TITLE:

Bilingual early functional-lexical mixing and the activation of formal features[*]

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RUNNING HEAD:

Bilingual activation of formal features

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Abstract

We have argued that the Grammatical Features Spell-Out Hypothesis (GFSH) (Liceras et al. 2003; Spradlin, Liceras and Fernández 2003a) accounts for the functional-lexical mixing patterns that prevail in the case of Determiner Phrases produced by bilingual (English-Spanish) children. This hypothesis (Liceras 2002; Spradlin, Liceras and Fernández 2003b) states that in the process of activating the features of the two grammars, the child, who will rely on the two lexicons, will make code-mixing choices which will favor the functional categories containing the largest array of uninterpretable features (Chomsky 1998, 1999). This implies that in the case of English/Spanish child acquisition data, mixed utterances such as *el book* (Spanish Determiner + English Noun) will prevail over mixed utterances such as *the libro* (English Determiner + Spanish Noun). Thus, in the process of acquisition, children pay special attention to the visible morpho-phonological triggers which lead to the activation of abstract formal features.

In this paper, we will test this hypothesis by analyzing data containing English/Spanish functional-lexical mixings as well as data from other language pairs. We will argue that early functional-lexical mixings, including word-internal mixings, provide evidence for how children activate the abstract syntactic features of the individual target languages in an emergent grammar. Specifically, we will try to show that: 1) patterns of production are syntactically motivated in that morphemes which spell-out a greater array of abstract features are favored; thus in any given language pair, the 'dominant' language—the one that will systematically contribute the functional free morpheme, the Determiner, to a Determiner + Noun pair—will be the language whose determiner system displays the greater array of uninterpretable features to be checked within the Determiner Phrase; and 2) when the Determiner in the two languages displays a similar array of uninterpretable features within the Determiner Phrase, no preference for either is manifested. We will further suggest that bilingual word-internal mixing plays a similar role to monolingual inflectional overregularizations in that it is the visibility of the uninterpretable features that will inform patterns of production in both cases.

1. Introduction

Child bilingual data provides a rich ground for characterizing the nature of emergent grammars in that these children are confronted with two different realizations of the computational system of all human languages. From an innatist approach, the child is equipped with a Universal Grammar (the genetic endowment that characterizes the initial state of the language organ) which makes available to him/her the total inventory of features (the minimal units which conform the categories of the computational system). The choices and patterns that the bilingual emergent systems display may provide us with information about the features that are activated and how this is accomplished. According to this approach, children are sensitive to the abstract features which are manifested in the input of a given language(s). This view is no way at odds with the kind of phonological (or prosodic) bootstrapping that has been described, for instance, in Morgan and Demuth (1996), and is especially attuned to Lleó and Demuth's (1999) and Lleó's (2001a, 2001b) proposals concerning the prosodic organization of children's mono-morphemic words and the ways in which determiners are prosodified in the various languages.[1]

Functional-lexical language mixings in bilingual children have been accounted for as being determined by the matrix language (Azuma 1993; Myers-Scotton 1995) or the dominant language (Peterson 1988). It has been proposed that the matrix language is the one that provides the system morphemes to a given stretch of bilingual discourse.[2] On the other hand, the dominant language has been attributed a leading role in providing the functional lexicon to language mixing and code-switched utterances. Proponents of the dominant language hypothesis (Petersen

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[1] These authors maintain that German children do not try to produce determiners by creating unfooted syllables, in the same way that they do not tend to produce unfooted syllables because this is not common in the adult language. On the other hand, Spanish children do because the constraint that avoids the presence of unfooted syllables in a given language is violated in the adult language, and so it is in child Spanish.

[2] System morphemes as defined by, for example, Myers-Scotton and Jake (2001) have attributes of functional categories and/or features in the Government and Binding Theory (Chomsky 1998, Haegeman 1994) or the Minimalist Program (Chomsky 1995) versions of Generative Grammar.

1988) explain the specific patterns of early language mixings in terms of language proficiency. According to Petersen, in an English/Danish bilingual system where the dominant language is English, (1) but not (2) will be a possible utterance. Conversely, were Danish the dominant language the opposite would be true.

    (1) HER duke   [her dolly]

    (2) HENDES dolly   [her dolly]

The functional lexicon is also at the center of other explanations for what are considered to be grammatical versus ungrammatical code-switched utterances. For instance, Joshi (1985) maintains that switching between closed-class and open-class lexical items is ungrammatical, as in the English/Marathi example in (3), while Belazi, Rubin and Toribio (1994) and Toribio (2001) would reject (1), (2), (3) and (4) on the basis of the Functional Head Constraint, which amounts to a constraint on the production of a functional head in one language and its complement in another.

    (3) Some chairs-WAR   [some chairs-on/ on some chairs]

    (4) THE casa   [the house]

However, these types of mixings are constantly found in bilingual child language (Deuchar and Quay 2000; Fantini 1985; Köppe and Meisel 1995; Lanza 1997; Lindholm and Padilla 1978; Meisel 1994; Nicoladis and Genesee 1998; Liceras 2002; Spradlin, Liceras and Fernández 2003, among others). Köppe and Meisel (1995) explain these mixings in terms of two different stages: a first stage, which they call early mixing, and a second stage referred to as code-mixing. These stages are divided by the onset of syntax (+/- 2;00). They claim that in the first stage (early child grammar), the child does not have access to functional categories and that therefore mixed utterances cannot be accounted for in terms of syntactic constraints. In this specific stage, children produce functional-lexical mixings where the functional category is provided by either of the two languages. In the second stage, functional-lexical mixing is primarily reduced to the production of NN compounds and/or Determiner Phrases where the functional category is, as a general rule, provided by only one of the two languages.

Vihman (1998, 1999) and Deuchar and Vihman (2002) argue that function words have a special status in bilingual production because they match the language context considerably less often than content words. Using data from an English/Spanish bilingual child and an

English/Estonian bilingual child, they maintain that function words seem to be treated as language-neutral while content words seem to be treated as language-specific. The problem with these analyses is that in spite of the fact that these authors equate their function words with Myers-Scotton and Jake's (2000) 'early system morphemes', their definition and consequently their classification of what exactly constitutes a function word is neither clear nor made explicit. However, if their function words were equivalent to functional categories in the Government and Binding Theory (Chomsky 1998, Haegeman 1994) or the Minimalist Program (Chomsky 1995) versions of Generative Grammar, the fact that they consider function words language-neutral and content words language-specific, would somehow hint at the reinterpretation of the concept of language dominance that we propose below.[3]

Using the theoretical framework provided by the Minimalist Program (1995, 1998, 1999), and in the spirit of MacSwan (2000), who assumes that the bilingual mind operates with two lexicons and one computational system, in Liceras et al. (2002) and in Spradlin, Liceras and Fernández (2003b) we analyzed English/Spanish bilingual child data and proposed a reinterpretation of the concept of language dominance. We argued that in the process of activating the features of the two grammars, the child makes choices in terms of the language that will provide the functional vocabulary to a given functional-lexical mixing. As a result of these choices, the functional categories the child mixing will favor will be those provided by the language whose functional system contains the greater array of uninterpretable features (Chomsky 1995, 1998, 1999). This implies that in the case of English/Spanish child acquisition data, mixed utterances such as (5) will prevail over (6) because in Spanish the Gender and Number features of Nouns are activated in the Determiner via agreement.

