

Comprehension-Production Asymmetry in Bilingual Children's Acquisition of Subject-Verb Agreement

Michele Goldin

1. Introduction

Monolingual (L1) children are universally successful in acquiring the basic properties of language, but bilingual speakers are prone to variability, especially with respect to the functional features associated with agreement morphology (Montrul, 2004). In L1 acquisition, children produce accurate subject-verb agreement at a remarkably young age though it emerges earlier in Spanish (Buesa, 2007) than in English (Hyams, 2001). Simultaneous bilingual (2L1) children's production follows this same pattern in each of their languages (Serratrice, 2001), but child second language (L2) agreement morphology shows optionality (Herschensohn, Stevenson & Waltmunson, 2005) due to a range of variables (Unsworth, 2016). Of noteworthy interest is the finding that, cross-linguistically, monolinguals produce inflected verb forms in their speech much earlier than they are able to rely on verbal morphology for comprehension (i.e. Johnson et al., 2005; Miller & Schmitt, 2014). While various explanations have been posited, there is debate as to why this phenomenon occurs.

Considerable attention has been given to the development of verb morphology in monolingual acquisition (i.e. Johnson et al., 2005; among others), but very little is still known about this process in bilingual children (Goldin, 2021). Thus, this study explores the acquisition of third person subject-verb agreement in young simultaneous and sequential bilinguals with the aim of adding to our understanding of children's access and retrieval of functional features in the language acquisition process.

2. Verb morphology

English has a simplified subject-verb agreement system in which the only agreement marker is /s/ for third person singular verbs (Corbett, 2006). 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).

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Table 1. Person and number inflections for English verbs

| Person | Number | |
|--------|----------|--------|
| | Singular | Plural |
| First | -∅ | -∅ |
| Second | -∅ | -∅ |
| Third | -s | -∅ |

In contrast to English, Spanish has a more complex verbal paradigm. Verbs are inflected for person, number, tense, aspect and mood, and are categorized 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 (1a) and (1b) (Aguirre, 2011).

- (1) a. [root + thematic vowel] stem + suffix1 (tense/aspect/mood) + suffix2 (person/number)
 b. [camin + a]_{stem} + ba_{suffix1} + mos_{suffix2}
 walk + past imperfect indicative + first person plural
 ‘We walked’

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. Verbs have different endings for person and number, except third person singular, which is a stem form, and can be seen in Table 2 below (Harris, 1991; Aguirre, 2011).

Table 2. Person and number inflections for Spanish verbs

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

As we can see, 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 while in Spanish, all verbs are marked for person and number contrast except for third person singular verbs. This robust paradigm may exist because of the fact that 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.

According to Chomsky's (1995) Minimalist Program, person and number features are grammatical but 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. Further, Bybee's (1985, 1995) lexical morphology model posits that morphological markers for identifying person and number distinctions are peripheral to the verb's meaning. According to the model, person and number features don't carry strong semantic relevance because they do not impact the inherent meaning of the verb.

Under these proposals, listeners must rely on other features in a phrase, like context or the overt subject, for information about number and person on the verb. This may suffice for an analysis of English, with its minimal morphological paradigm and omnipresent overt subjects, but an analysis of Spanish morphology may require further consideration because its verbal inflections carry all the semantics of subject person and number due to its status as a null subject language.

3. Monolingual acquisition of subject-verb agreement

In both English and Spanish acquisition, young children pass through a stage in which they produce grammatical inflected verb forms alongside a large percentage of ungrammatical infinitival verb forms. During this Optional Infinitive Stage (Wexler, 1994), uninflected forms called Root Infinitives (RIs) appear in places where finite verbs should appear as per the adult grammar (Montrul, 2004). In English, a language that lacks infinitival morphology, RIs appear as bare forms (with no tense or agreement morphology) as shown in (2a).

