

Root Infinitives in the Spontaneous Speech of Two Bilingual Children: Evidence for Separate Grammatical Systems

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1.0 Introduction

The central focus of bilingual first language acquisition research has been concerned with the question of whether or not the child separates the linguistic systems of the various languages acquired (De Houwer 1995, Leopold 1949, Meisel 1989, Paradis & Genesee 1997, Volterra & Taeschner 1978, among others). Initially, it was hypothesized that bilingual children construct a unitary grammatical system before separating the systems of the various languages acquired (Leopold 1949, Volterra & Taeschner 1978). More recently, however, researchers of language acquisition have argued that bilingual children construct a separate grammar and lexicon for each language from the onset of acquisition (Meisel 1989, De Houwer 1995, Paradis & Genesee 1997, among others). The purpose of the current study is to investigate the validity of these hypotheses by analyzing the spontaneous speech samples of two bilingual children, one acquiring German and Italian, and the other acquiring English and Spanish. In particular, we examine the occurrences of root infinitives, a developmental phenomenon that is attested only in early child German and English, but not in early Italian and Spanish (Clahsen 1986, Grinstead 1994, Guasti 1994, Madsen and Gilkerson 1999, Schaeffer 1990, Ud Deen 1997, Wagner 1985). If such a dichotomy concerning the distribution of RIs can be observed in the speech of bilingual children as well, then we can conclude that the child from the earliest stages of language acquisition is able to separate the different grammars.

2.0 Theoretical Background

2.1 Unitary System Hypothesis and Separate Systems Hypothesis

Proponents of the Unitary System Hypothesis (USH) suggest that the bilingual child initially forms only one grammar and one lexicon for both languages that are acquired. This hypothesis is based on the observation that words as well as constructions of one language seem to occur in the other language.

(1) Unitary System Hypothesis:

The bilingual child initially forms only one collective grammar and lexicon for the target languages involved (Leopold 1949, Volterra & Taeschner 1978).

According to Volterra & Taeschner (1978), bilingual children go through an initial stage in which they form one lexicon for the two language acquired. This stage is followed by a period (i.e. stage 2) in which the child applies the same syntactic rules to both languages, thus forming a unitary syntactic system. Finally, during Volterra & Taeschner's stage 3, the bilingual child is able to separate the two languages on the lexical and syntactic levels.

A number of more recent studies have provided evidence against the USH, and instead favor an analysis whereby the child creates two separate lexicons and grammatical systems from the onset of acquisition. The Separate Systems Hypothesis (SSH) is formulated in (2) below.

(2) **Separate Systems Hypothesis:**

From the onset of acquisition, the bilingual child forms separate grammatical systems for each of the target languages involved (Meisel 1989, De Houwer 1995, Paradis & Genesee 1997, among others).

For instance, Meisel (1989) found that French-German bilingual children used the correct word order in the respective languages. Similarly, De Houwer (1990, 1995) found that a Dutch-English bilingual child adhered to morphosyntactic differences between the two languages in the domains of word order, agreement, and inflectional morphology, which points to the existence of separate syntactic systems. The following study provides further support for the SSH by introducing evidence from the developmental phenomenon of root infinitives (RIs).

2.2 Distribution of RIs in Monolingual and Bilingual Children

While previous studies that have given support to the SSH have often focused on phenomena that are related to parameter setting issues, such as word order and agreement, RIs are different in this respect. RIs have been a well-studied topic in monolingual language acquisition, and researchers have found that they occur in the speech of children acquiring languages such as German, English, Dutch, or French, roughly around the age of two. This period of acquisition is often referred to as the RI stage. During the RI stage, children use finite verb forms in complementary distribution with non-finite forms in root contexts. Examples from German and English RIs are given in (3).

- (3) a. Heidi gucken. (German, Salustri & Berger-Morales (2001))
Heidi watch-INF
‘(I want to) watch ‘Heidi’.’
- b. M take shower. (English, Deuchar and Quay (2000))
‘M (wants to) take a shower.’

Note that the German RIs display the German infinitival suffix *-en*, while the English non-finite verb is merely a bare verb stem. Because of this difference, we refer to German non-finite verbs as RIs and English non-finite verbs as bare verb forms. As we will discuss later, this difference suggests that English non-finite forms are not equivalent to German RIs.

