper forms will be kept in a locked filing cabinet.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All study data will be kept for 3 years with the exception of audio recordings which will be retained indefinitely, as per federal regulations and as stated in the study protocol.

There are no foreseeable risks to participation in this study.
You/your child have been told that the benefits of taking part in this study may be to help researchers better understand the role that academic instruction plays in the linguistic development of bilingual children. However, you may receive no direct benefit from taking part in this study.

Participation in this study is voluntary. You may choose for your child not to participate, and you may withdraw your child from participating at any time during the study activities without any penalty to your

child. In addition, you/your child may choose not to answer any questions with which you/your child are not comfortable.

If you/your child have any questions about the study or study procedures, you/your child may contact myself or my faculty advisor at

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Rutgers University
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15 Seminary Place
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848-932-9323
lsanchez@spanport.rutgers.edu

If you/your child have any questions about your rights as a research subject, you may contact the Institutional Review Board (a committee that reviews research studies in order to protect those who participate). Please contact an IRB Administrator at the Rutgers University, Arts and Sciences IRB:

Institutional Review Board
Rutgers University, the State University of New Jersey
Liberty Plaza / Suite 3200
335 George Street, 3rd Floor
New Brunswick, NJ 08901
Phone: 732-235-2866
Email: human-subjects@ored.rutgers.edu

Your child will also be asked if they wish to participate in this study. You will be given a copy of this consent form for your records.

Sign below if you agree to allow your child to participate in this research study:

Name of Child (Print) _____

Name of Parent/Legal Guardian (Print) _____

Parent/Legal Guardian's Signature _____ Date _____

Principal Investigator Signature _____ Date _____

RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY IRB
AUDIO/VIDEOTAPE ADDENDUM TO CONSENT FORM

You have already agreed to participate in a research study conducted by Michele Goldin. We are asking for your permission to allow us to *audio and videotape* as part of that research study. You do not have to agree to be recorded in order to participate in the main part of the study.

The recording(s) will be used for analysis by the principal investigator. The recording(s) will not include any identifying information such as name or other personal information. Only the child's responses to the tasks will be recorded.

The recording(s) will be stored digitally in a password-protected account and linked with a code to the subjects' identity. The audio recording will be retained indefinitely, but the video recording will be destroyed after three years.

Your signature on this form grants the investigator named above permission to record you as described above during participation in the above-referenced study. The investigator will not use the recording(s) for any other reason than that/those stated in the consent form without your written permission.

Name of Child (Print) _____

Name of Parent/Legal Guardian (Print) _____

Parent/Legal Guardian's Signature _____ Date _____

Principal Investigator Signature _____ Date _____

APPENDIX 2: Parental consent form - Spanish

FORMULARIO DE CONSENTIMIENTO INFORMADO

Tu hijo/hija está invitado a participar en un studio realizado por Michele Goldin que está realizando su doctorado en el Departamento de español y portugués en Rutgers University en Estados Unidos. El propósito de este estudio es determinar cómo los niños bilingües español-inglés desarrollan conocimiento gramatical.

Habrá aproximadamente 200 participantes en este estudio y su participación individual tomará unos 30 minutos.

El estudio consiste en lo siguiente:

-Primero, los participantes harán un juego de rellenar los huecos. Verán imágenes de una o dos personas participando en una acción (caminando, saltando, comiendo, etc.) y se les pedirá que completen las frases para describir las imágenes.

-La segunda tarea será un juego de conectar imágenes. En esta tarea, los participantes verán dos imágenes y escucharán una frase. Se les pedirá que elijan cual de las imágenes acompaña la frase que han escuchado.

-Tereco, los participantes haran una tarea de quien lo dijo mejor en la que verán imágenes y escucharán a dos personajes describir tales imágenes. Se les pedirá que elijan que personaje lo dijo mejor.

-Además, se les pedirá a los padres de los niños que rellenen un cuestionario de perfil lingüístico. En este cuestionario habrá preguntas sobre la adquisición y el uso del español y el inglés en el niño.

