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Linguistic theory and bilingual systems: simultaneous and sequential English/Spanish bilingualism[*]

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Introduction

The linguistic tools provided by the Minimalist Program (Chomsky 1998, 1999) are especially suited to account for the grammatical phenomena which characterize English/Spanish bilingual data from either simultaneous or sequential bilingualism. More precisely, and within the generative view of language in general and language acquisition in particular, our point of departure is the notion of Universal Grammar (UG) as the genetic endowment that enables all human beings to acquire a particular language, depending on the type of linguistic input they are exposed to. Therefore, and when dealing with the acquisition of two languages, we assume that UG provides the computational component which carries out the selection of features specified in the lexicon of each language.

Since it is assumed that parametric variation among languages is located in the lexicon, and specifically in the features that constitute the building blocks of functional categories, an analysis of the activation of the various features in the bilingual acquisition process can provide us with relevant information on the way in which two languages are acquired.

Using data from both simultaneous and sequential bilingualism, in this paper we approach the acquisition of a series of formal features which characterize four different types of structures. Simultaneous bilingualism (Spanish and English as two L1s) is defined as the acquisition of two first languages (L1) from birth in a natural context (Butler and Hakuta 2004, among others). Sequential bilingualism (Spanish and English as L1 and L2) implies the acquisition of an L1 from birth and the latter acquisition of a second language (L2) which starts being acquired in an institutional context in the majority of the cases (Wei 2000, among others).

The simultaneous bilingual data we discuss in this paper are grouped following two different criteria, age and type; we compare child and adult data as well as spontaneous production and experimental interpretation data. The four types of structures we analyze are shown in examples (1) through (5). Examples (1) and (2) correspond to cases of code-mixing within the Determiner Phrase (DP) and the particular feature we are interested in is [Gender] in mixed DP structures, a feature which emerges when the Determiner category is provided by Spanish.

(1)	a.	un tree	[Leo 2;07] [Spanish indef. masc. sing. DET *un* + English sing. N *tree*] (Fernández Fuertes et al. 2002-2005)
	b.	la rock	[Simon 3;05] [Spanish def. fem. sing. DET *la* + English sing. N *rock*] (Fernández Fuertes et al. 2002-2005)

(2)	a.	el weekend	[Spanish def. masc. sing. DET *el* + English sing. N *weekend*] (Jake et al. 2002)
	b.	el research	[Spanish def. masc. sing. DET *el* + English sing. N *research*] (Jake et al. 2002)

Examples in (3) show structures containing the Spanish definite article *la* and 3rd person singular accusative clitic *la*.

(3)	a.	¿has visto <u>la</u> mesa?	Def. fem. sing. DET *la* [have you seen <u>the</u> table?]
	b.	<u>la</u> hemos pintado	Fem. sing. CL *la* [we have painted <u>it</u>]

The specific syntactic characteristics of definite articles and clitics that we are concerned with are: their position with respect to the nominal or to the verbal head; their null versus overt phonological realization.

Spanish deverbal compounds, as shown in (4), are the result of merging a verbal form in the 3rd person singular indicative (*mata*, *come*) and a nominal form in the plural (*rataS*, *libroS*).

(4) a. matarratas Verb *kill*-3rd ps + Noun pl. *rats* [rat-killer]

b. comelibros Verb *eat*-3rd ps + Noun pl. *books* [book-eater]

The last type of structure that we analyze is illustrated in (5) and corresponds to null and overt sentential subjects. In this case, the relevant feature we will concentrate in is the Determiner feature ([D]) in Tense (T).

(5) a. puedes mover a esta [Simon 3;09]
[(you) can-3rd-ps move to this one]
(Fernández Fuertes et al. 2002-2005)

b. (I) don't know (the) story [Leo 3;00]
(Fernández Fuertes et al. 2002-2005)

This paper is structured as follows: Section 1 deals with simultaneous bilingualism, using both spontaneous and experimental data from children and adult bilinguals, and involves mixed DP structures, like those in (1) and (2), and null and explicit subjects, as in (5). In Section 2 sequential bilingual (non-native) systems are analyzed, also taking into account child and adult experimental data, and involving mixed DP structures, the definite article / accusative clitic dichotomy, as in (3) and deverbal compounds like those in (4). In Section 3 we present the conclusions.