(5) LOS (plural) books   [the books]

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[3] It is far from clear to us what these authors define as function words. They are neither the closed-class items of the open/closed tradition nor functional categories in the Government and Binding Theory (Chomsky 1998, Haegeman 1994) or the Minimalist Program (Chomsky 1995) versions of Generative Grammar. Therefore, their proposal would only be relevant to what we say if the distinction were made between functional and substantive categories.

(6) THE libros   [the books]

In other words, Spanish Nouns trigger Gender and Number agreement with both Determiners and Adjectives, which makes the Spanish NP feature system more transparent than the English one in terms of the phonetic and morphological evidence that it provides for the activation of abstract features. This accounts for the fact that in our analysis of the data produced by Mario (Fantini 1985), Manuela (Deuchar and Quay 2000) and Simon and Leo (Fernández, Liceras and Spradlin 2000-2005), four English-Spanish bilingual children, instances of utterances such as the ones in (5) account for 98% of all cases of mixed Det+N utterances. Further, if this account is correct, functional-lexical mixings by other English/Spanish bilinguals as well as bilingual children with language pairs which display the same types of contrasts among uninterpretable features will show the same pattern. However, when neither of the two languages displays a greater array of uninterpretable features, no preference for either of the two determiners should be found in the mixing patterns.

2. Features and learnability

Features are central to modern generative linguistic theory. They constitute the minimal units of which lexical categories are comprised and, in the tradition of Chomky (1965), they belong to the inventory of substantive universals.[4] In Chomksy (1995) a distinction is made between interpretable and uninterpretable features. According to Chomsky, interpretable features such as, for example, [number], [person] or [animacy] enter into interpretation at LF while features such as [case] or [agreement] are uninterpretable and therefore must be eliminated.

Tsimpli (forthcoming), in parallel to the principles of the UG/parameterized phenomena distinction, maintains that uninterpretable features are the actual lexicon of the computational system and that they are subject to maturational constraints. Thus, interpretable and uninterpretable features do not share the same status in terms of learnability in that: (a) the former are always accessible to the learner while the latter are not if maturation (past the critical period) has taken place; and, (b) the activation of interpretable features occurs prior to that of

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[4] For a distinction between formal and substantive universals see Chomsky (1965).

uninterpretable features. For instance, in the case of the Determiner, it has been argued (Bartra 1997) that features are acquired in the following order: [+referential], [+definite], [+plural], [+case], [+feminine] and [+person]. The hypothesis that we put forward deals strictly with uninterpretable features, namely, formal grammatical features which are syntactically realized in a given language.[5]

3. The Grammatical Features Spell-out Hypothesis (GFSH)

Liceras et al. (2002) and Spradlin, Liceras and Fernández (2003) argue that in Det + N functional-lexical mixings, the language of the functional category will be determined by the language whose Determiner Phrase (DetP) requires the "internal" checking of a greater array of uninterpretable features. This implies that Spanish will be the dominant language in that sequences such as those in (5) will be favored because Spanish Determiners have the uninterpretable features Number and Gender while English Determiners only have the uninterpretable feature Number, as shown in Table 1.[6]

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[5] The status and role of features both in linguistic theory and learnability theory is presently subject to much discussion within the generative grammar framework (see Travis, forthcoming; Radford, forthcoming). Therefore, the issue of whether the interpretable gender feature is acquired before the uninterpretable one lies outside the scope of this paper. Furthermore, the fact that gender has consequences outside the NP and in the case of [+animate] Nouns has semantic value, leads us to suggest that Gender is an inherent feature of Nouns in Spanish, in the sense that it is marked in the Determiner so that the relationship Probe/Goal is established. What the Spanish Noun has (but not the English Noun), besides inherent gender, is the gender agreement feature. See Liceras, Spradlin and Fernández (2004) for a specific way of accounting for Gender in the Spanish DP.

[6] Possesives are different in two respects: (1) in English, they have three forms (*his*, *her* and *its*), which are marked for gender, while only two are marked for gender in Spanish (*nuestro-a*, *vuestro-a*); and (2) because the English possessive agrees anaphorically with the possessor and not with the entity possessed, the English marking is not relevant to our hypothesis.

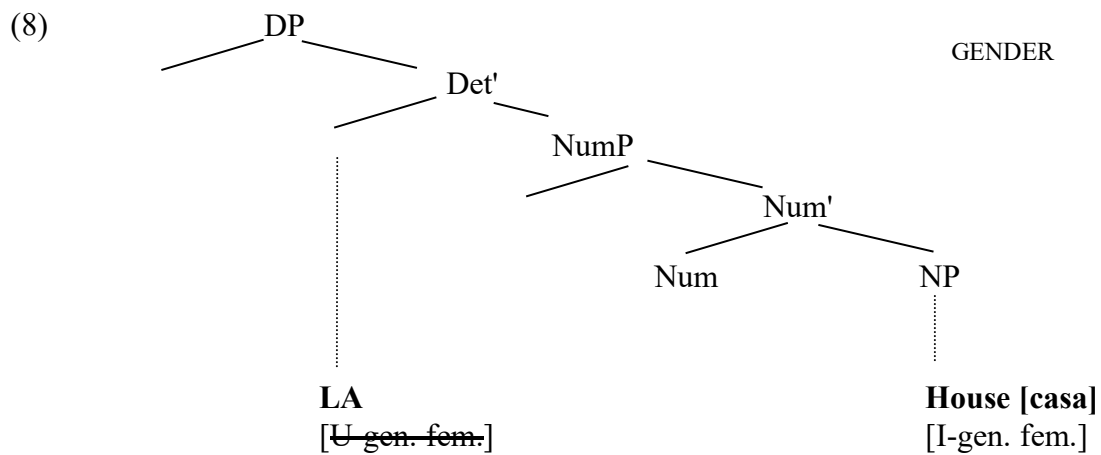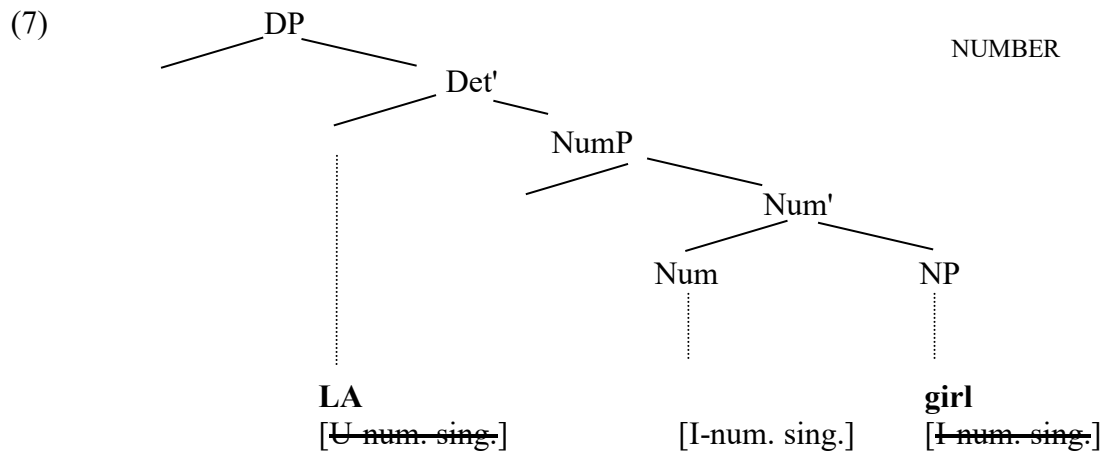| TABLE 1. DetP uninterpretable features			
		DETERMINER	NOUN
English	Gender	——	INHERENT [+animate]
	Number	UNINTERPRETABLE	INTERPRETABLE
Spanish	Gender	**UNINTERPRETABLE**	INHERENT [+/-animate]
	Number	UNINTERPRETABLE	INTERPRETABLE