Such occurrences of non-finite forms in root contexts are interesting for two reasons. First, they differ from phenomena involving parameter setting because they are largely prohibited in the adult grammars of German and English. Therefore, child non-finite root forms are not simply a reflex of the adult target grammar, but rather represent a developmental stage that is unique to child language. Secondly, non-finite root forms are not a universal of child language, as their presence varies cross-linguistically. Interestingly, it is only the languages that lack rich syntactic agreement, German or English in this case, that exhibit non-finite root forms in their respective child languages. In contrast, the phenomenon is not attested in languages with rich agreement morphology, which are typically pro-drop languages, such as Italian or Spanish. Table 1 shows the frequency of non-finite root forms in monolingual development across the languages under investigation in the current study.

Table 1. Non-Finite Verbs in Root Contexts

	Child/age	Non-finite	Source
German	S (2;1 – 2;2)	43%	Weissenborn (from Guasti 1994)
	Julia (2;2 – 2;5)	55%	Clahsen 1986
	Andreas (2;1)	47%	Wagner 1985
English	Nina and Naomi (2;4 – 3;3)	41%	Madsen and Gilkerson 1999
	Adam and Eve (1;6 – 3;5)	75%	Ud Deen 1997
Italian	Diana (2;0)	0%	Guasti 1994
	Martina (2;1)	4%	Guasti 1994
	Gabriele (1;7 – 2;6)	7%	Schaeffer 1990
Spanish	Damariz (2;6 – 2;8)	5%	Grinstead 1994
	Juan (2;1 – 2;4)	10%	Grinstead 1994

We can see that non-finite root forms are virtually absent in pro-drop languages like Italian and Spanish but are a robust phenomenon in German and English.

Due to the cross-linguistic differences associated with RIs, they prove to be an effective tool for testing the SSH and the USH. If the SSH is accurate, then we expect a German-Italian bilingual child to form separate grammatical systems for the two languages. In other words, the development of the two languages in the bilingual child should mirror the grammatical development of monolingual German and Italian speaking children. Specifically, the SSH predicts that RIs should surface only in the bilingual child's German utterances, but should not be found in his Italian utterances. Similarly, the same predictions should be borne out for the English-Spanish bilingual child: non-finite root forms should be restricted to the English data, and should be virtually absent from the Spanish data. In contrast, if the USH is correct, the bilingual child should have access to only one grammatical system. In this case, both languages of the bilingual child should pattern the same with regard to non-finite root forms. We would expect to find RIs in both the bilingual child's German and Italian, or a lack thereof in both of these languages. The same observation should hold for the English-Spanish bilingual child, as bare root forms should either be present in both these languages, or in neither of them.

3.0 Method

3.1 Subjects

In order to evaluate the claims of the USH and the SSH, let us now turn to the naturalistic speech data of two bilingual children, Leo and M. Leo, a German-Italian bilingual child, is the only child of a German mother and an Italian father. Together, the family has lived in Florence, Italy since Leo's birth. The family operates a principle of *une personne – une langue*, whereby each parent speaks their native language to the child. The parents communicate with one another in Italian. It is estimated that Leo is exposed to German about 60% of the time, and Italian about 40% of the time. The data were collected in the form of audiotapes by one of the authors during two-hour naturalistic play sessions. Recordings were made approximately once or twice a month, starting at age 2;0 until age 2;7. Sessions were transcribed in CHAT format. Altogether, 7 files were considered in the data analysis, as illustrated in table 2.

M, an English-Spanish bilingual child, was living in Brighton, England at the time of data collection. For the time of observation reported in this study, M was 1;11 to 2;6. M's mother is a native speaker of English. Her father is a native speaker of Cuban Spanish. It was estimated that at age 1;3, M heard English about 48% of the time, and Spanish about 52% of the time. Video and audio recordings were made on a monthly basis and transcribed in CHAT format. M's data are available through the Deuchar corpus on the CHILDES database. As table 2 illustrates, 5 files were considered in the data analysis.

