The status of interrogative subject–verb inversion in Spanish-English bilingual children

Alejandro Cuza *

Department of Spanish and Portuguese, School of Languages and Cultures, Purdue University, 640 Oval Drive, Room 160, Stanley Coulter Hall, West Lafayette, IN 47906, United States

Received 13 February 2015; received in revised form 26 April 2016; accepted 26 April 2016
Available online 14 June 2016

Abstract

The present cross-sectional study examines the status of interrogative subject–verb inversion in Spanish among twenty-seven (n = 27) Spanish-English bilingual children born and raised in the United States. Results from an oral elicited production task show significant low levels of target inversion in both matrix and embedded wh-questions, compared with monolingual children. Lack of inversion was more significant with embedded questions, and among the youngest children. It is argued that the differences observed stem from syntactic transfer from English, language dominance and the complexity of the structure. This leads to a process of syntactic optionality in child heritage Spanish similar to what is found in Caribbean varieties of Spanish.

Keywords: Interrogative subject–verb inversion; Spanish-English bilingual children; Crosslinguistic influence; Structure complexity; Syntactic reconfiguration

1. Introduction

Simultaneous bilingual children exposed to two languages from an early age develop functionally differentiated grammatical systems with little interdependence between the two languages (De Houwer, 1990; Genesee, 1989; Genesee et al., 1995; Meisel, 1994; Paradis and Genesee, 1996). This process, although independent, is not exempt from cross-language interaction, which plays either a negative or positive role in the development of a myriad of morphosyntactic features (Döpke, 1998; Müller and Hulk, 2001; Pirvulescu et al., 2014; Silva-Corvalán, 2014; Strik and Pérez-Leroux, 2011; Yip and Matthews, 2000, 2009). In the specific case of Spanish-English bilingual children born and raised in the United States (U.S.), previous research documents significant asymmetries vis a vis the monolingual norm in the production and interpretation of morphosyntactic structures such as clitic placement (Pérez-Leroux et al., 2011), differential object marking (Montrul and Sánchez-Walker, 2013), gender concord and assignment (Cuza and Pérez-Tattam, 2016; Montrul and Potowski, 2007) or in the development of tense, aspect and mood morphology (Cuza and Miller, 2015; Silva-Corvalán, 2014). In addition to cross language interaction, other factors play a crucial role in the development of a morphosyntactic system in the minority language, including reduced input and use, age of onset of

* Tel.: +1 765 496 1685.
E-mail address: acuza@purdue.edu.

http://dx.doi.org/10.1016/j.lingua.2016.04.007
0024-3841/© 2016 Elsevier B.V. All rights reserved.
bilingualism, as well as structure complexity and frequency. More recently, researchers have postulated that the structural asymmetries found between bilingual and monolingual linguistic systems stem from the restructuring of native language (L1) functional features, and the development of a new feature matrix that encompasses properties of either language (Putnam and Sánchez, 2013).

The current study contributes to this previous discussion by examining the extent to which child heritage speakers of Spanish have knowledge of obligatory subject verb inversion, an area of research so far underexplored among Spanish heritage children. Interrogative inversion is obligatory for both matrix (1) and embedded (2) questions in most varieties of Spanish, with the exception of the Caribbean dialect, where non-inversion is the norm (Goodall, 2011; Gutiérrez-Bravo, 2008; Ordóñez and Olarea, 2006; Pérez-Leroux and Dalíous, 1998; Suñer, 1994; Villa-García et al., 2009). In English, in contrast, only matrix questions involve auxiliary inversion (do support) leading to potential patterns of cross-linguistic influence:

1. ¿A quién conoció Dora? Matrix wh-question
   “Who did Dora meet?”
2. No sé a quién conoció Dora Embedded wh-question
   “I don’t know who did Dora meet”

While the acquisition of subject–verb inversion in Spanish monolingual children is complete by the age of 3;0 (Pérez-Leroux and Dalíous, 1998; Serrat and Capdevila, 2001), previous research with English-speaking second language (L2) learners (Bruhn De Garavito, 2002; Guijarro-Fuentes and Larrañaga, 2011; Mandell, 1998) and adult heritage speakers of Spanish (Cuza, 2013) shows significant non-inversion patterns in both the production and interpretation of inverted interrogative [+wh] sentences. This is particularly so with embedded wh-questions, which appear to be more difficult to process.

In contrast with previous work, the current study presents new cross-sectional data from twenty-seven (n = 27) Spanish heritage children (age range, 5;0–13;3) born and raised in Northwestern Indiana (U.S.), and eighteen (n = 18) monolingual children (age range, 6;6–12;4) from Guadalajara, Mexico, serving as control baseline. Results show low levels of subject verb inversion among the bilingual children, crucially with embedded wh-questions. I argue that the structural asymmetries stem from three interrelated factors: crosslinguistic influence from English, complexity issues, and language dominance (Argyri and Sorace, 2007; Montrul and Sánchez-Walker, 2013; Sorace et al., 2009; Strik and Pérez-Leroux, 2011; Yip and Matthews, 2000). I conclude that heritage Spanish children follow a different albeit complete developmental path, as far as this construction is concerned, which leads to the formation of a new system similar to that of native speakers of Caribbean Spanish (Toribio, 2000).

The study is structured as follows. Section 2 presents a syntactic analysis of obligatory inversion in Mainstream Spanish, Caribbean Spanish and in American English. This is followed by a review of previous acquisition research in Section 3. The study is presented in Section 4, followed by the results in Section 5. The discussion and conclusions are presented in Sections 6 and 7.