1. Simultaneous bilingualism: L1 English + L1 Spanish

The two sets of bilingual data we have analyzed correspond to (a) the spontaneous production of a set of English/Spanish bilingual twins and to (b) the results of an experiment on mixed DP structures carried out on a group of English/Spanish bilingual children from an elementary school in Dallas, USA.

1.1. The spontaneous data from our longitudinal study

The elicitation of spontaneous data for our longitudinal study began in 2000 (Fernández Fuertes et al. 2002-2005). At the time, the twins, Simon and Leo were 1;01 years old. They were born—and live—in Salamanca (Spain) but spend two to three months per year in the United States.

The linguistic input the twins have been exposed to since birth corresponds to the communication strategy *one parent – one language* (Ronjat 1913): the mother, a native speaker of American English, has always addressed the twins in English, and the father, a native speaker of Castilian Spanish, has done so in Spanish.

The data collected up to this point cover the age range from 1;1 to 6;3 and have been elicited following the methodological guidelines employed in research on monolingual and bilingual acquisition (Slobin 1985, De Houwer 1990, López-Ornat 1994, among others). A total of 168 sessions have been recorded on videotape and DVD, of which 113 are in an English context (i.e., with an English interlocutor) and 55 in a Spanish context. The Spanish recordings were made at intervals of 2-3 weeks until age 3;00 (with some interruptions) and then they were made once a month. The English recordings were sometimes made more frequently, but the sessions are usually much shorter. Thus the total amount of data recorded in each language is fairly equivalent.

1.2. The experimental data

Our experimental data were elicited from a group of 23 English/Spanish bilingual school children in Dallas. They were classified into the following four groups[1]:

Kindergarten (4 years old): 8 children	[G1]
Grade 2 (7 years old): 3 children	[G2]
Grade 3 (8 years old): 8 children	[G3]
Grade 4 (9 years old): 4 children	[G4]

The experimental task consisted of grammaticality judgements of a series of structures containing mixed DPs. The sentences presented to the children were as follows: 64 experimental sentences (like those in 6-8); 18 distractors containing other types of mixings; and 18 fillers with deverbal compounds.

(6) a. me resulta difícil dormir en <u>el plane</u>

[it is difficult for me to sleep on the plane]

b. Adriana se pasa las vacaciones en <u>la beach</u>

[Adriana spends her holidays at the beach]

(7) a. voy a comprar flores para <u>el church</u>

[I am going to buy flowers for the church]

b. los pájaros están haciendo un nido en <u>la tree</u>

[the birds are building a nest in the tree]

(8) Peter's mother wants him to sweep <u>the suelo</u> [floor]

Among the 64 experimental sentences with mixed DPs, 32 of them had a Spanish Determiner and an English Noun (as in 6 and 7), and 32 had an English Determiner plus a Spanish Noun (as in 8). In the case of sentences where the mixed DP contained a Spanish Determiner, we included translation equivalents, like those in (6), where the gender of the Spanish Determiner agreed with the gender of the Spanish translation of the English Noun (*el plane* because *plane/avión* is masculine in Spanish; and *la beach*, because *beach/playa* is feminine in Spanish); and we also included non-translation equivalents, like those in (7), where no such agreement occurred.

Children from grade 2 to 4 (7-9 years old) were given the elicitation task containing the structures described above, which they had to judge using five different options involving numbers (1 if it sounds bad, 5 if it sounds good). The kindergarten children (4 years old) were given a modified version of this task where the items were presented orally rather than in written form, and, instead of giving them five different options involving numbers, we gave them four options involving colors, each color representing a different degree of acceptance. Both the teacher who administered the task and the director of the school suggested the use of this procedure because the school uses it with this age group to test lexical knowledge, and consequently the children were familiar with it.