Table 2. Language Corpora

<i>Child</i>	<i>File 1</i>	<i>File 2</i>	<i>File 3</i>	<i>File 4</i>	<i>File 5</i>	<i>File 6</i>	<i>File 7</i>
Leo	2;0	2;1	2;2	2;3	2;4	2;6	2;1
M	1;11	2;0	2;2	2;5	2;6		

3.2 Procedure

In our analysis of the Italian, German, Spanish and English data, we counted the number of non-finite and finite verb forms in root clauses.¹ While the infinitival morphology can be clearly established in Italian (i.e. through the infinitival suffixes *-are, -ire, -ere*) and Spanish (i.e. through the infinitival suffixes *-ar, -ir, -er*), the undertaking is slightly more complicated in German and English. In German, the infinitival suffix *-en* is homophonous with the inflectional suffix for 1st and 3rd person plural present tense. However, we were able to disambiguate most of these morphologically ambiguous verb forms based on non-linguistic context or based on the syntactic position that the verb occurred in. In the standard analysis of German, finite verbs are thought to raise to the head of the Complementizer Phrase (CP), while German infinitives remain low in the structure. Thus, we can tell that the examples in (4) are RIs rather than inflected verb forms, because the verb clearly has not raised above the verb particle in (4a) and the direct object in (4b).

(4) Examples of non-finite German utterances

- a. *Leo*: Das hier aufheben. (Leo 2;4)
 This here up-pick-INF
 "This here (I want to) pick up."
- b. *Leo*: Heidi gucken. (Leo 2;1)
 Heidi watch-INF
 "(I want to) watch Heidi."

(5) Examples of finite German utterances

- a. *Leo*: Enzo macht die. (Leo 2;0)
 "Enzo makes those"
- b. *Leo*: Wir spielen. (Leo 2;4)
 we play
 "We are playing."

English has highly impoverished verbal morphology. Only past tense verb forms and 3rd person singular present tense verb forms are overtly inflected, while the remaining forms in the verbal paradigm, including the infinitival form, take the shape of bare verbs. Therefore, only those verbs that are inflected in 3rd person singular context were counted as finite (present *-s*, past *-ed* and irregular past), and only those bare stems that occurred with an overt or null 3rd person singular subject were

¹ All instances of finite main verbs, finite auxiliaries, and finite copula are included in the category of finite verbs.

considered to be non-finite bare forms.² Again, this was determined based on linguistic and non-linguistic context. Examples of finite and non-finite English forms are provided in (6) and (7).

(6) Examples of non-finite English utterances

- a. *M*: M draw him . (M 2;0)
- b. *M*: M take shower. (M 2;0)

(7) Examples of finite English utterances

- a. *Mother*: What does it say? (M 1;11)
M: Says people.
- b. *M*: That's dirty one. (M 2;0)
- c. *M*: Rayna touched the floor. (M 2;0)

4.0 Results

4.1 Distribution of Root Infinitives

The results of our analyses are illustrated in the following tables. The phenomenon of RIs is clearly operative in Leo's German, as indicated in table 3 below.

Table 3. Proportion of Non-Finite Verbs in Bilingual German/Italian³

<i>RI</i>	<i>German</i>		<i>Italian</i>	
	Tokens	%	Tokens	%
2:0-2:3	35/45	78	1/45	2
2:4-2:7	43/68	63	2/38	5

During both the earlier German data files and the later German data files, the clear majority of his verbs (i.e. 78% and 63% respectively), are non-finite. However, non-finite root forms are virtually absent from Leo's Italian data, (i.e. 2% during the early stage and 5% during the later stage of investigation). These results are in line with the findings of Hulk & Mueller (2000), who noticed a similar distribution of RIs in another German-Italian bilingual child.

A similar trend in the distribution of non-finite root forms can be observed in M's English and Spanish data.

² As is standard, in our analysis of the English data we included only sentences with 3rd person subjects, either overt or null. When null, the 3rd person reference of the subject was inferred from context. We excluded 1st and 2nd person subject sentences because in these cases the finiteness of the verb could not be determined. Without a detailed contextual analysis to determine the temporal reference of the verb, a sentence such as *I/you jump* is ambiguously a grammatical finite present tense sentence or a non-finite form with past meaning, or a non-finite form with present tense meaning. Restricting our analysis to 3rd person contexts eliminated this kind of indeterminacy from the data. See note 6 for further discussion of the possible effects of different grammatical persons on modal reference.

³ The German and Italian non-finite verbs include only root infinitives. Null copula and null auxiliaries are not included in the count.