2. The syntax of subject–verb inversion in Spanish wh-questions

Spanish and English behave differently regarding their surface word order for argument wh-questions. In Spanish, the verb appears to the left of the subject and adjacent to the wh-word, in both matrix and embedded questions (3a and 3c). A subject in preverbal position would render a wh-question ungrammatical (3b and 3d), except for Caribbean Spanish, where non-inversion is typically the norm (Buesa-García, 2008; Camacho, 2013; Ordóñez and Olarea, 2006; Toribio, 2000) or in adjunct wh-questions introduced by por qué (“why”) (Contreras, 1991; Torrego, 1984). This is known in the literature as subject–verb inversion (Goodall, 2011; Pesetsky and Torrego, 2001; Zagona, 2002). In English, however, the subject appears to the right of the auxiliary in matrix questions (4a). This phenomenon is known as subject–auxiliary inversion (Adger, 2003; Chomsky, 1995; Radford, 2014). With embedded questions, the subject appears to the left of the lexical verb (4c). This is represented below:

Spanish:

(3a) ¿Dónde puso Dora los libros? Matrix wh-question [WH-V-S]
(3b) *¿Dónde puso los libros Dora? Matrix wh-question *[WH-S-V]
(3c) Me preguntó dónde puso Dora los libros Embedded wh-question [WH-V-S]
(3d) *Me preguntó Dora puso los libros Embedded wh-question *[WH-S-V]
English:
(4a) Where did Dora put the books? Matrix wh-question [WH-Aux-S]
(4b) *Where Dora did put the books? Matrix wh-question *[WH-S-Aux]
(4c) I wonder where Dora put the books Embedded wh-question [WH-S-V]
(4d) *I wonder where put Dora the books. Embedded wh-question *[WH-V-S]

Current theoretical analyses account for subject–auxiliary inversion in mainstream English via T’-to-C’ movement (Adger, 2003; Chomsky, 1995; Rizzi, 1996). Within this approach, with matrix questions the auxiliary verb (Aux) generated in the head of the tense phase (T’) raises to the head of the complementizer phrase (C’ in the form of do) support (dummy do) to check the strong interrogative features of C’ ({+wh/Q}). This, in turn, triggers overt verb movement at the surface level. With embedded questions, there is no overt raising of the auxiliary verb from T’ -to-C’ because the interrogative features of C’ are weak ([-wh/Q]). Therefore, V raising is not triggered (Adger, 2003; Radford, 2014).1

For Spanish, the literature does not agree on the underlying mechanism that constrains subject–verb inversion (Goodall, 2011, 2004, 2001, 1993; Gutiérrez-Bravo, 2008; Ordóñez and Olarea, 2006; Pesetsky and Torrego, 2001; Suñer, 1994). Some authors follow the same T’-to-C’ movement analysis as in English (Pesetsky and Torrego, 2001; Torrego, 1984). This position, however, is controversial as it does not account for cases in Spanish where the C’ position is not filled by a V raised from T’ but rather by an adverb; therefore, there is no specifier-head configuration with the wh-word, as happens in English (Goodall, 1993; Suñer, 1994). This is represented in (5) below.

(5) ¿Desde cuál asiento apenas veías la pantalla? (from Goodall, 1993)
   “From which seat could you barely see the screen?”

Another argument against a T’-to-C’ movement in Spanish is the lack of inversion with adjunct wh phrases like por qué ("why"). Furthermore, in Spanish there is no root vs. embedded questions asymmetry in regard to inversion, as there is in English. Goodall (1993) argues that in Spanish there is no raising of the verb to C’. Instead, he argues that the verb is base-generated in initial position and the subject in post verbal VP internal position (Spec, VP). More recently, Goodall (2011) found that Spanish speakers are vulnerable to ‘satiation’ effects; that is, the acceptance of ungrammatical sentences after repetition. This process, however, never happens with English speakers, which makes the author question whether both languages have the same syntactic mechanism.

A T’-to-C’ operation for Spanish is further questioned by Grinstead et al. (2010) (also see more recent work by Villa-Garcia, 2015). The authors tested the acceptability of English and Spanish inverted and uninvited questions among Spanish and English monolingual children (mean age, 59 months) and its correlation with finiteness. They found large differences between the judgment of finiteness (90%) and inversion (59%) in Spanish. However, the differences were much smaller among English monolingual children of similar age (80% for finiteness and 74% for inversion). The authors conclude that finiteness and inversion are not correlated in Spanish, as they are in English. Therefore, the syntactic mechanism for inversion in both languages cannot be the same. It is important to note, however, that some of the test items in the study included subject personal pronouns (e.g., ¿Qué tú rompes en la escuela? “What do you break at school?”). Given the extended use of preverbal pronoun subjects in matrix questions in Caribbean and other varieties of Spanish, it is possible that this word order has become more “acceptable” for monolingual children and adults vis a vis un-inverted lexical NP subjects (“¿Qué María hizo?” “What did Mary do?”).2

As mentioned earlier, interrogative subject–verb inversion is not fully operational in Caribbean Spanish, including the Spanish spoken in Cuba, Dominican Republic, Puerto Rico and coastal areas of Mexico (Cameron and Flores-Ferrán, 2004; Morales, 1989; Ordóñez and Olarea, 2006; Toribio, 2000). Furthermore, research shows that non-inversion is more prominent with pronoun subjects than with nominal subjects. In this regard, Ordóñez and Olarea (2006) propose that subject pronouns in these cases are prosodically weak pronouns, and thus they occupy a different position vis a vis strong pronouns or nominal subjects.