(2) a. Eve sit(\emptyset) floor [Child English]

While the RI phenomenon lasts for several years in English (Wexler, 1994; Hyams, 2001), it appears earlier and is shorter in null subject Romance languages like Spanish (Grinstead, 1998; Bel, 2001; Buesa, 2007; Austin, 2010). Between the ages of 1 and 3, the rate of RI production in Spanish and other Romance languages ranges from 3% to 16% (Grinstead, 1998; Bel, 2001), meaning that the first verbs of Spanish-speaking children are almost always inflected. In English, the rate of RI production in this age range is as high as 78% (Hyams, 2001; Guasti, 2002).

To conclude, RIs are found across languages but the Optional Infinitive Stage is shorter in null-subject languages with robust morphological paradigms, like Spanish, than it is in English (Austin, 2010; Guasti, 2002). Thus, Spanish monolingual children produce inflected verbs earlier than English monolingual children.

4. Bilingual acquisition of subject-verb agreement

Research of early morphosyntactic development in bilingual children acquiring English and another more morphologically robust language reveals that

2L1 children develop like monolingual children in each of their languages, such that adult-like inflection appears later in the children's English (Paradis & Genesee, 1996; Serratrice, 2001; Castro & Gavrusseva, 2003). This contrast in finiteness is comparable to the rates reported in other studies for monolingual children in English (Hyams, 2001) and Spanish (Grinstead, 1998; Bel, 2001). This may occur because it is simply impossible to pronounce a verbal root, e.g. *camin-* 'walk', without at least the thematic vowel morpheme *-a* that forms *camina* (Harris, 1991). In English, on the other hand, the morphological root and stem for *walk* are the same.

Studies investigating the acquisition of verb morphology by child L2 learners across various languages (i.e. Herschensohn et al., 2005; Paradis, 2010; Blom et al., 2012) 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 Missing Surface Inflection Hypothesis (MSIH) (Prévost & White, 2000). 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, while verbal morphology is acquired by 2L1 children following the same patterns as their monolingual counterparts, L2 children experience variability due possibly to the MSIH.

5. The comprehension-production asymmetry

With an understanding of children's production patterns, Johnson et al. (2005) 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. English-speaking children participated in a picture selection task, testing third person singular and plural verbs, 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 possibility that agreement features get triggered 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). These results are echoed in de Villiers & Johnson (2007). English children do not rely exclusively on /s/ inflection to determine the number of the subject. English agreement is almost always redundant because person and number markings appear on the subject noun, hence young children may simply ignore the verb marking in these tasks.

One might predict that children acquiring languages with richer morphological paradigms, and null subjects, would have earlier comprehension because person and number markings carry semantic information about the subject, but this is not so. Despite evidence that these children produce nonfinite verbs earlier than children acquiring English (i.e. Bel, 2001), comprehension studies following the type of methodology in Johnson et al. (2005) 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), have found that the same comprehension-production asymmetry appears to exist cross-linguistically¹.

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 (i.e. Goldin, 2020). 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. Indeed, studies have shown that children aged 3 and 4 can reliably use the information provided by number agreement on the verb in tasks with lower cognitive demand in German (Brandt & Höhle, 2010), Spanish (Gonzalez-Gomez et al., 2017) and English (Beyer & Hudson Kam, 2009). Thus, knowledge of the distributional properties of functional morphemes related to agreement (perception of the grammar) may precede knowledge of their interpretive implications (comprehension of the grammar) by several years. This may be due to cognitive maturity or task complexity, but young children seem to recognize grammatical structures and produce them before they understand their meaning.

6. The present study

Given how little is known about the development of morphological knowledge (beyond only production) in bilingual children, this study builds on the data from Goldin (2021) to uncover whether the same comprehension-production asymmetry that exists in monolingual acquisition of third person subject-verb agreement is also found across simultaneous and sequential bilingual development. In addition to the participants from that study (42 simultaneous heritage bilinguals (HL) in the U.S., 40 English monolinguals (EM) in the U.S. and 39 Spanish-dominant (SD) children in Spain), 35 sequential bilinguals (L2) of the same ages from English monolingual families learning L2 Spanish at school were also included: 10 in Pre-K3 (mean age=3;8, SD=4.7); 12 in Pre-K4 (mean age=4;8, SD=3.3); 7 in Kindergarten (mean age=5;6, SD=2.4) and 6 in 1st grade (mean age=6;5, SD=1.5). The L2 children all began acquiring Spanish at the age of 3. Both groups of bilingual children were dominant in English². Thus, in total, this study analyzes the data of 156 children age 3;0-7;0.