Table 4. Proportion of Non-Finite Verbs in Bilingual English/Spanish⁴

<i>RI</i>	<i>English</i>		<i>Spanish</i>	
	Tokens	%	Tokens	%
1;11-2;2	13/48	27	3/105	3
2;5-2;6	1/56	2	3/205	1

Table 4 shows that M's English utterances contain substantially more non-finite main verbs than her Spanish utterances. In the later data files, she appears to have already moved out of the stage during which non-finite root forms are permissible in the English child grammar. Therefore we do not consider data from this later stage in our subsequent analysis. Note that M's Spanish data are parallel to Leo's Italian data, in that non-finite verb forms are also virtually absent from her Spanish utterances (i.e. 3% during stage 1 and 1% during stage 2). Instead, nearly all of M's Spanish verbs are finite.

These results show that, in the bilingual data, non-finite root forms are attested in German and English, but are extremely infrequent in the pro-drop languages Italian and Spanish. Hence, the grammatical system of each language acquired by these bilingual children appears to follow the same developmental path observed in monolingual children. Recall that the occurrence of non-finite root forms is sensitive to the lack of rich syntactic agreement in the target language. Our data show that bilingual children, like monolingual children, are sensitive to this typological property from the very beginning. Such an observation strongly supports the SSH, and is incompatible with the USH.

4.2 The Modal Reference Effect

We have seen that bilingual children acquiring German or English, like monolingual English- and German-speaking children, go through a stage in which they use non-finite root forms. Based on this similarity, Wexler (1994) has argued that English non-finite verb forms are analogous to RIs found in languages such as German. However, Hoekstra and Hyams (1998) argue that there are important qualitative differences between English bare verbs and true RIs as we find them in German. In this section, we focus on three such differences: the temporal reference and eventivity of the non-finite root verb, and its co-occurrence with null-subjects.

It has been noted that German RIs show a systematicity with respect to their temporal reference. Becker & Hyams (1999) show that German RIs primarily have a future or modal interpretation, while German finite verbs are not restricted to modal interpretation. Consider Table 5 below.

Table 5. Temporal Reference for RIs and Finite Verbs in Monolingual German (based on Becker & Hyams 1999)

	Present/Past	Future/Modal	Unclear	Total
RIs	12 (20%)	47 (80%)	0 (0%)	59
Finite Verbs	79 (79%)	13 (13%)	8 (8%)	100

We can see that German RIs carry a future or modal interpretation about 80% of the time. For finite verbs, the interpretation is not limited to future/modal, but is mostly present or past (i.e. 79% of the time). Similar findings have been reported for Dutch (Wijnen 1996), Swedish (Ingram & Thompson 1996) and French (Ferdinand 1996). Based on these findings, Hoekstra and Hyams claim that RIs are subject to the Modal Reference Effect.

(8) Modal Reference Effect (MRE)

With overwhelming frequency, RIs have modal interpretations.

English bare verbs differ from German RIs with respect to the MRE. Ud Deen (1997) reports the following temporal interpretations for English bare forms, as summarized in table 6.

⁴ The Spanish non-finite verbs include only root infinitives. English non-finite verbs include only bare stems. Both Spanish and English finite verbs include inflected auxiliaries, copula and lexical verbs.

Table 6. Temporal Reference for Bare Verbs and Finite Verbs in Monolingual English (Ud Deen 1997)

	Present/Past	Future/Modal	Unclear	Total
Bare Verbs	230 (87%)	34 (13%)	0 (0%)	264
Finite Verbs	79 (88%)	10 (11%)	0 (0%)	89

Unlike German RIs, English bare forms carry a modal interpretation with a much lower frequency. Only 13% of the bare forms are modal, while most have a present tense or past tense interpretation (i.e. 87% of the time). Hence, bare verbs in English do not markedly differ in this respect from finite verbs in English.

Based on these observations, the Separate Systems Hypothesis predicts that the same patterns will also hold in the German and English of the bilingual children. More specifically, Leo's German RIs should have a modal interpretation, while M's English bare forms should not be subject to the MRE. This prediction is borne out, as illustrated in Tables 7 and 8.