In addition to non-inversion in interrogative phrases, Caribbean Spanish is also characterized by the overproduction of pronominal subjects in declarative sentences, as well as in infinitival expressions (Con tú venir es suficiente “That you come is enough”) (Dauphinais and Ortiz López, 2014; Ortiz López, 2009; Ortéguy and Zentella, 2012; Orozco, 2015; Toribio, 2000). Toribio (2000) argues that this stems from an internal process of intra-dialectal variation and

1 As noted by a reviewer, in some dialects of English (e.g., Chicano English, Belfast English, Newfoundland English) subject–auxiliary inversion is allowed in embedded questions (Clarke, 2004; Fought, 2003; Henry, 1995; McCluskey, 2006). However, the participants in this study were exposed to standard American English.
2 While preverbal pronoun subjects of the type ¿Qué tú quieres? “What do you want?” are more commonly found in Caribbean Spanish varieties, this phenomenon also extended to other varieties of Spanish and has become more common.
bi-dialectalism. She proposes that there has been a diachronic change from a canonical pro-drop language typology (mainstream Spanish type) to a non pro-drop typology (English or French type), leading to a system of dual parameter setting. Following a Minimalist program perspective, Toribio sustains that the linguistic variation present in Dominican Spanish “represents the addition and reorganization of the abstract feature specifications on lexical items and functional projections” (p. 338). This proposal explains the variability observed regarding interrogative inversion, and the distribution of overt pronominal subjects. She considers Dominican Spanish speakers to be bi-lingual in that they have the representations of two distinct grammatical systems (also see Domínguez and Hicks to appear for a similar proposal).

Toribio’s approach is consistent with Amaral and Roeper’s (2014) Multiple Grammars Hypothesis in relation to child bilingual development, and with Putnam and Sánchez’s (2013) Feature Re-Assembly Hypothesis in relation to heritage speakers’ grammatical asymmetries. Amaral and Roeper (2014) argue that bilingual children have parallel rule-sets from the two languages (i.e., pro and non pro-drop features), and that their task is to parse the two coexisting rules and select the one that is more productive for either language depending on language experience. Along this vein, Putnam and Sánchez (2013) propose that heritage language learners undergo a process of functional feature reassembly and reconfiguration, leading to a new set of featural matrices that instantiate both L1 and L2 features (see Lardiere, 2008 for proposal for L2 acquisition). This proposal emphasizes the role of crosslinguistic influence from the dominant language, as it is precisely the presence of different feature matrices in the dominant language, as well as minority language experience and use, that leads to the reconfiguration of the L1 functional system and corresponding feature value shifts in the bilingual continuum. This hypothesis has been recently adopted by Cuza and Pérez-Tattam (2016) to explain the asymmetries child heritage speakers of Spanish have in regard to gender assignment, agreement and phrasal word order within the Spanish Determiner Phrase.

To summarize, English and Spanish differ in terms of the position that the subject occupies in relation to the verb in matrix and embedded questions. As shown in (3c) and (4c) above, this difference is particularly clear with embedded questions, where the subject is in postverbal position in Spanish but not in English. With matrix questions, however, the two languages behave similarly. Different syntactic mechanisms have been proposed to account for this process in Spanish. The literature has also discussed why this syntactic operation is optional in Caribbean Spanish, which is argued to instantiate a completely different set of functional features. In what follows, I discuss previous work on the acquisition of subject-verb inversion among bilingual children and adult heritage speakers of Spanish. I then propose the research questions and hypotheses that guide the present study.

3 The acquisition of subject-verb inversion in Spanish

Interrogative subject-verb inversion in Spanish monolingual children is typically in place by 3;0 years of age; thus far, no developmental delays have been observed (Hernández-Pina, 1984; Pérez-Leroux and Dalious, 1998). With the exception of Caribbean varieties of Spanish, which fail to invert given that they have a different parametric option as far as inversion is concerned, this syntactic phenomenon has little variability in the monolingual norm. In contrast to monolinguals, research shows that bilinguals show significant variability in this regard, suggesting that their grammar includes both inversion and non-inversion options. This has been found among L2 learners (Bruhn De Garavito, 2002; Frank, 2013; Guijarro-Fuentes and Larrañaga, 2011; Mandell, 1998), adult heritage speakers (Cuza, 2013), and Spanish-English bilingual children (Austin et al., 2013).

Austin et al. (2013) examined the longitudinal development of interrogative sentences, sentential negation, and sentences with negative polarity items (NPIs) among 13 Spanish-English bilingual children aged 5;0–6;0. Results from an elicited production task (puppet show) showed crosslinguistic influence effects from English into Spanish, evidenced in discreet patterns of non-target subject verb inversion (¿Qué tus papás comen? “What do your parents eat?”) and NPIs (“Le gusta ningun pastel “He likes no pie”). In English, the children also showed difficulties with do support in NPIs but not with interrogative formation. The authors found no difficulties with negative sentences in either language. They argue for crosslinguistic influence from English, selectively affecting the weak functional features of the heritage language.