Esta investigación es confidencial. Confidencial significa que los datos del estudio incluirán alguna información sobre tu hijo y que esta información será almacenada de tal manera que existirá un vínculo entre su identidad y sus respuestas. Parte de la información recgida sobre tu hijo incluye edad, edad de adquisición del español y del inglés, año escolar y que lenguas habla en casa y en la escuela. Por favor, recuerda que mantendremos confidencial esta información limitando el acceso a los datos del estudio y manteniéndolos en un lugar seguro. Todos os datos de audio y video serán almacenados en cuentas de Dropbox protegidas con contraseña. Los datos del cuestionario de prefil lingüístico serán almacenados bajo llave en un mueble archivador en la oficina del investigador principal. Los formularios de consentimiento informado serán almacenados bajo llave en otro mueble archivador en la oficina de la casa del investigador principal.

El equipo de investigación y el Comité de Etica (Institutional Review Board) de Rutgers University son las únicas terceras partes que tendrán permiso de ver los datos, excepto si la ley lo requiere. Si se publica un informe sobre este estudio o si se presentan los resultados en una conferencia profesional, solo se informará de datos de grupo. Todos los datos del estudio serán almacenados indefinidamente, como especifica el protocolo del estudio. No se prevén riesgos a la participación en este estudio.

Tu/tu hijo/a han sido informados de que los beneficios de participar en este estudio pueden ser un aumento en la concientización sobre el uso del lenguaje. Sin embargo, puede que no reciba beneficio directo por participar en este estudio. Tu/tu hijo/a recibirá útiles escolares por completar el estudio en su totalidad.

La participación en este estudio es voluntaria. Puedes escoger que tu hijo no participe y se retire del estudio en cualquier momento de las actividades del estudio sin ningún tipo de penalización. Además, tu/tu hijo/a puede escoger no responder a cualquier pregunta que te resulte incómada.

Si tienes preguntas sobre el estudio o el procedimiento, puedes ponerte en contacto conmigo:

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Rutgers University
15 Seminary Place
New Brunswick, NJ 08901
646-402-4622
michele.goldin@rutgers.edu

Si tienes preguntas sobre tus derechos como sujeto de investigación, por favor, ponte en contacto con un administrador del Comité de Etica (IRB) de Rutgers University, Arts and Sciences IRB:

Institutional Review Board
Rutgers University, the State University of New Jersey
Liberty Plaza / Suite 3200
335 George Street, 3rd Floor
New Brunswick, NJ 08901
Phone: 732-235-2866
Email: human-subjects@ored.rutgers.edu

A tu hijo también se le preguntará si desea participar en el estudio. Recibirás una copia de este formulario de consentimiento.

FORMULARIO DE CONSENTIMIENTO AUDIOVISUAL

Ya has dado permiso para que tu hijo/a participe en un estudio de investigación dirigido por Michele Goldin. Pedimos permiso para grabar a tu hijo en audio y en video como parte de dicho estudio.

Las grabaciones se usurán para unos análisis de datos para investigar y también como recurso para enseñar a estudiantes universitarios que no forman parte del equipo de investigación.

Las grabaciones de video incluirán imágenes de la cara de tu hijo/a. Las grabaciones de audio y video incluirán la voz de tu hijo/a. En todos momentos guardaremos privado el nombre de tu hijo/a. Los datos de video y/o audio que recogemos serán archivados permanentemente en un gabiente cerrado, manteniendo la privacidad del apellido del niño.

Tu consentimiento verbal otorga al investigador mencionado anteriormente, el permiso de grabar a tu hijo/a de la manera indicada en el formulario durante la participación del estudio. El investigador responsable no utilizará la grabación para otras razones fuera de lo indicado del formulario sin un permiso escrito previo.

APPENDIX 3: Language background questionnaire - English

Language Background Questionnaire

Participant Name:_____ Date of birth: _____

Grade in school: _____

I. Geography

1. At what age did your child first begin to learn to speak English? __0___ [SEP] a. In what context (e.g., school, home, church...etc...)? _____

2. At what age did your child first begin to learn to speak Spanish? __3___ [SEP] a. In what context (e.g., school, home, church...etc..)? _____

3. What language(s) does caregiver #1 speak? _____ [SEP] If Spanish, what variety of Spanish is spoken? _____

4. What language(s) does caregiver #2 speak? _____ [SEP] If Spanish, what variety of Spanish is spoken? _____

5. Who are the primary caregivers for the child? _____

6. Has your child traveled to a Spanish-speaking country? _____ If so, how many times and for how long? _____

II. Family language usage

1. What is the primary language used in the home? _____

2. What language does caregiver #1 speak TO the child? _____

3. What language does the child speak TO caregiver #1? _____

4. What language does caregiver #2 speak TO the child? _____

5. What language does the child speak TO caregiver #2? _____

6. Are there other adult family members who speak with the child in a language other than English? _____ If so, what language? _____

7. Do adult family members encourage the child to speak Spanish in the home as much as possible? _____

8. Can you provide some examples of ways Spanish is encouraged in the home? (i.e. movies, books, games, skype with family members abroad, etc.)