1.3. Code-mixing within the DP: spontaneous and experimental data from children and adults

The analysis we have conducted of the spontaneous data from the bilingual twins Simon and Leo (Liceras and Fernández Fuertes 2005, Fernández Fuertes et al. 2005a) shows how, in the case of mixed DPs, there is a clear preference for structures like those in (9) and (10) in which Spanish contributes the functional category, the Determiner, and English provides the lexical category, the Noun, as opposed to cases like those in (11) where an English Determiner appears with a Spanish Noun.

(9) el piggy [Leo 2;07]

[Spanish def. masc. sing. DET *el* + English sing. N *piggy*]

(Fernández Fuertes et al. 2002-2005)

(10) el month [Simon 4;11]

[Spanish def. masc. sing. DET *el* + English sing. N *month*]

(Fernández Fuertes et al. 2002-2005)

(11) the vaca [English def. DET *the* + Spanish fem. sing. N *vaca / cow*]

(Lindholm and Padilla 1978)

This preference is reflected not only in the spontaneous data from Simon and Leo but has also been attested to in other studies involving English/Spanish bilingual children, as shown in Table 1.

@@ Insert Table 1 here

In order to account for this preference for the Spanish Determiner, we have proposed the Grammatical Features Spell-Out Hypothesis (GFSH) (Liceras et al. 2005). We have argued that the GFSH accounts for the functional-lexical mixing patterns that prevail in the case of DPs produced by bilingual (English/Spanish) children. Following Chomsky's (1998, 1999) differentiation between interpretable and uninterpretable features, this hypothesis 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-switching choices which will favor the functional categories containing the largest array of uninterpretable features. This implies that, in the case of English/Spanish child acquisition data, mixed utterances such as (9) and (10) (Spanish Determiner + English Noun) will prevail over mixed utterances such as (11) (English Determiner + Spanish Noun). Thus, we propose that in the process of acquisition, children pay special attention to the visible morpho-phonological triggers which lead to the activation of abstract formal features (Spradlin et al. 2003).

This preference is also evidenced in the spontaneous data from adult bilinguals, as in the studies by Myers-Scotton and Jake (2001) and Jake et al. (2002) where they analyze Milian´s (1996) and Pfaff´s (1979) corpora. Some of the examples are shown in (12) and (13) and the specific countings in Table 2.

(12) el doorway [Spanish def. masc. sing. DET *el* + English sing. N *doorway*]

(Jake et al. 2002)

(13) una broom [Spanish indef. fem. sing. DET *una* + English sing. N *broom*]
(Jake et al. 2002)

@@ Insert Table 2 here

We can therefore conclude that the overall preference for the Spanish Determiner in mixed DPs continues up to adulthood, where this category is preferred because it contains the features [Gender] and [Number] while the English Determiner lacks the feature [Gender].

This clear preference for the Spanish Determiner in production data does not show in the experimental data elicited from the group of children from Dallas (Liceras et al. 2005) since they do not show a preference for any of the two Determiners, as Figure 1 shows.

@@ Insert Figure 1 here

We would like to propose that this difference can be explained in terms of the production/interpretation dichotomy, as we will see later. In fact, we would like to argue that the processor plays a different role in each of these two scenarios, since the processing mechanisms that are at work when judging an already built structure (a mixed DP in this case) are different from the checking mechanisms operating when a mixed DP is to be built '*ex novo*' selecting items from the lexicon.

1.4. Null and explicit subjects

We have conducted a study on the nature of sentential subjects in the spontaneous production (English and Spanish) of Simon and Leo (Liceras et al. in press). Specifically, we have taken into consideration sentences with explicit subjects—(14a) and (14b) for Spanish and (15a) for English—, as well as sentences with null subjects, like those in (14c) for Spanish and (15b) for English.

(14) a. <u>yo</u> quiero mover un caballo [Simon 3;09]
[I want to move a horse]
(Fernández Fuertes et al. 2002-2005)

b. estos son malos [Simon 3;00]
[these ones are bad]
(Fernández Fuertes et al. 2002-2005)

c. _ escucho la oveja [Leo 3;00]
[_ listen-1stps to the sheep]
(Fernández Fuertes et al. 2002-2005)

(15) a. the bunny is carrying the case [Leo 2;05]
b. _ [I] miss the top [Leo 2;05]
(Fernández Fuertes et al. 2002-2005)

To carry out this study we have analyzed data from both languages at three different developmental stages (Table 3).