Table 7. Temporal Reference for German RIs and Finite Verbs in Leo's Bilingual Data

	Present	Past	Future/Modal	Total
RIs	4 (5%)	5 (6%)	69 (89%)	78
Finite Verbs	28 (80%)	6 (17%)	1 (3%)	35

Table 8. Temporal Reference for English Bare Verbs and Finite Verbs in M's Bilingual Data⁵

	Present	Past	Future/Modal	Total
Bare Verbs	6 (46%)	2 (15%)	5 (38%)	13
Finite Verbs	32 (91%)	2 (6%)	1 (3%)	35

As Table 7 indicates, 89% of the RIs in Leo's German utterances have a modal interpretation. In contrast, as Table 8 shows, only 38% of M's English bare forms have a modal interpretation. Hence, the bilingual children in this study mirror the trend observed in monolingual children in that the German RIs are subject to the MRE and the English bare forms are not, thus providing further evidence in support of the Separate Systems Hypothesis.⁶

4.3 The Eventivity Constraint

In addition to modal reference, Hoekstra and Hyams (1998) also note that RIs are restricted to event-denoting predicates. Finite verbs in RI languages, on the other hand, include both stative and event denoting predicates. This phenomenon has also been reported for Dutch (Wijnen 1996), French (Ferdinand 1996) and Russian (Van Gelderen & Van der Meulen 1998), and is illustrated in Table 9 for a monolingual German child in the RI stage.

⁵ From this point forward, the English bilingual tables include only data from the bare verb stage (age 1;11 – 2;2). Any data beyond the age of 2;2 are irrelevant to the discussion of phenomena occurring during the bare verb stage.

⁶ It should be noted that we compare results for the German and English data although we analyzed only 3rd person utterances in the English data but 1st, 2nd, and 3rd person utterances in the German data. To control for this difference, Blom (2003) in her study of Dutch and English root infinitives, excluded 1st and 2nd person contexts and reanalyzed her Dutch data including only 3rd person contexts. Under this analysis the proportion of Dutch modal RIs was reduced by about 20%.; Even with this reduction, however, there is still a significant difference in the proportion of modal RIs in monolingual Dutch children and monolingual English speaking children (13%). Blom also conducted an experimental study comparing Dutch and English speaking children's propensity to use RIs (bare verbs in English) in modal and non-modal contexts. This experiment also controlled for the effect of grammatical person since all contexts were 3rd person. The results also showed a significant difference between Dutch and English: Dutch children used RIs in 61% of modals contexts, while English children did so in only 36% of modal contexts (cf. Blom's table 3.12).

Table 9. Eventivity of Verbs in Monolingual German (based on Clahsen 1986)

	Eventive	Stative
RI s	57/57 (100%)	0/57 (0%)
Finite verbs	12/47 (26%)	35/47 (75%)

As table 9 illustrates, 100% of the RIs in the spontaneous utterances of the German monolingual child are event-denoting verbs, while finite verbs are both stative and eventive. Hoekstra and Hyams refer to this restriction as the Eventivity Constraint (EC), as in (9).

(9) *The Eventivity Constraint (EC)*

RI's are restricted to eventive predicates

While German RIs are subject to the EC, Table 10 shows that English bare forms are not; English bare verbs can be both eventive and stative.

Table 10. Eventivity of Verbs in Monolingual English (based on Ud Deen 1997)

	Eventive	Stative
Bare forms	199 (75%)	65 (25%)
Finite verbs	81 (91%)	8 (9%)

We now turn to the bilingual data to see if these noted differences between German RIs and English bare verbs hold here as well. According to the predictions of the SSH, we expect the same difference between German and English with respect to eventivity in non-finite root forms to also be observed in the bilingual children. Table 11 shows that the RIs in Leo's German utterances clearly adhere to the EC, as all of the RIs are eventive and none of them are stative. In contrast, M's English bare verbs are not restricted to event-denoting predicates, but instead include both eventive and stative verbs, as illustrated in table 12. The fact that the bilingual children pattern just like monolingual children with respect to the EC again lends support to the Separate Systems Hypothesis.

Table 11. Eventivity of German Verbs in Leo's Bilingual Data

	Eventive	Stative
RI s	78/78 (100%)	0/78 (0%)
Finite verbs	19/35 (54%)	16/35 (46%)

Table 12. Eventivity of English Verbs in M's Bilingual Data

	Eventive	Stative
Bare forms	10/13 (77%)	3/13 (23%)
Finite verbs	5/35 (14%)	30/35 (86%)

4.4 Root Infinitives and Subject Type

Finally, studies have shown that there is a co-occurrence restriction associated with RIs and subject type (e.g. Behrens 1993; Krämer 1993). More specifically, RIs tend to co-occur with null-subjects more often than finite verbs. This phenomenon is illustrated for monolingual German in Table 13.