The rationale goes as follows: a bilingual child, like an English or a Spanish monolingual child, must select the abstract uninterpretable features that are realized in English and Spanish from the input data. This selection may lead to the projection of different categories and to different parametric options depending on the languages involved. This process is crucial if the child is to differentiate the two language systems; child bilingual data, and specifically functional-lexical mixings in child bilingual data, may provide us with information about this process.[7]

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[7] It may be the case that instances of child and adult code-mixing are more abundant in the Determiner Phrase domain than in the domain of other functional categories, since, as a reviewer points out, it has been argued that both the CP and the DP, being at the interface level between syntax and discourse pragmatics, may constitute 'vulnerable domains' for crosslinguistic influence in bilingual acquisition. However, the concept of 'vulnerable domains' has been used to suggest that grammatical operations related to the CP are problematic (Platzack 2001), while Kupisch (2003) argues that the DP may not constitute a 'vulnerable domain'. Since we are not making any inference in terms of whether code-mixing may be linked to problems in terms of acquisition (omission, late acquisition, etc.), we think that discussing this issue lies out of the scope of this paper.

4. The GFSH and the bilingual (English/Spanish) DetP system

Examples (7) and (8) illustrate what occurs with the uninterpretable features on the Det in DP-internal mixings for Number and Gender features respectively. In (7), the uninterpretable number feature is projected and checked by the interpretable feature of the Noun "girl". The projection remains for interpretation at LF.

In (8) the uninterpretable Gender feature of the Spanish Det checks the interpretable one on the noun "girl". Indeed, what we suggest is that in the case of (8) there is a sort of agreement relation between the Spanish Det and the English Noun.

(7)

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                        DP
                         \
                          Det'
                           \
                            NumP
                              \
                               Num'
                              /    \
                           Num      NP
                            ┊        ┊
        LA                          girl
   [U num. sing.]      [I-num. sing.]  [I num. sing.]
```

NUMBER

(8)

```
                        DP
                         \
                          Det'
                           \
                            NumP
                              \
                               Num'
                              /    \
                           Num      NP
                                     ┊
        LA                          House [casa]
   [U gen. fem.]                    [I-gen. fem.]
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GENDER

If there is inherent gender on the English noun, as suggested for (8), the choice of a non-matching Spanish equivalent as in (9b) and (9d) would not be possible in this bilingual grammar.

(9) a.	El	boy
(9) b.	**El**	**girl**
(9) c.	La	girl
(9) d.	**La**	**boy**

However, if there is no inherent gender on the English Noun, any of the logically possible combinations given in (10) should theoretically be available, even if the Spanish equivalent of

"bed" *cama*, is inherently marked as feminine and the Spanish equivalent of "car" *coche* is inherently marked as masculine.

(10) a.	El	car	[el coche]
	G/N:UN [sing.]	G/N:[ø] [sing.]	
(10) b.	**El**	**bed**	**[la cama]**
	G/N:UN [sing.]	G/N:[ø] [sing.]	
(10) c.	La	bed	[la cama]
	G/N:UN [sing.]	G/N:[ø] [sing.]	
(10) d.	**La**	**car**	**[el coche]**
	G/N:UN [sing.]	G/N:[ø] [sing.]	

At the same time, since there is no uninterpretable Gender feature on the English Det, no clash of gender between the English Det and the Spanish Noun should occur, which means that mixings such as those in (11) can be generated by a Spanish/English bilingual grammar.

(11) a.	The	coche	[the car]
	[Ø]	G/N: INH [masc.] [sing.]	
(11) b	The	cama	[the bed]
	[Ø]	G/N: INH [fem.] [sing.]	
(11) c.	The	chico	[the boy]
	[Ø]	G/N: I [masc.] [sing]	
(11) d.	The	chica	[the girl]
	[Ø]	G/N: I [fem.] [sing.]	

While according to this model of grammar, DetPs such as (10b) and (10d) would be perfectly grammatical, the examples in (9d) and (10d) would not be favored if it is the case, as proposed by Spanish grammarians (Roca 1989), that the masculine determiner is the default form. Neither would they be produced if English [-animate] nouns as in (10) were assigned gender according to their Spanish counterparts. In fact, based on the code-switched DetPs produced by a near-native speaker and his native interlocutor, Franchescina (2001) argues that the masculine determiner may be the default form for non-native and near-native speakers but not for native speakers, since the latter use both masculine and feminine Spanish determiners with English nouns.[8]

5. Functional-lexical mixings in child bilingual (English/Spanish) data

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[8] We have also discussed this issue in Spradlin, Liceras and Fernández (2003a and 2003b).

Tables 2 – 6 show that the Spanish Det is the preferred option in the case of bilingual English/Spanish functional-lexical mixings (Liceras 2002).

Table 2 displays functional-lexical mixings taken from Deuchar and Quay's (2000) book and from the transcriptions they have made available in the CHILDES database (MacWhinney 2000). The data from the book appear in an appendix of multi-word utterances from age 1;6.25 to age 1;8.24 and in a table of multi-word mixed utterances for the same age range. The language context for each utterance is given in the appendix. The 19 transcriptions in the CHILDES database cover the age range 1;3.8 to 2;6.2. Of these, 10 are in an English context and 9 are in a Spanish context. According to the authors, over 200 recordings were made, so that the corpus available in the CHILDES system is only a representative sample of the data they collected.