@@ Insert Table 3 here

Since our bilingual subjects were exposed to data compatible with the two options of the null subject parameter, the [-null subject] English option and the [+null subject] Spanish option, we were able to investigate the development of these two options in the same 'population'.

What is relevant to our analysis is the fact that English pronominal subjects are not only obligatory but also have a different grammatical status from their Spanish counterparts. Namely, the presence versus absence of Spanish pronominal subjects is regulated at the pragmatic interface level. This implies that English personal pronouns are to be compared with Spanish verbal morphology (person agreement markers such as the *–o* in *quierO* and *escuchO* in 14a and 14c) rather than with Spanish personal pronouns.

In this respect, we have considered two related issues: (a) an analysis of the null subject parameter that allows us to compare English and Spanish pronominal elements in the way described above; and (b) a notion of markedness according to which English represents the marked option of the parameter.

According to Speas (1994), Chomsky (1995) and Alexiadou and Anagnostopoulou (1998), the presence of a non-lexical (uninterpretable) [D(eterminer)] feature in the Tense category in English is responsible for the projection of a specifier in Tense (which is the obligatory position for the subject). This specifier is where the EPP feature (the checking of a categorial [D] in T) is checked as the tree diagram in (16) shows.

@@ Insert tree diagram (16) here

The corresponding operation in Spanish does not involve a specifier but checking the [D] feature of Tense via a head-to-head operation between the interpretable person agreement marker of the verb (for instance *–o*) and Tense (Speas 1994, Alexiadou and Anagnostopoulou 1998, Ordoñez 1997, Kato 1999 and Rosselló 2000, among others). This implies that Spanish person agreement markers are pronominal elements (weak pronouns) listed in the lexicon independently from the verb stem.

Our data are consistent with the view that English is the marked option and Spanish the unmarked option of the null subject parameter because, as shown in Tables 4 and 5, the obligatory presence of English subject pronouns is more problematic than the production of Spanish person agrement markers.

@@ Insert Tables 4 and 5 here

What these data show is that the synchronic and developmental patterns of omission and production of English weak pronouns and Spanish agreement morphemes are very different: instances of omission of null subjects in the English data are significantly higher and occur until a later age than instances of omission of verbal agreement affixes in the Spanish data.

These results can also be interpreted as evidence for the special role of bound versus free morphology that characterizes first language acquisition as suggested in previous work (Zobl and Liceras 1994, Vainikka and Young-Scholten 1998). In other words, agreement markers (bound morphology) play a privileged role in first language acquisition.

Figure 2 and Figure 3 show a trade-off between null subjects and pronouns in English but not in Spanish. This we interprete as clear-cut evidence for a competence account of child null-subject data (Hyams and Wexler 1993) versus a performance-limitation account (Valian and Eisenberg 1996).

@@ Insert Figures 2 and 3 here

Our data show an overall increase in the production of overt subjects in English but not in Spanish (compare Figures 4 and 5). This difference with respect to the increase of subject pronouns in the two languages, which happens to be highly significant, provides evidence for a competence account of the data, since the Spanish data do not mirror the L1 Portuguese data discussed in Valian and Eisenberg (1996) but the Italian data discussed in Valian (1991) and Hyams and Wexler (1993).

@@ Insert Figures 4 and 5 here

These findings also suggest that there are two separated systems in the bilingual mind since, even though our subjects are confronted with two different languages, there appears to be no transfer from either one with respect to the implementation of the two options of the null subject parameter.

2. Sequential bilingualism: bilingual non-native systems

In the case of sequential bilingualism (L1+L2), we elicited data from two different groups of speakers: native speakers of Spanish studying English as an L2 at the University of Valladolid (Spain); and non-native speakers of Spanish from the University of Ottawa (Canada) whose L1 was either English or French.

Both the native and the non-native Spanish speakers performed a grammaticality judgement task which contained: (a) English/Spanish mixed DPs as the ones displayed in (1) and (2); (b) Spanish definite articles and accusative clitics (examples in 3 above); and (c) Spanish deverbal compounds (examples in 4).