Regarding heritage speakers of Spanish, Cuza (2013) examined the acceptability and production of interrogative inversion among adult heritage speakers and found significant non-inversion patterns in the speakers’ intuition and
production, crucially with embedded wh-questions. He also found tasks effects, as the participants did much better with target inversion in the oral production task than in the two written tasks. The author argues that the asymmetry found between matrix and embedded questions stem from crosslinguistic influence from English. Similar results have been found recently among English-speaking L2 learners of Spanish (Frank, 2013). Frank (2013) examined the rates of inversion in Spanish, and found less inversion in embedded questions than in matrix question. The author argues that lack of inversion might be constrained by derivational complexity effects in addition to crosslinguistic differences.

With the exception of Austin et al.'s (2013) study, it remains unexplored whether the divergences found among adult heritage speakers are also present and systematic at earlier stages of language development, crucially after school immersion. Immersion in the English-only school system represents an important turning point in children's bilingual development and language dominance shift (Merino, 1983; Silva-Corvalán, 2014). The intense exposure to English in the school setting, and consequent decrease in exposure to Spanish at home, often leads to a shift from Spanish dominance to English dominance, and with that, either the attrition or incomplete acquisition of morphosyntactic forms during early childhood (Cuza et al., 2013; Montrul, 2008) or the restructuring of the native language system due to crosslinguistic influence from English and lower levels of native language activation and use (Cuza and Pérez-Tattam, 2016; Putnam and Sánchez, 2013). This does not mean, however, that there is an incomplete acquisition or featural restructuring will necessarily occur after school immersion. For example, in minority language enclaves in the U.S. where Spanish is widely spoken (i.e., Hialeah, FL), heritage Spanish children might develop a completely balanced bilingual system, typical of any other bilingual person born and raised in a similar bilingual setting.

3.1. Research questions and hypotheses

Following previous research on the development of interrogative inversion among Spanish-English bilinguals, as well as previous work on the role of crosslinguistic influence effects in child bilingual development, the present study examines the following questions:

1. To what extent do heritage Spanish children have knowledge of obligatory subject–verb inversion in matrix and embedded wh-questions?
2. If differences are found, do they increase with developmental age? That is, will older children show fewer inversion patterns than younger children?
3. What is the role of syntactic transfer and structure complexity in this process?

If crosslinguistic influence occurs from English into Spanish, I expect older children to show lower levels of target inversion than younger children given their more extended exposure to English and consequent decrease in exposure and use of Spanish as their home language. I also expect lack of inversion to be more prominent with embedded questions, as it is precisely here where the two languages diverge the most (inversion in Spanish but not in English) and also because embedded questions are structurally more complex than matrix questions. I also predict bilingual children to restructure their functional features representation to include both L1 and L2 futures, and end up with a grammar where inversion and non-inversion are possible, as has been shown in Caribbean varieties of Spanish (Toribio, 2000). Crucially, I hypothesize the following:

i. Spanish-English bilingual children will show significantly less target inversion vis a vis the monolingual controls.
ii. Older children will fail to invert significantly more than the younger children, leading to developmental differences. I propose that this stems from a restructuring of the Spanish functional system due to increased exposure and use of English and consequently less exposure and use of Spanish.
iii. Non-target inversion will affect embedded wh-questions more than matrix questions. Embedded questions involve a higher level of syntactic complexity. Furthermore, it is precisely here where English and Spanish diverge leading to syntactic cross-language priming.

In what follows, I present the study and the results.

4. The study

4.1. Participants

Twenty-seven (n = 27) Spanish-English bilingual children and eighteen (n = 18) Spanish monolingual children serving as control baseline participated in the study. All of the children were tested at either their homes or schools by the investigator and a research assistant. Parents completed a language background questionnaire and a child language
background questionnaire (Cuza and Pérez-Tattam, 2016). The questionnaires elicited information on the parents (e.g., age at time of testing, languages spoken, level of education, length of residence in the U.S., language ability) and the children respectively (e.g., age at testing, language ability, patterns of language use).

The bilingual children were born and raised in the U.S. and lived in Northwestern Indiana at the time of testing. They had a mean age of 8.4 years old (age range, 5.0–13.3; SD = 2.08) and were attending English-only schools. They were overall more dominant in English than in Spanish, with a mean parental rating for English of 3.5/4 and 2.8/4 for Spanish (1/4 being ‘not fluent’ and 4/4 being ‘completely fluent’). Regarding patterns of language exposure and use, the children were exposed to Spanish via TV, church and family social gatherings. Most of the children (63%) were reported to speak Spanish with their parents, and English with their siblings (58%) and friends (63%). English was also spoken at school and outside the home/family environment.

The parents of the bilingual children immigrated to the U.S. as adults, except for one parent who arrived at the age of six. Two of the parents came from Peru and one from Colombia. The rest of the parents came from Mexico. Their mean age at the time of testing was 33.8 years old and their mean length of residence in the U.S. of 12.4 years. They reported to speak mostly Spanish at home and English outside home. Three parents reported to have college education and the rest reported to have either elementary or high school education. Most of the parents reported to be ‘not fluent’ or ‘somewhat fluent’ in English (mean rating for both parents, 2/4) and ‘very fluent’ or ‘completely fluent’ in Spanish (mean rating for both parents, 3.9/4). They all reported feeling more comfortable in Spanish than in English. The parents did not complete any of the experimental measures.

In order to have a comparable baseline, eighteen (n = 18) Spanish monolingual children were tested. Their mean age at testing was 8.8 years old (age range, 6.6–12.4; SD = 1.85), and they were all monolingual speakers of Spanish living in Guadalajara, Jalisco, Mexico. The participants were recruited and tested in Guadalajara given that many of the parents of the bilingual children came from this region. The parents rated the language ability of their children as ‘very fluent’ or ‘completely fluent’ in Spanish (3.7/4) and not fluent in English (1.2/4). The parents were all born and raised in Mexico, where they resided at the time of testing. Their reported mean age at testing was 36 years old. Seven of the parents reported to have college education and the rest reported having either elementary or high school education. The parent with most contact with the child completed the questionnaires, which in most cases was the mother.