TALE 2. DetP mixings: Spanish/English. Manuela (Deuchar and Quay, CHILDES)			
Language context: English		Language context: Spanish	
Demonstrative [this]	Indefinites [another]	Definite article [the]	Indefinite article [a / an]

this padre   (1;11)
 this niña   (1;11)
	oto **picture** (1;9)
	 otra (fem.) picture (1;9) x7
	 otro new book (1;9)
	 otro book (1;9)
	 otro one (1;9)
		el cake de M (2;2)	un woof
			     (1;7)
			 un woofy
			     (2;2)
			 un bus
			     (2;5)
			 un pram
			     (2;6)

English Det: 2	Spanish Det: 11	Spanish Det: 1	Spanish Det: 4
TOTAL: 16 Spanish Det + English N // 2 English Det + Spanish N			

Deuchar and Quay do not take up the issue of language dominance because of their reservations about the variety of ways in which the term 'dominance' has come to be used; they specifically cite a tendency in recent literature to refer to both production and non-production factors when discussing the issue, and to confuse the causes of language dominance with its effects. Further, they propose that instances of language mixing in their data may be explained in terms of the child's need to fill lexical gaps, since Manuela generally made contextually appropriate choices where she had equivalents in the two languages available.

We would like to point out that the claim that children code-mix in order to fill lexical gaps is not inconsistent with the claim that, in code-mixings involving a functional and a lexical category, it may be the dominant language which informs the selection of the former and that patterns in the code-mixing data may reflect this, particularly in cases where it can be shown that translation equivalents exist in the child's two lexicons.[9] Furthermore, it is clear that Manuela's use of mainly Spanish determiners is not due to a need to fill lexical gaps in the determiner system because at the time when she produces these mixings, she uses determiners from both languages, as examples in (12) and (13) show:

(12) a. una vela	(Manuela, 2;0.5)	[Spanish context]
(12) b. el zapato	(Manuela, 2;0.5)	[Spanish context]
(12) c. tu carta	(Manuela, 2;0.5)	[Spanish context]
(13) a. the floor	(Manuela, 2;1,3)	[English context]
(13) b. my dog	(Manuela, 2;1,2)	[English context]

Deuchar and Quay (2000) followed this bilingual English-Spanish child, Manuela, from the age of 6 months to 7 years. Diary records were kept by the mother from when the child was about 6 months old to when she was over 7 years old. Daily diary records were kept until age 2;10, at which point only novel utterances were recorded. Audio-video recordings were made on a regular basis from age 1;3 to age 3;2. Two sessions per week were recorded, one with an English-speaking interlocutor and one with a Spanish-speaking interlocutor. Audio recordings were also made for the purposes of phonological analysis.

Manuela was living in Brighton, England, at the time the data were collected. Her father was a native speaker of Cuban Spanish who was educated in Cuba and Panama; her mother was a native speaker of British English. The father and mother, who were the primary caregivers, spoke Spanish with each other and with the child when they were together; English was used when the mother and child were alone or when there was a monolingual English speaker present. Deuchar and Quay estimate exposure to English input at 71% from birth to age 1;0 versus 29% for Spanish. From age 1;0 to age 2;0 they estimate exposure to English and Spanish input at 48% and 52% respectively. Spanish was the main language in the home; Manuela was exposed to

Spanish for about 4 hours a day on weekdays and all day on weekends. From the age of 0;4, she spent about eight hours a day in daycare, where the language was English.

We interpret the above information as evidence that at the time in which the mixings were produced, Manuela was not more proficient in Spanish than in English. Furthermore, since the Spanish determiner prevails both when the context is English and when it is Spanish, we conclude that neither the language context nor a concept of dominance based on proficiency can account for the preference for the Spanish determiner. We therefore conclude that this bilingual emergent grammar shows a preference for the determiner which displays the greater array of uninterpretable features.

Fantini followed his son Mario's acquisition of Spanish and English from 'birth' (Fantini 1985: 5) through his eleventh birthday. According to the author, the data were obtained through diary notations based on direct observation and—during the first year—monthly recorded sessions.[10] The author states that the data were collected with 'considerable regularity' through age 6 and less regularly thereafter. The mixed utterances we analyze appear in an appendix of excerpts from the speech diary, as well as two different tables which present what Fantini calls 'lexical borrowings' (147) and 'grammatical borrowings' (169). Since the data included in the appendix are not exhaustive, it is not clear whether the tables and appendix include all of the mixed utterances that Mario produced or only a sample thereof.

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[9] In table 3, page 379, Quay (1995) provides a list of 54 equivalent pairs produced by Manuela by 1;10.

[10] In the case of Mario, Fantini's child, there is a good deal of doubt as to whether he can be considered to have grown up as a simultaneous bilingual since he did not produce his first English word until the age of 2;6. However, from the information Fantini provides, it is obvious that this child was either English dominant or a balanced bilingual when many of the DetPs listed below were produced. It could well be the case that these all were 'frozen' forms, but we doubt that this would be the case. It could also be the case that this child was behaving like an adult whose L2 is English. However, if this were the case, he would be behaving as a near-native speaker of Spanish (Franceschina 2001), since his production seems to favor the masculine determiner as the default option.

Mario's mother was a native speaker of Bolivian Spanish; the father was a native speaker of American English who chose to speak Spanish in the household except when monolingual English speakers were present. Thus, although the family resided in the United States, Mario's primary language contact was with Spanish at least through age 2;6. Additional contact with Spanish was provided by several Spanish-speaking nursemaids and a number of trips to Mexico and South America. Instances of Mario's mixings are provided in table (3).