2.1. Code-mixing within the DP: experimental data

Using the same experimental design with which we elicited data from simultaneous bilingual children (see section 1.3.), we also elicited experimental data from sequential bilinguals (Liceras and Fernández Fuertes 2005, Fernández Fuertes et al. 2005a). The experimental task (as described in 1.2.) involved judging of 64 structures containing mixed DPs, 32 with a Spanish Determiner and an English Noun (examples 6 and 7), and 32 with an English Determiner plus a Spanish Noun (as in 8). As we indicated above, in the case of Spanish Determiners, we wanted to investigate whether our subjects' sensitivity to the [Gender] feature was reflected in a preference for the translation equivalent items (example 6) versus the non-translation equivalent ones (example 7).

We tested two groups of subjects: 72 native speakers and 135 non-native ones (of whom 61 were L1 English and 74 L1 French). The non-native subjects were classified in four different levels in terms of their proficiency in their L2 (Spanish) by means of the CANTEST and the SGEL tests. The results appear in Figures 6 and 7.

@@ Insert Figures 6 and 7 here

As Figure 6 reveals, there is no preference for the Spanish Determiner, neither in the native nor in the non-native group. Figure 7 suggests that native speakers prefer translation equivalent mixed DPs where Spanish provides the Determiner and its gender coincides with the translation of the equivalent Noun (as in example 6 above). As for non-native speakers, there is a preference for the masculine as default. In the case of non-native L1 French speakers, the formal features of the French Determiner do not seem to be transferred into the Spanish Determiner, since French speakers behave as English speakers in showing a preference for the English Determiner, in spite of the fact that in all cases Spanish Nouns and their French translations had the same inherent [Gender] feature.

These experimental sequential bilingual data contrast with the spontaneous simultaneous bilingual data in 1.3 where a clear preference for the Spanish Determiner occurs. Once more, we attribute this difference to the checking relations that operate when judging an already formed mixed DP (as in our experimental data) versus the ones that operate when 'creating' a mixed DP (as in spontaneous data). In the former case, checking relations take place *a posteriori* and features are made to converge or match somehow (thus the preference for translation equivalent DPs by native speakers shown in Figure 7). On the contrary, in the latter, the functional category which exhibits a richer array of features—that is, the Spanish Determiner—constitutes the preferred option and is therefore selected from the lexicon. Thus, the processing mechanisms responsible for the interpretation and the production data are different and, as such, activate different checking relations within a given syntactic domain, in this case the DP domain.

2.2. Spanish definite articles and accusative clitics

Spanish definite articles, as in (16a) and (17a), and 3rd person singular clitics, as in (16b) and (17b), share a common origin in Latin demonstratives (Menéndez Pidal 1958, Lapesa 1980, Lathrop and Gutierrez-Cuadrado 1984, Penny 1993). Both categories also share some phonological and morphological features, although they differ in terms of their semantic and syntactic properties (Uriagereka 1995 and Sportiche 1995).

(16) a. leen el libro b. lo leen
[they read the book] [they read it]

(17) a. comen la manzana b. la comen
[they eat the apple] [they eat it]

Clitics have traditionally been considered important elements both for linguistic theory and for acquisition theory because they are at the interface of morphology and syntax. These elements have also received special attention in the acquisition literature because they follow a very specific calendar in L1 acquisition (Clark 1985, Pierce 1992, Hamann et al. 1996) and, in the case of L2 acquisition, they tend to be candidates for fossilization (Liceras 1985, Liceras et al. 1998).

As Table 6 shows, Spanish definite articles and 3rd person singular accusative clitics have the same form (except for masculine singular).

@@ Insert Table 6 here

As is the case with Spanish, French definite articles and accusative clitics also share the same form. However, this parallelism does not hold in English. As far as word order is concerned, articles occur in pre-nominal position in all three languages, while this is not the case for accusative clitics and pronouns. In Spanish, clitics are placed before an inflected verb, as in (18), after a non-inflected verb, as in (19), or they may undergo clitic climbing, as in (20).