¹ The exception to this general picture of late comprehension is data on French-acquiring children (i.e. Legendre et al., 2014). These authors conclude 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.

² Both HL and L2 children attended dual language immersion schools where they received daily academic content instruction primarily in Spanish from grades Pre-K3 and up. Dominance in English was determined by the language background questionnaire.

6.1. Materials and procedure

Participants' parents completed a language background questionnaire and all children's knowledge of nominal morphology was assessed as a baseline using a portion of the Bilingual English Spanish Assessment, BESA (Peña et al. 2014)³. Participants completed two experimental tasks including a fill-in-the-blanks (FIB) elicited production task and a picture-matching (PM) task to elicit comprehension. A Spanish and English version of each task were delivered via digital presentation. The bilingual children first received the Spanish tasks, then the English tasks in the same 20-minute session at their schools. Monolingual participants were administered the task in English only or Spanish only.

6.1.1. Fill-in-the-Blanks (FIB) elicited production task

The elicited production task included 8 experimental items and 4 distractors. The participants were presented with two images, showing one singular and one plural action respectively. They heard the accompanying sentence for the first image and were asked to complete the sentence for the second image by using a specific verb. In four experimental items, participants were asked to complete a sentence with a singular subject while in the other four items, the subjects of the sentences were plural, as shown below in 3a and 3b. A set of 12 regular verbs featuring *-ar*, *-er*, and *-ir* conjugations were chosen for representing a range of morphological forms that commonly occur in children's input. All items were counterbalanced, as well as the expected responses.

(3) a. Elicitation of a third person singular verb form in Spanish

Experimenter in Spanish: *Aquí los niños corren todos los días y aquí Alex también. ¿Qué hace Alex todos los días? Alex ...*

'Here the children run every day and Alex does too. What does Alex do every day? Alex ...'

b. Elicitation of third person plural verb form in Spanish

Experimenter in Spanish: *Aquí la niña baila todos los días y aquí sus amigas también. ¿Qué hacen sus amigas todos los días? Ellas ...*

'Here the girl dances every day and her friends do too. What do her friends do every day? They ...'

6.1.2. Picture-matching (PM) comprehension task

The PM task consisted of 16 experimental items and 4 distractors. Participants saw two images at the same time, a singular subject and a plural

³ This was assessed as a baseline measure because studies have shown that acquisition of nominal morphology precedes that of verbal morphology in monolingual children (Forsythe, 2015).

subject performing the same action. They heard an accompanying sentence recorded by a ‘mommy’ and were asked to point to the image the mommy was talking about. Half of the experimental sentences (8) were plural and half (8) were singular. Of these, 4 contained a null subject (in Spanish) 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 as representative of forms that occur in children’s input. All items were counterbalanced, and the expected choices were counterbalanced between Choice A and Choice B. The following examples in 4a and 4b illustrate the types of sentences used in the Spanish and English tasks.

(4) a. Singular sentence with an overt subject.

Accompanying audio in Spanish: ‘*¡El niño toma agua!*’

Accompanying audio in English: ‘The child drinks water!’

b. Plural sentence with an overt subject

Accompanying audio in Spanish: ‘*¡Los niños corren la carrera!*’

Accompanying audio in English: ‘The children run the race!’

7. Results

As part of a larger body of work, in this section we present children’s overall results across all conditions in Spanish and English separately. More detailed analysis of results on the individual conditions of task items such as singular and plural verbs, items with null and overt subjects and distractors is beyond the scope of this paper⁴. Proportion of accurate responses was calculated in order to assess possible differences in the children’s production and comprehension abilities. The data were analyzed in R (R Development Core Team, 2012) using a GLMM to examine mean accuracy as a function of age and task (FIB (production), PM (comprehension)). 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, EM, SD) in both languages.