TABLE 3. DetP mixings: Spanish/English. Mario (Fantini 1985)				
Definite article [the]	Indefinite article [a / an]	Demonstrative [that]	Indefinites [another]	Possessive

el baby   (3;6)
lo(s) babies   (3;6)
la [fem.] outside
                 (3;6)
 	
lo **squirrels**   (3;8)
los rockets   (3;8)
el **sidewalk**   (5;8)
el **puppet**   (5;8)
el glitter   (6;4)
el **curtain**   (8;11)
al **waterfall**   (10;2)
	un rabbit (3;5)
	un **bottle** de leche
	                 (3;8)
	
	un ball (3;8)
	un Indian corn (5;1)
	un **song** (5;1)
	un **drink** (5;1)
	un **stop sign** (5;7)
	un stick (5;8)
	un **gate** (7;1)
	un **lobster** (7;3)
		ese dump truck (5;8)
		
		ese egg (6;0)
			otro haunted house (10;6)	mis [my] snakes
				          (3;6)x2
				
				su [his/her] nose
				          (3;8)
				
				mi [my] kite
				          (5;7)
				
				su [his/her] partner (5;7)

18	16	2	1	6
TOTAL: 43 Spanish Det + English N				

Fantini attributes examples of language mixing prior to age 2;8 to the child's inability to differentiate between his two languages (i.e, the unitary system hypothesis (see Genesee 1989)) and suggests that examples of later mixing were due to interference. He further claims, based on a word count of the child's vocabulary at the age of 3;0 which comprised 445 Spanish words, 48 English words and 8 Italian words (the paternal grandparents were Italian), that Mario was Spanish-dominant. We would argue that, in the case of Mario, it may not make sense to speak of a single language system in which the child was unable to differentiate between Spanish and English given that he did not produce his first English word until the age of 2;6. However, we have to admit that this late contact with English does not allow us to relate his systematic choice

of the Spanish determiner to a procedure which shows how his bilingual emergent grammar favors the functional category which has the greater array of uninterpretable features.[11]

We have analyzed data taken from our own ongoing study on the bilingual acquisition of Spanish and English by twins. The twins, whom we shall call Simon and Leo, live with their parents in Spain. The father is a native speaker of Peninsular Spanish and the mother is a native speaker of American English. Both parents are university educated and work in an academic setting. The parents practice a strict 'one person one language' strategy of communication with the twins; the father always speaks to the children in Spanish and the mother always addresses them in English, except on those occasions where a monolingual Spanish speaker is present. According to a parental questionnaire, this practice was followed from the moment the twins were born. The parents generally speak Spanish with each other, except on occasional trips to the United States or when a monolingual English speaker is present.

During the first year, the mother was the primary caretaker of the twins. The father was present all day on weekends and less on weekdays. Through age 1;0 there was also a cleaning woman who spent approximately 4 hours per day in the home and provided additional exposure to Spanish. At age 1;10 the twins began attending daycare for 3 hours a day on weekdays, where the language of the staff and other children was Spanish. Apart from the mother, additional contact with English was provided by occasional visits by the maternal grandfather and by 4 lengthy visits of about two months each to the United States.

The data we have collected to this point cover the age range of 1;1 to 4;9. A total of 94 sessions have been recorded on videotape, of which 51 are in an English context (i.e., with an English interlocutor) and 43 in a Spanish context. The recordings were made at intervals of 2-3

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[11] A reviewer points out that since these data represent various stages in the development of Mario's two languages, it is questionable to collapse them. Though we are in general in agreement with this observation, as previously noted in the text and in footnote 8, it seems to be the case that Mario's dominant language was Spanish at the early stages, and that after that it is difficult to determine how the two systems developed. However, what is relevant here is the fact that not a single instance of English Det + Spanish Noun is reported at any time in the data that Fantini makes available.

weeks, and were interrupted for approximately 2 months in the summer of 2000 when the family traveled to the United States. The family again traveled to the U.S. in the summers of 2001, 2002 and 2003, during which time the mother took charge of recording the twins.

Code-mixing first appeared in our data at age 2;7. This is later than is reported in Deuchar and Quay, but given that twins in general seem to lag behind their singleton counterparts in language development (Dale et al. 1998, among others), we do not consider this to be anomalous. Tables 4 and 5 show the early DetP mixings in Simon and Leo' spontaneous production.

TABLE 4. DetP mixings: Spanish/English. Leo (Fernández Fuertes, Liceras and Spradlin 2000-2005)			
Language context: English			
Definite article [the]	Indefinite article[a / an]	Indefinites [another]	Possessives
el piggy (2;7)	un tree (2;7) un **sheep** (2;7) un rope (3;2)	otro **blanket** (2;7) x17	tus [your] blocks (2;7)
1	3	17	1
TOTAL: 22 Spanish Det + English N			

TABLE 5. DetP mixings. Spanish/English. Simon (Fernández Fuertes, Liceras and Spradlin 2000-2005)	
Language context: English	
Definite article [the]	Indefinite article [a / an]
el otro birdy (2;7) el other birdy (2;7) el month (5;10)	a cocina, a kitchen (2;7) un cordito (3;4)
3	1 + (1)
TOTAL: 4 Spanish Det + English N	

As in the case of Manuela, both Leo and Simon were producing determiners in English and Spanish independently as in (14) and (15) below; further, the results of a questionnaire on lexical knowledge completed by the parents when the twins were age 2;7.3 indicates that they were spontaneously producing most of the translation equivalents for the nouns shown in Tables 4 and 5 (neither 'sheep' not the Spanish equivalent *oveja*, appeared on the list, nor did 'cocina'/*kitchen*, though as Table 5 shows, Simon was able to retrieve the appropriate word in English).

(14) a. tus zapatillas (Leo and Simon 2,7)

(14) b. la puerta   (Leo and Simon 2,7)

(14) c. el árbol   (Leo and Simon 2,7)

(15) a. the apple   (Leo and Simon 2;7)

(15) b. this bike   (Leo and Simon 2,7)

(15) c. the monster tape   (Leo 2,7)

In addition to these three longitudinal studies, Lindholm and Padilla (1978) examined the language mixings of five English/Spanish bilingual children at different ages (2;10 – 6;2). The children were second-generation Mexican-Americans living in the United States. The authors collected their data via an experimental situation in which the children interacted with one investigator who spoke in Spanish and a second investigator who spoke in English, so that the children took on the role of translator between the two. Their analysis found that the predominant mix was between "an article or a demonstrative (functors)" (Lindholm and Padilla 1978:329) from Spanish and a Noun from English. The authors further comment that number agreement in such mixings was always correct but that gender of the Determiner was not always "consistent" (Lindholm and Padilla 1978:329). These data are wholly in keeping with our analysis of DetP-internal mixings from young English/Spanish bilinguals. Examples from Lindholm and Padilla (1978) appear in Table 6 below.

TABLE 6. DetP mixings. Five English/Spanish bilinguals (Lindholm and Padilla 1978)		
Definite article [the]	Indefinite article [a / an]	Demonstratives [that]
la clock	**una birthday**	**esa** carrot
la lady	**una bird**	**esa** window
el kitty cat	un **rock**	este lollipop
los guards	un car	estos candies
el king	un boy	este bird
the vaca [cow]	a perro [dog]	esto guitar
the agua [water]		
9	6	6
TOTAL: 18 Spanish Det + English N // 3 English Det + Spanish N		

The boldface examples in tables 2 to 6 display cases of feminine determiners with English Nouns whose Spanish equivalents are feminine. This is an interesting outcome and, under our view, are possible derivations if we assume that both features in the Spanish DP can be checked in spite of the fact that the English N is neither masculine nor feminine but (Ǿ). This

implies that it will not assign an uninterpretable feature and that no conflict will occur. And this would be the case both for the masculine and the feminine version of the Spanish Det. However, what would lead the bilingual speaker to choose EL versus LA? If the masculine is the default option, the choice of the feminine article will not be favored. A possible explanation for the choice of LA as in (10)c would be that there is a representation which associates BED with the corresponding Spanish Noun. In other words, the presence of LA with English Nouns would provide evidence that the corresponding Spanish Noun is already present in the Spanish lexicon, while the presence of EL might or might not provide such evidence. But instances of (10)d would not be expected if LA is the marked option, unless the child were also producing mismatches within wholly Spanish DPs.