4.2. Tasks and procedures

The children were tested individually at their schools or private homes using an elicited production task (Crain and Thornton, 1998; Pozzan and Quirk, 2014; Sarma, 1991). The task elicited inversion in matrix questions with a story followed by a question (6). Inversion in embedded questions was elicited with a story followed by a sentence to be completed (7). The beginning of the sentence started with the prompt No sé... ‘I don’t know...’ and the child had to complete what followed. The preambles were age appropriate in terms of content and complexity. They were about Dora and Diego, two fictional Latino characters depicted in the well-known TV series Dora the Explorer. In order to ensure the production of overt subjects as much as possible, and avoid pro elements (null subjects) in the children’s responses, the stories were constructed in a way that there was a contrast between two characters (Dora and Diego). The children were asked a question about something one of the characters did but the other one did not. Therefore, the subject was likely to be included (Shin and Cairns, 2012; Shin and Erker, 2015). The task was administered using PowerPoint on a laptop computer or tablet. The children were required to use the wh-word presented in the preamble and the finite verb provided between parentheses in their responses. The verb between parentheses was properly conjugated to reduce the processing load of the task. Examples illustrating the preamble, prompt, and expected response are illustrated in (6) and (7) below:

(6)  
**Matrix wh-question**

**Preamble:** Dora y Diego están de vacaciones en México. Dora regresará este sábado pero Diego regresará mucho más tarde. Quieres saber sobre Diego, no sobre Dora. Diego regresará más tarde, pero no sabes cuándo.

“Dora and Diego are on vacation in Mexico. Dora is coming back this Saturday but Diego is coming back later. You want to know about Diego not Dora. Diego is coming back later on but you don’t know when.

**Prompt:** Pregúntame ‘Ask me’

**Target:** ¿Cuándo regresará Diego?

“When is Diego coming back?

6 None of the parents came from Veracruz, Mexico, or any other coastal region where the Caribbean dialect of Spanish is spoken.
Embedded wh-question

Preamble: Dora y Diego fueron de vacaciones a Chicago y vieron a muchas personas. Quiero saber a quién vieron. Sabes que Diego via a su madre. Dora conoció a alguien muy especial pero no sabes a quién.

"Dora and Diego went to Chicago on vacation and they saw many people they know. I want to know who they saw. You know that Diego saw her mother. Dora saw someone special, but you don’t know who."

Prompt: Respóndeme. No sé… “Answer me. I don’t know…”

(conoció, "met")

Target: No sé… a quién conoció Dora.

“I don’t know… who Dora met.

There were a total of 16 test tokens (8 matrix and 8 embedded) and 4 training items. The wh-extraction sites included animate and inanimate direct objects (qué, “what”; a quién, “who”) as well as adjuncts (dónde “where”, cuándo “when”, cómo “how”). The wh-word por qué (“why”) was not included in the task as inversion is optional in this case across all dialects of Spanish. In addition, only nominal elements in subject position were used, rather than pronominal subjects. As discussed earlier, preverbal pronominal subjects tend to be more acceptable than lexical NPs among monolingual speakers of Spanish. All the prompts with embedded questions were with the verb saber (“to know”). The child had to answer the prompt using the verb saber plus the wh-word (i.e., No sé dónde… “I don’t know where…”). The researcher read the preambles as many times as needed, and digitally recorded the testing session for later analysis. The test tokens were randomized and counterbalanced across participants with the creation of two versions. Fillers were not included to avoid overloading the children with a long task, especially younger children who often get distracted easily.

5. Results

5.1. Coding

I examined the proportion of inverted questions, non-inverted questions, pro elements, and other responses among the bilingual and monolingual children. The responses classified as ‘other’ included matrix questions in contexts where an embedded question was required or vice versa, incomplete utterances, or questions produced using second person singular rather than third person singular (¿Qué compraste? “What did you buy?”). Inverted questions were scored as 1 (target response) and non-inverted questions were scored as 0 (non-target response). The proportion of inverted questions, non-inverted questions, pro elements or other utterances produced was calculated by adding the total number of target utterances produced (nominator) and dividing it by the total number of trials (denominator) for matrix and embedded questions separately. For example, if a child correctly inverted in seven matrix trials out of eight (7/8), and produced a pro element in the remaining trial (1/8), her proportion of inverted questions for matrix questions was 88% and her proportion of pro elements realized was 12%. In case a child was unable to produce anything in a given trial, such test item was discarded from the total number of expected items. This is because we cannot infer lack of knowledge from zero production. In some instances, participants dislocated the wh-subject to the left-periphery (e.g., ¿Diego, dónde compró las galletas? “Diego, where did he buy the cookies?”), rather than producing a postverbal subject. Those instances were considered as sentence topics, following Gutiérrez-Bravo (2008), and were scored as target responses. There were only five tokens of this sort produced by three monolingual children.