Table 13. Null Subjects with RIs and Finite Verbs in Monolingual German

Child	Finite verbs			RIs			Source
	Overt	Null	Total	Overt	Null	Total	
Simone 1;8-4;1	80%	20%	3636	11%	89%	2477	Behrens 1993
Andreas 2;1	92%	8%	220	32%	68%	68	Krämer 1993

While null-subjects occur between 68% and 89% of the time in RIs, the frequency of null-subjects is much lower in finite clauses (i.e. between 8% and 20% of the time). We do not see the same systematicity with English bare verbs and null subjects. As table 14 illustrates, English bare verbs allow for a low percentage of null subjects, (i.e. between 0% - 16% of the time).

Table 14. Null Subjects with Bare Verbs and Finite Verbs in Monolingual English⁷

Child	Finite verbs			Bare forms			Source
	Overt	Null	Total	Overt	Null	Total	
Nina 2;4-2;9	46 (94%)	3 (6%)	49	75 (84%)	14 (16%)	89	Madsen and Gilkerson 1999
Naomi 2;7-3;3	58 (93%)	1 (7%)	59	14 (100%)	0 (0%)	14	Madsen and Gilkerson 1999

The Separate Systems Hypothesis predicts that we will observe the same co-occurrence patterns with respect to type of subject and non-finite forms in the respective grammars of the bilingual children. Our analysis shows that the bilingual children again pattern like monolingual children with regard to subject type in non-finite clauses. Table 15 indicates that the majority of Leo's German RIs, namely 63%, contain null-subjects, similar to the 68% reported by Kramer (1993) in Table 13.⁸ Table 16 shows that none of M's English bare verbs contain null-subjects, similar to the monolingual data of Naomi in table 14.⁹

Table 15. Null Subjects with German Verbs in Leo's Bilingual Data

Finite verbs			Non-finite verbs		
Overt	Null	Total	Overt	Null	Total
21 (60%)	14 (40%)	35	29 (37%)	49 (63%)	78

Table 16. Null Subjects with English Verbs in M's Bilingual Data

Finite verbs			Non-finite verbs		
Overt	Null	Total	Overt	Null	Total
32 (91%)	3 (9%)	35	13 (100%)	0 (0%)	13

Given our observation that German RIs and English bare verbs in the bilingual data follow the tendencies observed in monolingual children, we take the bilingual data as ample evidence for the Separate Systems Hypothesis.

5.0 Conclusions

In conclusion, the experimental results of the current study indicate that bilingual children form separate grammatical systems for each language from the earliest stages of acquisition. More specifically, we have provided evidence in support of the Separate Systems Hypothesis through various properties related to the RI phenomenon. First, we have shown that the well-known restriction of non-finite root forms to non-pro drop languages holds in the bilingual data of the German-Italian

⁷ Note that copula and auxiliary 'be' were not included in Nina and Naomi's finite verbs.

⁸ Note that the vast majority of overt subjects with RIs in Leo's data are proper names.

⁹ Recall that we only considered English bare verbs as such if they had clear 3rd person subjects, expressed overtly or covertly. In the coding of the English data, there were no clear cases of bare verbs containing a null-subject which could clearly be interpreted as 3rd person sg. from context, as all the bare verbs co-occurring with null subjects could have been either imperative or 3rd person sg. and were thus excluded. Although the high number of overt subjects with English bare verbs thus may be inflated due to our conservative coding procedures, it is in line with the monolingual English data, as Phillips (1995) reports that 80%-89% of English bare forms co-occur with overt subjects.

speaking child and the English-Spanish speaking child, clearly indicating a very early separation of grammatical systems in bilinguals. Furthermore, we have illustrated that the qualitative differences that have been observed between German RIs and English bare forms exist in the bilingual data as well. Particularly, we have seen that in both the monolingual and the bilingual data, German RIs and English bare verbs differ with respect to the Modal Reference Effect, the Eventivity Constraint, and co-occurrence restrictions associated with RIs and null subjects. These observations once again strongly support the idea of separate grammatical systems in bilingual first language acquisition.

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