_____

9. Does the child have siblings? _____ If so, what ages are the siblings and are they younger or older? _____

10. What language do the siblings use to speak with each other? _____

III. Child Language Assessment

1. When SPEAKING, the child is:

a. More comfortable using English ☐

b. More comfortable using Spanish ☐

c. Equally comfortable using both languages ☐

2. When LISTENING, the child is:

a. More comfortable understanding English ☐

b. More comfortable understanding Spanish ☐

c. Equally comfortable understanding both languages ☐☐

3. When READING and WRITING, the child is:

a. More comfortable understanding English ☐

b. More comfortable understanding Spanish ☐

c. Equally comfortable understanding both languages ☐

4. Is the child learning to read and write in Spanish? _____ ☐If so, where are they learning? (i.e. school, parents, etc.) _____

5. On a scale from 1 to 10 (1 = not important; 10 = very important), how important is it for you to maintain and further your child's Spanish knowledge? _____

6. If the child's family is of Hispanic heritage, do you believe that speaking Spanish is important to his or her identity? Explain.

_____

7. On a scale from 1 to 10 (1 = least appreciated; 5 = neutral; 10 = most appreciated), what do you think is the current status of Spanish in the US? _____

8. How often does your child speak Spanish? _____

9. Is there anything else you would like to share about your child's Spanish-speaking experiences?

_____

APPENDIX 4: Language background questionnaire - Spanish

Cuestionario sobre el uso del español y del inglés

Edad del niño o la niña (en años y meses):_____

Año escolar: _____

I. Geografía

1. ¿A qué edad empezó tu hijo a hablar el español? _____[SEP]a. ¿En qué contexto (e.g., colegio, casa, etc...)? _____

2. ¿A qué edad empezó tu hijo a hablar el inglés? _____[SEP]a. ¿En qué contexto (e.g., colegio, casa, etc...)? _____

3. ¿Qué idioma(s) habla cuidador #1 (padre, madre, abuela, etc.)?

_____

4. ¿Qué idioma(s) habla cuidador #2 (padre, madre, abuela, etc.)?

_____

5. ¿Quiénes son los cuidadores principales del niño? _____

6. ¿Ha viajado tu hijo a países de habla inglesa? _____ Si es así, ¿Cuántas veces y por cuánto tiempo? _____

II. Uso del lenguaje en la familia

1. ¿Cuál es el idioma principal en la familia? _____

2. ¿En qué idioma habla cuidador #1 AL niño? _____

3. ¿En qué idioma le habla el niño AL cuidador #1? _____

4. ¿En qué idioma le habla cuidador #2 AL niño? _____

5. ¿En qué idioma le habla el niño AL cuidador #2? _____

6. ¿Hay otros familiares adultos que hablan con el niño en otro idioma que no sea español?_____ ¿Si es así, en qué idioma(s)? _____

7. ¿Los padres promueven el uso del inglés en casa? _____ Si es así, puedes proporcionar unos ejemplos de como (e.g. películas, libros, conversaciones, juegos, etc.)

_____

8. ¿Tiene el niño hermanos/as? _____ Si es así, ¿qué edades tienen? ¿Son mayores o menores? _____

9. ¿Qué idioma usan los hermanos entre ellos? _____

III. Uso del lenguaje del niño

1. Cuando HABLA, el niño:

d. Es más cómodo hablando en español ☐

e. Es más cómodo hablando en inglés ☐

c. Es igual de cómodo en los dos idiomas

2. When LISTENING, the child is:

d. Es más cómodo escuchando en español

e. Es más cómodo escuchando en inglés

f. Es igual de cómodo en los dos idiomas ☐☐

3. When READING and WRITING, the child is:

d. Es más cómodo escribiendo en español ☐

e. Es más cómodo escribiendo en inglés ☐

c. Es igual de cómodo en los dos idiomas

4. ¿Está tu hijo aprendiendo a leer y a escribir en inglés? _____ ☐ Si es así, dónde? (e.g. casa, colegio, clases etc.) _____

5. En una escala de 1 a 10 (1 = no es importante; 10 = es muy importante), ¿cómo de importante es que tu hijo aprenda el inglés? _____

6. ¿Por qué?