5.2. Results: embedded questions

As expected, bilingual children showed lower levels of target inversion vis a vis the monolingual children. Their lower level of inversion stemmed primarily due to non-inversion, together with very few instances of pro elements realized and other utterances. The monolingual children did not show ceiling performance. This stemmed from a higher proportion of pro elements realized (12%), compared to the bilingual children (0.01%). Although the task was constructed in a way that the children had to produce an overt subject to disambiguate between the two characters of the story, some of the children produced pro elements. This is not completely surprising among monolingual children of Mexican Spanish, who have been found to prefer null subjects in declarative sentences (Shin, 2015; Shin and Erker, 2015). Perhaps they are

---

7 As noted by a reviewer the wh-word cómo (“how”) behaves much like por qué when it means how come. However, in those cases it is often used with the particle así as in ¿Cómo así?

8 For prompts with ask/wonder verbs (i.e., María le dijo a Juan… “Mary asked John…”) the reader is referred to Cuza and Frank (2015).
transferring the same mechanism to wh-questions. Their proportion of non-inversion, however, was very small (3%), compared to the bilingual children (63%), which confirms our expectations. This is shown in Fig. 1:

The proportions realized were transformed into arcsine values and submitted to a repeated measures ANOVA with language group (bilingual children and monolingual children) as the between-subject variable (independent factor) and the proportion of responses (for inversion, non-inversion, pro and other) as the within subject variable (dependent factor). Age was treated as a continuous variable (covariate). Results showed a significant effect of condition ($F(1, 41) = 10.51, p = .000$). There was no significant effect of group ($F(1, 41) = .028, p = .868$). Independent samples t-tests looking at the differences per group and condition showed significant differences between bilingual and monolingual children in their proportion of inversion ($M = .41$ vs. $M = 1.07$, $t(43) = -.5.16$, $p < .000$), and non-inversion ($M = .79$ vs. $M = .03$, $t(43) = 7.94$, $p < .000$) realized, confirming Hypothesis 1. The two groups also behaved significantly different in their proportions of pro elements ($M = .01$ vs. $M = .11$, $t(41) = -3.32$, $p = .004$). The monolingual children produced significantly more pro-elements than the bilingual children did, who instead favored preverbal explicit subjects (non inversion). There were no significant differences in other utterances realized ($M = .03$ vs. $M = .03$, $t(41) = .262$, $p = .795$).

There was a significant interaction between age and condition ($F(1, 41) = 6.24, p < .001$). In order to find where the differences lay across the bilingual children, and test hypothesis 2, the bilingual children were divided into two groups: younger bilingual children ($n = 14$, age range, 5;0–8;5, $M = 6;9$, $SD = 1.2$) and older bilingual children ($n = 13$, age range, 8;8–13;3, $M = 10$, $SD = 1.5$). I then conducted an independent samples t-test measuring their differences pairwise across conditions. Results showed narrowly missed significance in their proportions of non-inversion ($M = .62$ vs. $M = .97$, $t(25)$ $= -1.95$, $p = .06$). The younger children inverted more than the older children. There were no significant differences in their proportion of target inversion ($M = .55$ vs. $M = .25$, $t(25) = 1.53$, $p = .140$), although the younger bilingual children did produce a higher inversion rate than the older bilingual children. There were no significant differences in the proportion of pro elements ($p = .918$), or other instances realized ($p = .397$).

5.3. Results: matrix questions

Regarding matrix questions, the bilingual children showed much lower levels of inverted questions realized (51%) than the monolingual children (90%), as predicted. Their errors stemmed primarily from lack of inversion (44%). As in the case of embedded questions, the monolingual children showed a higher proportion of pro elements realized than the bilingual children (4% vs. 1%). This is shown in Fig. 2:

The results were transformed into arcsine values and submitted to a repeated measures ANOVA with group (bilingual children and monolingual children) as a between-subject variable (independent factor) and the proportion of responses as a within subject variable (dependent factor). Age was treated as continuous variable in the main analysis (covariate). Results showed a significant effect of condition ($F(1, 41) = 12.99, p = .000$) and of group ($F(1, 41) = 4.42, p = .042$). To examine where the differences lay between groups and conditions, independent samples t-tests among bilingual children and monolingual children per condition were conducted. Results showed significant differences in their proportion of inversion ($M = .65$ vs. $M = 1.26$, $t(43) = -4.52$, $p < .000$), and non-inversion ($M = .51$ vs. $M = .02$, $t(43) = 5.57$, $p < .000$).
There were no significant differences in their proportions of pro elements \((p = .207)\) or other utterances realized \((p = .813)\). There was a significant interaction of age and condition \((F(1, 41) = 4.41, p < .003)\). However, independent samples t-test measuring the differences pairwise among younger and older bilingual children per condition showed no significant differences in their proportion of inversion \((p = .191)\), non-inversion \((p = .340)\), pro elements \((p = .579)\) or other elements realized \((p = .999)\).

These group results confirm what was expected in terms of a potential asymmetry between younger and older bilingual children as far as embedded questions are concerned (partially confirming hypothesis 2). As predicted in hypothesis 3, these results also confirm my expectations of more variability with embedded questions that with matrix questions. The divergences observed between matrix and embedded questions were also observed among the monolingual children, who inverted less with embedded questions (around 80% accuracy rate) than with matrix questions (90% target rate). To examine the extent to which bilingual children diverge in their proportion of inversion in matrix and embedded questions at the individual level, I conducted an individual analysis.

5.4. Individual analysis

For this analysis, I classified younger and older bilingual children according to their rate of inversion (out of eight trials) into the following subgroups: high inversion children (6 or more inverted questions realized), mid inversion children (4–5 inverted questions realized), low inversion children (1–3 inverted questions realized) and non-inversion children (no inverted questions realized).