7.1. Production-comprehension comparison for Spanish

In Spanish, the analysis for the HL group yielded a main effect of age ($\beta = .008$; SE = .001; $z = 4.43$; $p < .001$). There was no effect of task ($\beta = .028$; SE = .017; $z = 1.69$; $p = 0.09$) and no task by age interaction ($\beta = -0.00$; SE = .001; $z = -0.74$; $p = 0.46$). Similar results were obtained in the analysis for the L2 children. There was a main effect of age ($\beta = .013$; SE = .002; $z = 5.15$; $p < .001$). There

⁴ Though not reported in detail here, performance on the BESA screening task revealed that all children had indeed acquired the plural /s/ marker of nominal morphology in both English and Spanish, performing at above 80% accuracy by age 5. This data was analyzed using a linear regression to examine BESA scores as a function of group and age.

was no effect of task ($\beta = .023$; $SE = .025$; $z = 0.93$; $p = 0.36$) and no task by age interaction ($\beta = -0.00$; $SE = .002$; $z = -1.36$; $p = 0.19$). However, the analysis for the Spanish-dominant group yielded a main effect of task ($\beta = -0.10$; $SE = 0.01$; $z = -8.84$; $p < .001$), a main effect of age ($\beta = .003$; $SE = .000$; $z = 4.85$; $p < .001$), and a task by age interaction ($\beta = .003$; $SE = .000$; $z = 3.86$; $p < .001$). As seen in Figure 1, production accuracy significantly preceded comprehension accuracy for the Spanish-dominant group and, so, the effect of age differed across tasks. However, both bilingual groups 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.

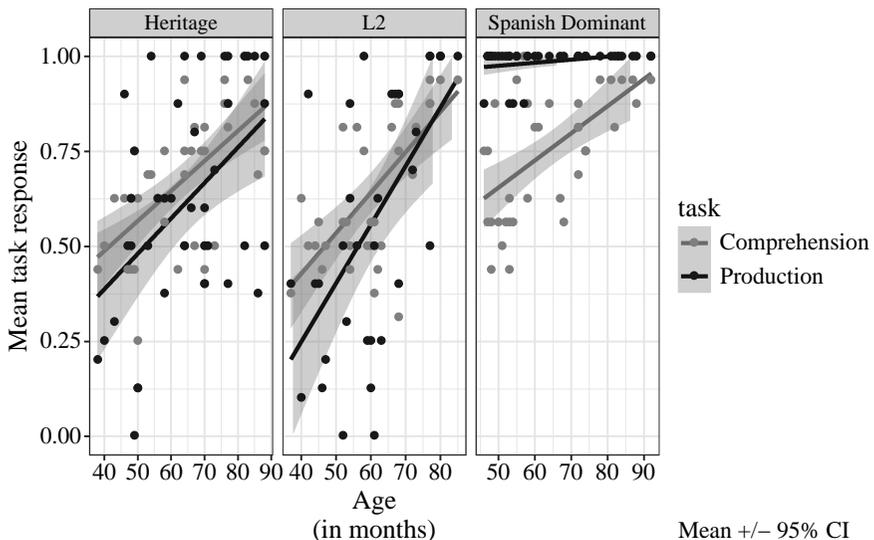


Figure 1. Mean responses by group in the Spanish comprehension and production

7.2. Production-comprehension comparison for English

In English, the analysis for the HL group yielded a main effect of task ($\beta = -0.12$; $SE = 0.02$; $z = -6.53$; $p < .001$) and a main effect of age ($\beta = .009$; $SE = .001$; $z = 6.84$; $p < .001$). There was no task by age interaction ($\beta = -0.00$; $SE = .001$; $z = 0.09$; $p = 0.93$). Similar results were obtained in the analysis for the L2 children. There was a main effect of task ($\beta = -0.113$; $SE = .024$; $z = -4.65$; $p < .001$) and a main effect of age ($\beta = .008$; $SE = .002$; $z = 4.26$; $p < .001$). There was no task by age interaction ($\beta = -0.00$; $SE = .002$; $z = .98$; $p = 0.33$). The analysis for the EM group yielded a main effect of task ($\beta = -0.14$; $SE = 0.01$; $z = -14.6$; $p < .001$), a main effect of age ($\beta = .003$; $SE = .001$; $z = 4.83$; $p < .001$), and a task by age interaction ($\beta = .002$; $SE = .001$; $z = 3.17$; $p < .001$). As seen in Figure 2, production accuracy significantly preceded comprehension accuracy for the EM

group and, so, the effect of age differed across tasks. Both bilingual groups 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.