While cases such as (11c and 11d)—which we repeat below—will be scarce, they are possible for this model of grammar. Namely, these derivations should converge because there are no features that have to be deleted.

(11) c.	The	chico
	[Ø]	G/N: INT [masc.] [sing]
(11) d.	The	chica
	[Ø]	G/N: INT [fem.] [sing.]

The question is, why would the child favor an option which in principle seem to be more problematic? We suggest that it is because via the Spanish Det that this feature of the computational system is instantiated. Furthermore, we would like to propose that in the process of acquisition, Spanish Nouns acquire their feature specification via Det since the Det/Noun unit is initially processed and even stored as a single unit. Monosyllabic placeholders (Liceras, Díaz and Mongeon 2000; Pérez-Tattam, Senn, Nicolás and Liceras 2002) produced by monolingual and bilingual Spanish-speaking children provide evidence for this.

The preference for the Spanish Det in DP-internal mixings cannot be attributed to a lack of the English Dets in the children's vocabulary since, as in the case of Manuela and Simon and Leo (and according to the authors), these children were also using both English and Spanish determiners productively at the time the mixings were recorded. It has been argued (Lleó and Demuth 1999) that the prosodic organization and the prosodic constraints which differentiate Romance and Germanic languages account for the differences found in the acquisition of the article system by Spanish and German monolingual children, since Spanish children acquire

determiners about six months earlier. While earlier acquisition may play a role in the automatization and processing of Spanish determiners, it is a fact that when these mixings are produced English determiners have already been acquired. Furtheremore, we have argued (Liceras, Díaz and Mongeon 2000; Liceras 2003) that the monosyllabic place-holders that appear as early protodeterminers in languages such as Italian and Spanish provide evidence for how children activate the abstract uninterpretable features (Gender, and possibly Word-marker) in these languages. Therefore, this early acquisition (together with the activation of the uninterpretable features) is related to the dominant status that Spanish determiners have in bilingual mixings.This preference for the Spanish Det is especially typical of a stage in which the children appear to be in the process of activating the abstract Gender feature (and, possibly, the word marker feature as discussed in, for example, Harris (1991)). Examples (16)-(22) below, taken from numerous instances which appear in our own data, show that Simon and Leo have trouble with gender (they do not appear to have the assigned intrinsic Gender feature to them) and do not seem to apply the general phonotactic rule by which the Spanish articles **LA/UNA** correspond to words ending in **A** and **EL/UNO** with words ending in **O**. These examples were taken from data when the twins were age 3;01.23.

(16) E(l) oveja   (the sheep)

(17) Un salchicha   (a sausage)

(18) El cama   (the bed)

(19) Un nariz   (a nose)

(20) Un zanahoria   (a carrot)

(21) Un manzana   (an apple)

(22) Muchos calletas [= galletas]   (many cookies)

(23) Un pequeño pupa   (a small wound)

(24) Un piesa [= pieza] de queso   (a piece of cheese)

(25) Una pequeño naunau   (a small "naunau")

(26) Los hamicas [= hormigas]   (the ants)

Thus, what we argue is that the Spanish protodeterminer "schwa", "a", "e" (Liceras, Díaz and Mongeon (2000), Liceras (2003)) is the trigger for the abstract feature Gender which children activate for each Spanish Noun. Contact with these vowels reaches a qualitative stage which

leads to the incorporation of the uninterpretable feature Gender in the Spanish Determiner Phrase.[12]

6. The "Grammatical Features Spell-Out Hypothesis" and other language pairs

According to this hypothesis, in French/English code-mixing by young bilingual children, the French determiner will be preferred because, as in the case in Spanish, the French Det but not the English Det has a Gender uninterpretable feature. Though the extant data are scarce, Tables 7 – 9, taken from Swain (1972) and Swain and Wesche (1975) show that the French Det is preferred. The two cases of English determiner happen to be possesives and, as we have discussed previously, the possesive determiner does not behave like the article since it has gender features that must be valued by the possesor (*his, her, its*) outside the DetP. Swain (1972) studied four bilingual children (Michael, Mónica, Douglas and Martin) who were acquiring French and English in Québec, Canada. The data, presented in Tables 7 – 9, are reproduced from Swain and Wesche (1975) and Apendices A and B from Swain (1972), in which the children's production of interrogatives is examined. In Tables 7 – 9, the data for Michael and Mónica are given; Douglas and Martin were studied at a later age and, though each produced a French Det + English N mixing ("au store", Douglas 3;8-3;9; "un ours", Martin 4;4-4;5) in the corpus, they are not included here as separate tables simply for reasons of space.

TABLE 7. DetP mixings: French/English. Michael (Swain and Wesche 1975; Swain 1972)		
Definite article [the]	Indefinite article [a / an]	Possessives
le man	un autre sweater	your poupée **ta** [your fem.] hand **sa** [his/her] mouth
1	1	4
TOTAL: 5 French Det + English N // 1 English Det + French N		

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[12] Contrary to one reviewer's interpretation of our claim, it is not the Gender feature that triggers determiner selection, but rather, children's search for the specific 'content' (bundle of features) of Spanish determiners that triggers the activation of the feature Gender.

TABLE 8. DetP mixings: French/English. Michael (Swain 1972)		
Definite article [the]	Indefinite article [a / an]	Possessives
	un kleenex (3;6 – 3;7)	ses boots (3;6 – 3;7) your sac (3;6 – 3;7)
0	1	2
TOTAL: 2 French Det + English N // 1 English Det + French N		

TABLE 9. DetP mixings: French/English. Mónica (Swain 1972)		
Definite article [the]	Indefinite article [a / an]	Possessives
le cookie x3 (2;10 – 2 –11) le chicken (3;2 – 3;3)	Une more…more…une more les…des cigarettes? (3;2 – 3;3) un autre cookie x2 une 'pop' un cookie x2 des slippers	
4	7	0
TOTAL: 11 French Det + English N // 0 English Det + French N		

It is also the case that both French and English determiners have already been acquired and are used productively by these children, as shown in (27) - (28).