_____

7. ¿Con qué frecuencia está expuesto tu hijo al inglés? _____

8. ¿Hay algo más que te gustaría compartir sobre vuestras experiencias con los idiomas?

_____

APPENDIX 5: Summary of relevant items from bilingual participant's

language background

Group	Primary Home Language	Language Parent #1 speaks	Language child speaks to Parent #1	Language Parent #2 speaks	Language child speaks to Parent #2	Language child is most comfortable speaking
Heritage (n=42)	En (n=22) En/Sp (n=15) Sp (n=5)	En (n=9 En/Sp (n=18) Sp (n=13) N/A (n=2)	En (n=15) En/Sp (n=19) Sp (n=6) N/A (n=2)	En (n=19) En/Sp (n=13) Sp (n=4) N/A (n=4) Other (n=1)	En (n=21) En/Sp (n=12) Sp (n=3) N/A (n=5) Other (n=1)	En (n=26) En/Sp (n=13) Sp (n=3)
L2 AoA 3 (n=35)	En (n=32) Other (n=3)	En (n=25) En/Sp (n=6) Sp (n=1) Other (n=3)	En (n=24) En/Sp (n=8) Other (n=3)	En (n=27) En/Sp (n=3) Sp (n=1) Other (n=4)	En (n=24) En/Sp (n=7) Other (n=4)	En (n=28) En/Sp (n=7)
L2 AoA 5 (n=46)	En (n=36) Other (n=10)	En (n=36) Other (n=10)	En (n=39) Other (n=7)	En (n=36) En/Sp (n=1) Sp (n=1) Other (n=8)	En (n=39) En/Sp (n=1) Sp (n=1) Other (n=5)	En (n=46)

APPENDIX 6: BESA items

English:

1. Here, Maria has an apple. What does Maria have here?
2. Here, Jenny has a flower. What does Jenny have here?
3. Here the girl has a cat. What does the girl have here?
4. Here the woman has an orange. What does the woman have here?
5. Here, this is a tree. What do you see here?

Spanish:

1. Aquí, Maria tiene una manzana. Y aquí, ¿qué tiene Maria?
2. Aquí, Anita tiene una flor. Y aquí, ¿qué tiene Anita?
3. Aquí, la niña tiene un gato. Y aquí, ¿qué tiene la niña?
4. Aquí, la mujer tiene una naranja. Y aquí, ¿qué tiene la mujer?
5. Aquí, hay un arbol. Y aquí, ¿qué hay?

APPENDIX 7: Fill in the Blanks Task stimuli

English:

Trial: Here, Paul talks every day. And here, his friends do too. What do his friends do every day? They …

1. Here, Susan dances every day. And here her friends to too. What do her friends do every day? They …

2. Here the children run every day. And here Alex does too. ¿What does Alex do every day? Alex …

3. (distractor) Here the car was pushed by Juan. And here, ¿what happened? The cars …

4. Here George plays every day. And here his friends do too. What do his friends do every day? They …

5. Here Lola jumps every day. And here her friends do too. What do her friends do every day? They …

6. Here the children eat every day. And here Johnny does too. ¿What does Johny do every day? Johnny …

7. (distractor) Here the balls were thrown by the children. And here, what happened? The ball …

8. (distractor) Here the tower was built by the children. And here, what happened? The tower …

9. Here the children paint every day. And here Sarah does too. What does Sarah do every day? Sarah …

10. (distractor) Here the toy was broken by the child. And here, what happened? The toy …

11. Here the children sleep every day. And here Max does too. What does Max do every day? Max …

12. Here Lucas walks every day. And here his friends do too. What do his friends do every day? They …

Spanish:

Trial: Aqui los niños hablan todos los dias, y aqui Pablo tambien. ¿Qué hace Pablo? Pablo ...