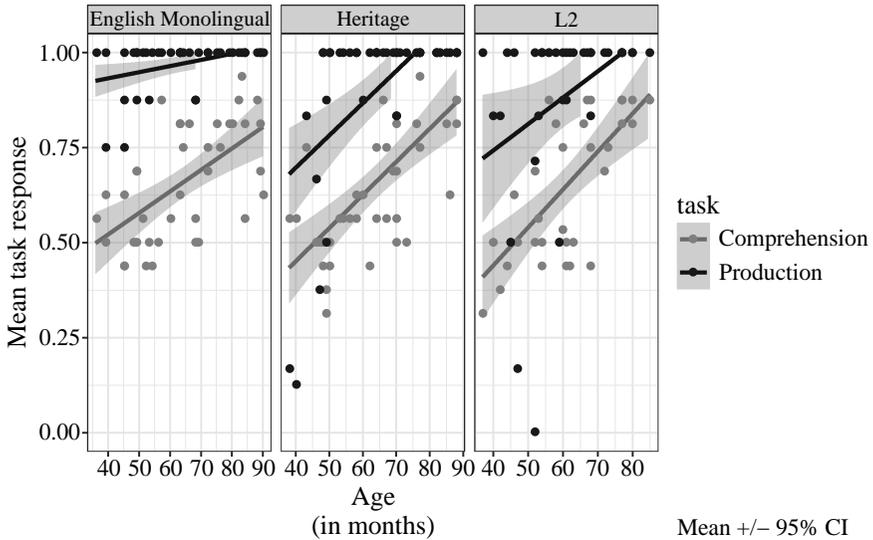


Figure 2. Mean responses by group in the English comprehension and production tasks

8. Discussion

In this study, monolingual, 2L1 and L2 bilingual children participated in two tasks to elicit their production (a fill-in-the blanks task) and comprehension (a picture-matching task) of third person subject-verb agreement. We sought to investigate whether the same comprehension-production asymmetry that exists in monolingual acquisition of third person subject-verb agreement is also found across simultaneous and sequential bilingual development, in order to add to our understanding of children's access and retrieval of functional features in the language acquisition process.

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, in line with previous studies (i.e. Johnson et al., 2005; Miller & Schmitt, 2014). Their production accuracy significantly precedes their accuracy in comprehension. Indeed, both the simultaneous and sequential bilinguals perform similarly to each other and pattern in this way as well in English, their dominant language. However, in Spanish we see a different pattern emerge in which the bilinguals' comprehension and production develop at the same rate with comprehension accuracy slightly higher throughout the

acquisition process. As compared to the Spanish-dominant children, the bilingual groups show lower accuracy in production, but similar accuracy in comprehension which is indicative of their grammatical knowledge and representation of third person morphology.

These findings indicate that the phenomenon of the comprehension-production asymmetry exists not only for monolinguals, but also for both simultaneous and early sequential bilinguals in their dominant language. In the non-dominant language, production accuracy is acquired more slowly and mimics the rate of acquisition of comprehension. It is possible that we find this asymmetry across child acquisition because person and number features are grammatical, but peripheral to the verb's meaning even perhaps in null subject languages (Chomsky, 1995; Bybee, 1985, 1995). Because of this, children may recognize and produce the functional morphemes related to agreement before they understand their interpretive implications. This process appears to be revealed by the task complexity of a methodology that examines comprehension rather than perception (Naigles, 2002). In their non-dominant language, bilingual children may recognize agreement features early on, but have difficulty in mapping them to their corresponding morpho-phonological forms in production (MSIH) (Prévost & White, 2000) or accessing them for production purposes due to lower levels of activation (Putnam & Sánchez, 2013) or less opportunity for output, as found in Goldin (2021). More research is needed to further understand what other factors such as these may influence the acquisition of agreement features in the comprehension and production of early bilingual verb morphology.

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