The individual results confirmed the group analysis. The younger children outperformed the older children (target inversion in matrix and embedded questions combined, 86% vs. 22%) in their overall rate of target inversion (6 or more inverted questions out of 8 realized), confirming hypothesis 2. The lower proportion of inversion between the two groups was particularly localized among embedded questions, confirming hypothesis 3. Among the younger children, 57% (8/14) showed low or non-inversion realized with embedded contexts, compared to only 36% (5/14) in matrix questions. Among the older children, the asymmetry was even higher, with 92% (12/13) of the children showing low or non-inversion in embedded contexts, compared to 54% (7/13) in matrix contexts. As in the group results, this asymmetry was also evidenced among the monolingual children, who showed higher instances of inversion with matrix questions (89%) than with embedded questions (67%). This is represented in Table 1:

5.5. Item analysis

It is possible that the lower level of inversion is affected by the type of wh-word, as documented by the literature (Gutiérrez-Bravo, 2008; Suñer, 1994; Grinstead et al., 2010). An analysis of items showed an item effect in embedded questions with only three specific items:

(8) No sé qué le dará Dora a Bert.
    “I don’t know what Dora will give to Bert”
Although the children did slightly better with argument *wh*-phrases than with adjuncts, they did not treat adjuncts and argument phrases completely different. However, both younger and older children did show much lower rates of inversion with the *wh*-word *cómo* ("how") than with *dónde* ("where") or *cuándo* ("when"). Regarding matrix questions, there were only two items that presented difficulty:

Only one child in the older children group inverted with item (11) and only six inverted with item (12). As in the case of embedded questions, there was no strong correlation between lack of inversion and *wh*-type, but overall, the younger children did better with argument phrases than with adjuncts. These results are presented in Table 2:

The monolingual children showed high levels of inversion across *wh*-words. There were only three cases of non-inversion with matrix questions and four cases of non-inversion with embedded questions. Rather than exhibiting variation with respect to subject–verb inversion, the monolingual children exhibited variability in subject expression; that is, they omitted subjects more frequently than the bilingual children. In contrast with the bilingual children, the monolingual children produced the highest rates of obligatory inversion with *qué* ("what"). This supports previous claims in the literature that inversion is more categorical with *qué* in non-Caribbean varieties of Spanish (Buesa-García, 2008, 2011; Pestsky, 2006).

The item analysis also showed interesting cases of code switching, crucially with the auxiliary *do* among some of the older children. In some of these cases, the subject was left dislocated and the main verb was not conjugated:
Table 2
Proportion of subject–verb inversion by wh-word per group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Matrix -wh</th>
<th>Embedded -wh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dónde</td>
<td>cuando</td>
</tr>
<tr>
<td>Younger bilingual children</td>
<td>54%</td>
<td>67%</td>
</tr>
<tr>
<td>Older bilingual children</td>
<td>50%</td>
<td>62%</td>
</tr>
<tr>
<td>Monolingual children</td>
<td>75%</td>
<td>82%</td>
</tr>
</tbody>
</table>

(13) ¿A dónde *did* Diego comió sus galleticas?
"Where did Diego eat his cookies?"

(14) ¿A quién *did* Dora pintar? [non-finite]
Who did Dora draw?

(15) ¿Qué *did* Diego comprar para Navidad? [non-finite]
What did Diego buy for Christmas?

(16) ¿Cómo *did* Dora disfrazar por fiesta de Halloween? [non-finite]
How did Dora dress up for Halloween?

(17) ¿Cuándo *did* Diego regresar a tu?
"When will Diego come back?"

Items (14)–(16) lend support for a correlation between inversion and finiteness (see Ebert, 2014 for discussion). However, this cannot be confirmed by the present study, as we did not control for this particular issue and more research is needed. Items (13)–(17) do support a transfer effect from English, as the word order in Spanish is basically identical to that of English. The overt production of the auxiliary *do* in the past tense shows that these children are placing tense and aspectual features in the auxiliary rather than in the main verb as in Spanish.

6. Discussion

The main question guiding the present investigation was whether young Spanish-English bilingual children are able to develop the syntactic properties constraining obligatory subject–verb inversion in Spanish interrogatives. If divergences persisted, I hypothesized that (i) Spanish-English bilingual children would show significantly less inversion *vis a vis* the monolingual controls; (ii) that older children would invert less than the younger children; and (iii) fewer instances of inversion with embedded questions than with matrix questions. Group and individual results showed significant differences among both younger and older bilingual children, in comparison with monolingual children of similar age, confirming hypothesis (i). Furthermore, the older bilingual children produced significantly more cases of non-inversion than the younger bilingual children did, crucially with embedded wh-questions, confirming hypotheses (ii) and (iii).

A logical question that arises from the asymmetry between older and younger children and between matrix and embedded questions is why, I argue that three interrelated factors are contributing to the results: (1) patterns of language dominance, (2) syntactic transfer, and (3) structure complexity. Regarding language dominance, a closer look at the data from the questionnaires shows that 62% of the older children were reported to be more dominant in English than in Spanish, compared to only 36% of the younger children. The fact that the older children were more English-dominant might have led to more crosslinguistic influence from English into Spanish, the recessive minority language in this case, and consequent grammatical restructuring. In regard to transfer, this is evident in the lack of obligatory inversion, crucially with embedded questions where the two languages differ the most. This is also evident in the production of the auxiliary *do* within code-switched utterances, as shown in (13)–(17) above, which shows a clear pattern of structural priming from English.