1. Aquí, Susana baila todos los días. Y aquí sus amigas también. ¿Qué hacen sus amigas? Ellas …

2. Aquí, los niños corren todos los días. Y aquí, Alex también. ¿Qué hace Alex? Alex …

3. (distractor) Aquí, el carro fue empujado por Juan. Y aquí, ¿qué pasó? Los carros …

4. Aquí Jorge juega todos los días. Y aquí sus amigos también. ¿Qué hacen sus amigos?

Ellos …

5. Aquí, Lola salta todos los días. Y aquí, sus amigos también. ¿Qué hacen sus amigos? Ellos …

6. Aquí, los niños comen todos los días. Y aquí, Juan también. ¿Qué hace Juan? Juan …

7. (distractor) Aquí las pelotas fueron tiradas por los niños. Y aquí ¿qué pasó? La pelota …

8. (distractor) Aquí, la torre fue construida por los niños. Y aquí, ¿qué pasó? La torre …

9. Aquí los niños pintan todos los días. Y aquí Sara también. ¿Qué hace Sara? Sara …

10. (distractor) Aquí el juguete fue roto por el niño. Y aquí ¿qué pasó? Los juguetes …

11. Aqui los niños duermen todos los días. Y aquí Max también. ¿Qué hace Max? Max …

12. Aquí Lucas camina todos los días. Y aquí sus amigos también. ¿Qué hacen sus amigos? Ellos …

APPENDIX 8: Picture Matching Task stimuli

English:

Trial: The children speak on the phone.
1. The children throw the ball.
2. Clean the table.
3. The child drinks water.
4. Eats the apple.
5. (distractor) You jump so high.
6. Pick up the toys.
7. The child takes a nap.
8. The children run the race.
9. (distractor) You play so well.
10. Pushes the car.
11. The children dance ballet.
12. Play board games.
13. (distractor) You are my brother.
14. The child builds the tower.
15. Paints the picture.
16. The children watch tv.
17. (distractor) You sing so well.
18. Read the books.
19. The child plays music.
20. Breaks the toy.

Spanish:

Trial: Los niños hablan al teléfono.
1. Los niños tiran la pelota.
2. Limpian la mesa.
3. El niño toma agua.
4. Come la manzana.
5. (distractor) Tu saltas muy alto amiga.
6. Recogen los juguetes.
7. El niño duerme la siesta.
8. Los niños corren la carrera.
9. (distractor) Tu juegas muy bien amiga.
10. Empuja el carro.

11. Las niñas bailan ballet
12. Juegan juegos de mesa.
13. (distractor) Tu eres mi hermano.
14. El niño construye la torre.
15. Pinta el cuadro.
16. Los niños ven la televisión.
17. (distractor) Tu cantas muy bien amigo.
18. Leen los libros.
19. El niño toca música.
20. Rompe el juguete.

APPENDIX 9: Forced Choice Task stimuli

English:

1. Eat the dinner! / The children eat the dinner.
2. Watch TV! / The children watch tv.
3. (distractor) I'm angry. / I want to read
4. Drink water! / The children drink water.
5. (distractor) I want to eat. / I'm tired.
6. Clean the table! / The children clean the table.
7. Go to sleep! / The children go to sleep.
8. (distractor) I want to read. / I'm angry.
9. Push the car! / The children push the car.
10. Pick up the toys! / The children pick up the toys.
11. (distractor) I'm tired. / I want to eat.
12. Play music! / The children play music.

Spanish:

1. ¡Toca mùsica! / El niño toca música.
2. ¡Duerme la siesta! / El niño duerme la siesta
3. (distractor) Estoy enfadado. / Quiero leer.
4. Empuja el carro. / El niño empuja el carro.
5. ¡Limpia la mesa! / El niño limpia la mesa.
6. (distractor) Estoy cansado. / Quiero comer.
7. ¡Ve la televisión! / El niño ve la televisión.
8. (distractor) Quiero leer. / Estoy enfadado.
9. ¡Toma agua! / El niño toma agua.
10. ¡Recoge los juguetes! / El niño recoge los juguetes.
11. (distractor) Quiero comer. / Estoy cansado.
12. ¡Come la cena! / El niño come la cena.

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