(27) a. a bottle   (Michael 3;6 – 3;7)

(27) c. your car   (Michael 3;6 – 3;7)

(27) d. the nurse   (Michael 3;6 – 3;7)

(27) e. my hat   (Monica 3;2 – 3;3)

(28) a. la cigarette   (Monica 2;10 - 2;11)

(28) b. un sac   (Monica 2;10 – 2;11)

(28) c. ton voiture   (Monica 3;2 – 3;3)

(28) d. ses souliers   (Michael 3.8 – 3;9)

(28) e. ton chapeau   (Michael 3.8 – 3;9)

(28) f. une boîte   (Michael 3.8 – 3;9)

Volterra and Taeschner (1978) and Taeschner (1983) studied the spontaneous speech of two Italian-German bilingual children, Lisa and Giulia. The mother of the children was a bilingual speaker of German and Brazilian Portuguese while the father was a native speaker of Italian. Taeschner claims that the mother spoke only German with the children and that the father always addressed them in Italian. The girls, who lived in Rome, had some contact with the father's Italian-speaking family via occasional visits and less with the mother's family, who lived in Brazil. According to the author, the children had some German-speaking friends but apparently many more Italian-speaking ones, and received additional exposure to Italian in nursery and elementary school.

Taeschner states that the data were collected beginning from the time that each of the two children produced their first words (1;6 and 0;11 for Lisa and Giulia respectively) using "bimonthly tape recordings" (Taeschner 1983:18). It is not clear from this description what exactly is meant by "bimonthly", nor is it explicitly specified whether the recordings were audio-only or audio-video, though given the year publication of the first study we assume the former to be the case. In a footnote, the author further states that production data for Lisa and Giulia were collected until the ages of 5 and 4 respectively, and less frequently until the ages of 8 and 9. The recordings, according to Taeschner, lasted about 45 minutes each and were supplemented by diary entries. The transcriptions were orthographic rather than phonetic and attempted to reflect "the way in which the children spoke" (Taeschner 1983:20).

The GFSH predicts that in the case of Italian/German bilingual code-mixing, there should be no preference for either of the two determiners because both have Number and Gender uninterpretable features. Though it is true that the German Det is marked for Case, Case does not factor into the DP-internal feature array in the same way because it does not have to be checked within the DP. The data in Tables 10 and 11, taken from Volterra and Taeschner (1978) and Taeschner (1983), therefore go in the direction predicted by the GFSH, since the Det+Noun mixings produced by Italian/German bilinguals do not show a clear preference for either the Italian or German determiners.

Table 10. DetP mixings (Italian / German). Lisa (Taeschner 1983)				
Definite article [the]	Indefinite article [a / an]	Demonstratives [that]	Indefinites [another]	Possessives
da gatto [the cat] (2;3) la Boot [the boat] (2;3) la Schuhe [the shoes] (2;4) il Buch [the book] (2;6) il Wolf [the wolf] (2;10) x2 della Pupi [of-the doll] (2;10) x2 le ruote [the road] (3;4) (3;9-4;5 range) la Flöteb [the flute] die sabbia [the sand] die vaccinazione [the shot] die unghie [the nails] il Waschbecken [the sink]	ein fazoletto [a handkerchief] (3;0) (3;9-4;5 range) ein biberon [a baby bottle] ein biciletta [a bicycle] eine totò [a spank] ein fil*en* [a thread] una Maus elegante [an elegant mouse] ein femmina [a girl] (5;8)	quetto Traktoa [this tractor] (2;6)	anda Papi [another of daddy´s] (2;3) l'ander la barca [the other the boat] (2;6) anda palla [another ball] (2;6) l'anda la tasca [the other the pocket] (2;10) l'ander mano [the other hand] (3;4)	la mia Schappen [my scarf] (2;6) meine zoccoli [my clogs] (7;11)
14 (4 GR)	7 (6 GER)	1	5 (5 GER)	2 (1 GER)
TOTAL: 16 German Det + Italian N // 13 Italian Det + German N				

Thus, this very preliminary analysis of French/English and Italian/German child bilinguals demonstrates that there is a systematic preference for the French Determiner over the English one, in contrast to the Italian/German data where no such preference is found. These data provide further evidence for the GFSH in that the dominant language, namely, the one that prevails in terms of providing the functional lexicon to child mixed utterances, is the one that displays the most obvious phonetic and morphological evidence for the activation of abstract features. Or, stated in a different way, the language whose functional system contains the greater array of uninterpretable features.

Table 11. DetP mixings (Italian / German). Giulia (Taeschner 1983)			
Definite article [the]	Indefinite article [a / an]	Demonstratives [that]	Possessives
alla Schwanz [to-the tail] (1;9) la Blume [the flower] (1;9) a Schuhe [the shoes] (1;9) a böse Wolf [the bad wolf] (2;2) die pecore [the sheep] (2;4) de bicicletta [the bike] (2;8) der amico [the friend] (2;8) die peli [the hair] (3;0) die gomma [the chewing-gum] (3;0) das mare [the sea] (3;0) il Frosch [the frog] (5;2)	Ein pallone [a balloon] (2;6) eine matita [a pencil] (2;6) ein petenino [a sandwich] (2;6) eine Madonina [a woman] (2;8) eine fil*en* [a thread] (2;8) ein klein palloncino [a small balloon] (2;8) una puppi [a doll] (2;8) eine luna [a moon] (2;8) eine mutandi [a panty] (3;0)	quetta Augen [these eyes] (1;9) hose quetta [pants these] (1;9) quetta Schwein [this pig] (1;9) quetta Stuhl [this chair] (1;9) quetta Zähne [these teeth] (1;11) quetta Schuhe [these shoes] (1;11) Babili quetta [children these] (1;11) questa klein klein Zeh [this small small toe] (1;11) diese da fiori [these here flowers] (2;8)	Stuhl mia [chair my] (1;9) Stuhl mia [chair my] (1;11) tua Haus [your house] (2;2) mein costume [my costume] (2;6) meine zoccoli [my clogs] (7;11)
11 (6 GR)	9 (8 GER)	9 (1 GER)	5 (2 GER)
TOTAL: 17 German Det + Italian N // 17 Italian Det + German N			

Returning to the issue of whether the early acquisition of Spanish determiners would favor the choice of Spanish versus English determiners in code-mixed utterances, the data in tables 10 and 11 constitute a testing ground for whether this prediction would override the one made by our hypothesis. Namely, the early acquisition of the Italian versus the German determiner would imply that Italian/German bilinguals would favor the Italian determiner.[13]

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[13] While we know of no studies in which it has been argued that Italian children master the determiner before German children do, Italian children (like Spanish and Catalan children) display a substantial number of protodeterminers (place-holders), such as in Botari, Cipriani and Chilosi (1993/1994).