These results support previous research among bilingual children showing an existing correlation between patterns of language dominance and syntactic transfer (Argyri and Sorace, 2007; Döpke, 1998; Müller, 1998; Paradis, 2001; Strik and Pérez-Leroux, 2011; Yip and Matthews, 2000,2009). As mentioned earlier, transfer effects were more salient with
embedded questions, which have been argued to be more complex than matrix questions (Frank, 2013). Embedded questions involve additional derivational steps than matrix questions. This adds a third dimension to the learning process, namely structure complexity, which has been found to condition grammatical acceptability and production among both bilingual and monolingual speakers (Housen et al., 2005; Jakubowicz and Strik, 2008; Sharp, 2012; Slavkov, 2011; Strik and Pérez-Leroux, 2011). In this regard, Jakubowicz and Strik (2008) propose the Derivational Complexity Hypothesis, which argues that structures with more derivational complexity are usually acquired later than those with less derivational steps. The effects of structure complexity were also evidenced among the monolingual children, who inverted significantly more often with matrix questions.

Furthermore, the results show a small but important difference in the children’s reported patterns of language use at home. Most of the younger children (77%) were reported to speak Spanish with both parents at home, compared to only 54% of the older children. Furthermore, 43% of the younger children were reported to speak either Spanish or both Spanish and English with their siblings, compared to 31% of the older children. Thus, it seems that the younger children were exposed to more day-to-day input with their parents and siblings than the older children, which appears to influence their performance. This confirms recent research proposing a correlation between syntactic performance and language activation and use of the heritage language (Putnam and Sánchez, 2013).9

As found in previous research among L2 learners (Guijarro-Fuentes and Larrañaga, 2011), there was no strong correlation between inversion and target morphology. Although the older children show less inversion with some items in the future tense (gastará “will spend”, dará “will give”), this synthetic future is not particularly more challenging than other forms, since the older children also showed lack of inversion with the simple past. The lack or presence of inversion does not seem to be related to the realization of morphological forms. This however cannot be completely confirmed, as the study did not test for this particular issue and more research is needed.

These results are also compatible with Cuza’s (2013) results among adult heritage speakers. It is clear that the rates of non-inversion increase as bilingual children grow older and become more English dominant. Looking at the results of these two studies together we are able to observe a clear development path toward a less restricted grammatical configuration and diachronic syntactic change in the lifespan of these heritage Spanish children (Adger and Smith, 2005; Biberauer and Roberts, 2006; Camacho, 2008; Zobl and Liceras, 2006)

7. Conclusions

Although it is widely accepted that bilingual children are able to develop independent linguistic systems (De Houwer, 1990; Meisel, 1989), the present study has demonstrated that child bilingual grammars are in constant interaction and change, and bilingualism effects are an intrinsic characteristic of child bilingual development (Hulk and Müller, 2000; Müller, 1998; Pirvu-lescu et al., 2014). I have argued that crosslinguistic influence, structure complexity and language dominance play a crucial role in the extent to which the two grammars can be completely separate from each other in online production. I do not discard the possibility that the overproduction of preverbal subjects in both matrix and embedded questions might be processing-based (Meisel, 2007), specifically in relation to an increased processing load in the production of unfamiliar finite forms. This is something that needs to be investigated further in future research.

The current study sheds light on current discussion on the nature and dynamics of heritage language acquisition in different ways. It shows that non-inversion in child heritage Spanish does not occur across the board; embedded questions were more vulnerable to non-inversion that matrix questions. It also shows that developmental age matters, and that the older children get, the more variability they will have in their grammar due to more English input and reduced exposure to their native language. Finally, and most importantly, this study shows that heritage Spanish children take a different developmental path, as far as interrogative inversion is concerned vis a vis monolingual children of Mexican Spanish. It does not seem, however, that this is the result of incomplete development or child L1 attrition in the lifespan. Their developmental path, although constrained by different factors, ends up being very similar to that of Caribbean Spanish, which also instantiates a different parametric option as far as inversion is concerned. Along the lines of Putnam and Sánchez’s (2013) recent proposal on Feature Reassembly, as well as Amaral and Roper’s (2014) hypothesis on Multiple Grammars, I propose that a new and different syntactic mechanism has developed in the lifespan of these children, rendering obligatory inversion unnecessary. Heritage Spanish children appear to develop a hybrid system made up of two competing grammars, which eventually leads to syntactic restructuring and diachronic change (Adger and Smith, 2005; Zobl and Liceras, 2006). Non-inversion in Spanish/English bilingual children in contact with English in the U.S. is not a deviant morphosyntactic process, nor the result of L1 attrition or incomplete development. Rather I argue this

---

9 A reviewer wonders whether the lack of inversion is conditioned by contact with an already attrited language variety from the parents. I do not think this is the case. Most of the parents were not proficient enough in English for their native grammar to undergo attrition in this grammatical area that could be potentially passed on to their children.
is the result of internal syntactic changes, and restructuring of the heritage grammar in the lifespan of the child, comparable to what has been argued to occur for Caribbean varieties of Spanish.

Acknowledgements

I am very grateful to Nelleke Strik for her thoughtful comments and thorough feedback on previous versions of this paper. Preliminary results of this study were presented at the 42nd Linguistic Symposium on Romance Languages (LSRL42), and the Conference on Formal Approaches to Heritage Language at the University of Massachusetts, Amherst. I thank the audience for their comments and feedback. Finally, I would like to thank all of the parents and children for their participation in the study and for all their support.

References