(18) hablando de ese perfume, no sé dónde LO he comprado
[speaking about this perfume, I don´t know where I bought IT]

(19) no sé dónde vamos a comprarLO
[I don´t know where we are going to buy IT]

(20) no sé dónde <u>LO</u> vamos a comprar
[I don´t know where IT we are going to buy]

French clitics are placed between the inflected verb and the infinitive, as shown in (21a). Finally, English pronouns behave as nouns in that both occur in post-verbal position, as in (21b).

(21) a. Juan veut <u>l</u>'acheter
[John wants to it buy] [John wants to buy it]
b. John is going to buy <u>it</u> / the perfume …

In Senn et al. (2005) we investigated the differences and similarities between the acquisition of definite articles and accusative clitics by L1 English and French learners of Spanish. We tested two groups of subjects: 12 native speakers and 60 non-native speakers of Spanish (of whom 24 were L1 English, 22 L1 French and 14 English/French bilingual). Non-native subjects were classified in three different levels according to their proficiency in their respective L2.

The experiment consisted of a grammaticality judgement task, presented in a PowerPoint format. There were 82 grammatical and 82 ungrammatical utterances. The ungrammatical utterances contained null articles or clitics (as in 22) or misplaced articles or clitics (as in 23).

(22)	a.	veo Ø libro	[I see Ø book]	19 items
	b.	no Ø gusta el agua	[I don´t like water]	21 items
(23)	a.	veo _ libro <u>el</u>	[I see book the]	20 items
	b.	no _ gusta <u>le</u> el agua	[he doesn´t like water]	22 items

The results are displayed in Tables 7 to 10. What Tables 7 and 8 show is that non-native speakers have more problems with clitics than with articles. The difference between the native and non-native speakers is more significant in the case of the ungrammatical items.

@@ Insert Tables 7 and 8 here

It is important to note that while non-native speakers substantially differ from native speakers when judging ungrammatical null articles, they perform like native speakers in the case of ungrammaticality due to the position of these categories (Table 9).

@@ Insert Table 9 here

As for clitics, Table 10 shows that native and non-native speakers differ when it comes to detecting null and misplaced instances of this category.

@@ Insert Table 10 here

Therefore, we can conclude that the formal features which determine the morpho-syntactic behaviour of accusative clitics are more difficult to acquire than those responsible for the behaviour of definite articles.

2.3. Deverbal compounds

The Spanish deverbal compounds shown in the examples in (4) have the following morpho-syntactic properties: (a) they are left-headed (Verb+Noun); (b) the verbal form appears in the 3rd person singular of the present indicative; and (c) the nominal form displays a generic *–s* marker. The head-initial pattern of Spanish deverbals is also found in French (e.g., *ouvre-boîtes [open-cans], gratte-ciel [scrap-sky]*). However, English deverbals are head-final (e.g., *can-opener, sky-scraper*) and also differ from Spanish and French deverbals in that the verbal form takes an agentive *–er* suffix and no *–s* marker appears in the nominal form.

Different studies on the acquisition of Spanish deverbal compounds have shown that adult L2 learners from different L1 backgrounds have problems with both the morphology and the directionality of these constructions (Salomaa-Robertson 2000, Pomerleau 2001, Liceras et al. 2004). This happens even when positive transfer from the L1 could lead to native-like performance in Spanish, as in the case of French speakers.

In order to further investigate whether the problems posed by the acquisition of these Spanish compounds were also detected when subjects had to perform an online task, we conducted a study to investigate how L1 and L2 speakers process Spanish deverbal compounds with and without morpho-syntactic violations taking into account these two dependent variables: response latency (RT, reaction time) and correct/incorrect answer (ER, error rate) (Desrochers et al. 2003, Fernández Fuertes et al. 2005b). [2]

We tested a group of 20 non-native speakers from the University of Ottawa (9 with L1 English, 9 with L1 French and 2 English/French bilinguals) and 63 native speakers from the University of Valladolid (27 with a background in Linguistics, referred to as 'L-sophisticated', and 36 without a background in Linguistics or 'L-unsophisticated').