However, given the nature of German determiners, our hypothesis (which would hold for mixed utterances produced by Spanish/German bilinguals) predicts that the determiner from either language may be chosen given that both languages (and both pairs) share the same number of uninterpretable features (Number and Gender) that must be checked within the DP (though it is true that German determiners are marked for Case, Case is checked outside the DP and thus should not affect determiner selection under our view). These data seem to support our prediction.[14]

8. Conclusions

We are aware of the fact that the code-mixing data that we have analized does not pass the test of statistical significance. However, they are very much suggestive of a clear trend which so far confirms the validity of our hypothesis. While it would be ideal to have more data, these are presently the only data available to us. Also, while it certainly seems to be the case that these types of mixings (as opposed to non-mixed utterances) are infrequent in the data, we would argue that other, also infrequent phenomena in child language, have provided a rich ground for testing well-known and far-reaching hypotheses. For example, children's overregularization of irregular morphology has been found to be infrequent in large samples of data (see Marcus et al.

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[14] A reviewer indicates that data from a study on attrition which involved Italian immigrants in Germany provide evidence against our hypothesis because these speakers always choose the Italian determiner in spite of their degree of competence in German. In fact, our hypothesis predicts that balanced, simultaneous bilinguals will indistinctly choose the Italian or the German determiner. Thus, had these speakers been balanced, simultaneous bilinguals and acquired both languages as children, the choice of Italian would have been a possible prediction of our hypothesis. However, the speakers they mention seem to be second language learners (their first contact with German was as adults) and our hypothesis does not make predictions in that regard. However see Liceras et al. (2003) and Spradlin, Liceras and Fernández (2003a) for the use of our GFSH as a diagnostic for adult bilingual competence.

1992; Clahsen et. al. 2002). Nevertheless, overregularization has provided the basis for the dual mechanism hypothesis as proposed by Pinker and Prince (1988) and Kiparsky's (1983) level ordering hypothesis. Consequently, we think that hypotheses on the nature of the bilingual mind can be both advanced and tested on code-mixing utterances, in spite of the fact that these type of utterances may not be extensively produced by children.

For Petersen's dominant language hypothesis, as stated above, the data would suggest that in the case of the English/Spanish and the English/French pairs ALL children were Spanish- or French-dominant at all stages, which is far from clear to us if language dominance must match the diagnostics provided by Petersen (1988); namely, if factors such as parents' perception, amount of exposure or even prevalence of overall functional words from one of the two languages. On the other hand, for Giulia and Lisa, Petersen's hypothesis would predict that these subjects have the same proficiency in Italian and German, though this is unlikely to be the case given their greater exposure to Italian.

Our interpretation of the Det + NP data is that in a language contact situation where children have to abstract the features of both the English and the Spanish Determiner Phrase, the Spanish Determiner will eventually win over, for it is the most transparent one in that it has two (Number and Gender) uninterpretable features (Chomsky 1995) while English only has one (Number).[8] Thus, we argue that child code-switching data will reflect a preference for the language whose free or bound morphemes provide the richest phonetic evidence for the projection of abstract features. This, we propose, constitutes the DOMINANT language for that specific mixing. We would also like to speculate that adult code-switching speakers would accept mixings where the dominant language (defined in this way) provides a free or bound morpheme, but would reject the opposite options. Thus, the sequence the casa would be rejected because the English determiner cannot match (or agree) with the Spanish Noun, which carries the intrinsic uninterpretable feature [+gender]. On the other hand, the sequence la house or el house would not pose the same problem because the English Noun does not carry a [+gender] uninterpretable feature.

As we have indicated in section 1 above, MacSwan (2000) argues that the mechanisms and constraints that account for monolingual grammars should account for code-switching systems (or bilingual grammars) and that the MP can account for both the monolingual and the

bilingual faculty. According to MacSwan, the bilingual language faculty has two lexicons and two phonological components but one computational system. What we propose is to take MacSwan's proposal a step further in that we will assume that the lexicon has both stems and functional morphemes, as in Halle and Marantz (1993) Distributed Morphology. Therefore, as is the case with a monolingual child who accesses the various lexical pieces and produces words such as (29) and (30), the bilingual child may access the two lexicons and produce instances or functional-lexical mixings such as the ones in (2) and (5)/(6) or the one in (31).

(29)   GO-ED

(30)   SAB-O [know + first person sing.]

(31)   JUMP-AR [jump + infinitival marker]

The existence of two phonological components implies that (31) will either be sent to the English or to the Spanish phonological component, and that adjustments may be made for ensuring its interpretation.

We have argued that the dominant language is the language for which more uninterpretable features have to be specified by the child who is acquiring a given language pair. It follows from our hypothesis that early bilingual word internal mixings will favour morphemes that are relevant for the specification of uninterpretable features related to Tense, Aspect, Person, etc., for each one of the two languages. This is in fact what the sample of word internal mixings in (32) – (37) seems to indicate.

(32)	No quiero choc**ar**	choke / -ar (Spanish infinitival marker)	(Simon 3;4)
(33)	I am lavi**ng** myself	lav [lavar = wash] / -ing	(Leo 3;3)
(34)	Shot**é** ese	shoot / -é (Spanish 1st ps past marker)	
(35)	Io ess**o**	ess- [German "essen", eat] / -o [Italian 1st ps present marker]	(Giulia 3;9 4;5)
(36)	cord**ito**	cord / -ito (Spanish masculine diminutive)	(Simon 3;05)
(37)	sill**ito**	silly / -ito (Spanish masculine diminutive)	(Simon 3;10)

In our view, then, this is the same as the monolingual process of building up words on the basis of the various morphemes, as proposed by, for example, Distributed Morphology (Halle and Marantz 1993).

We will further test this hypothesis using more data and language pairs where one of the two languages does not have articles (Japanese/English, Russian/English)**,** and in language pairs where one or the other has a greater range of postnominal marks of inflection (e.g., Estonian/English). This is especially important because it may well be the case that the strength shown by the Spanish determiners in the case of the English/Spanish data is not due (or not only due) to the existence of the uninterpretable feature Gender, but also to the internal structure of Spanish words, i.e., the presence of a word marker as proposed by Harris (1991). In the case of pairs such as Japanese/English or Russian/English where one of the languages does not have articles, we would predict no differences in terms of the number of Determiner Phrases with Ø Determiners produced by monolingual Japanese and Russian children on the one hand, and Japanese/English or Russian/English bilinguals on the other. However, once English articles are acquired, we will find Japanese articles with English determiners but will not find English nouns without determiners. Since both Japanese and Russian have demonstratives, possesives, etc., our predictions will go in the direction stated above. Our predictions for pairs such as the Estonian/English pair will be based on the Distributed Morphology model in that the bound morphemes being independent lexical entries will be potentially available in the process of creating a word-internal mixing (Spradlin 2003). The nature and characteristics of the bound morphemes that will predominate will depend on the unintepretable features thay they encode.

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