The experimental task was presented on a PC with the software Micro Experimental Laboratory (MEL) (Schneider et al. 1995). The subjects were shown individual letter strings that either conformed to the pattern of a deverbal compound or violated a composition rule. The experimental list consisted of 99 pairs (99 grammatical units and 99 ungrammatical units). The possible violations refer to the three defining features of Spanish deverbal compounds: infinitive marker instead of inflected Verb (24a); reversed head directionality (24b); and null –*s* marker in the Noun (24c).

(24)	a.	*cazar-moscas	vs	caza-moscas	
		[to catch-flies]		[catches-flies]	[fly-catcher]
	b.	*moscas-caza	vs	caza-moscas	
		[flies-catches]		[catches-flies]	[fly-catcher]
	c.	*caza-mosca	vs	caza-moscas	
		[catches-fly]		[catches-flies]	[fly-catcher]

In each case, subjects were asked to decide if the stimulus was or was not a possible Spanish word. We measured both the accuracy of their responses (ER) and their reaction times (RTs) (as in Table 11)

@@ Insert Table 11 here

Table 11 shows the mean proportions of errors (ER) and the mean correct latencies (RT). The results for native speakers indicate that, despite significant differences in frequency of use, the real deverbal compounds were detected relatively easily. Regarding the different violations of the three defining features of compounds, the results show that the infinitival form was perceived as having a clause structure with a headless 3rd person NP subject or a null 3rd person *pro* subject (Contreras 1985 and Lardiere and Schwartz 1997) serving as a primary cue in decision making. The head directionality violation was expected to be the easiest to detect. Although the error rate was indeed very low, the response latencies indicate that arriving at a decision involved a significant cost in processing time. The hardest type of violation was the null *–s* marker in the Noun, since the response accuracy was near chance level and the mean response latency was the longest of all.

As for the L2 speakers, their responses were generally less accurate and considerably longer than those of L1 speakers. Yet they provided a fairly close approximation of the patterns observed with the native speakers. L2 performance with null *–s* marker items also was near chance level. Decisions with head directionality items were also fairly accurate but required particularly long processing time. The similar pattern of results between L1 and L2 speakers strongly suggest that the processing cost with these items is related not to vocabulary size or grammatical knowledge, but to analyzing word order information in lexical processing. Once more, of all three types of violations the infinitive items were the easiest to process. The most relevant difference between L1 and L2 performance is the relative difficulty of non-native speakers to recognize real deverbal compounds. This pattern is likely attributable to L2 speakers' limited exposure to the language and their relatively restricted vocabulary.

Regarding the two groups of native speakers, no significant effect of formal training in linguistic analysis on response accuracy or speed was detected, even though a trend suggesting faster responses from L-sophisticated speakers was apparent. This observation is consistent with the proposition that the structure of deverbal compounds is learned implicitly and, therefore, the detection of structural cues occurs without intentional analysis. This process appears largely immune from formal training in linguistic analysis, and it seems to be independent of the actual elicitation technique, since our results parallel the ones obtained by Salomaa-Robertson (2000), Pomerleau (2001) and Liceras et al. (2004), as regards the performance of the native controls in these studies.

3. Conclusions

In the present study we have shown how linguistic theory can be put to use in the analysis of production and interpretation data from simultaneous and sequential bilinguals. Specifically, we have shown how linguistic constructs such as parameters and formal features allow us to formulate learnability hypotheses intended to investigate differences and similarities between 'native' (simultaneous) and 'non-native' (sequential) bilingual systems.

We have provided an account of how different features are activated in English/Spanish simultaneous ('native') and sequential ('non-native') bilingual acquisition, comparing on the one hand child and adult data and, on the other, spontaneous and experimental data. To this aim, we have analyzed the features involved in the projection and interpretation of: (i) mixed DPs ([gender] feature in the Spanish Determiner); (ii) null/overt subjects ([Determiner] feature in Tense); (iii) article/clitic elements (syntactic properties related to word order and omissions); and (iv) Spanish deverbal compounds (features affecting word order, Noun morphology and Verb morphology).

The spontaneous and experimental data pertaining to these four types of structures reveal clear-cut differences between native and non-native production/interpretation. We attribute this to the fact that, in the case of native speakers, production is determined by feature specification. For instance, we have shown that functional categories which contain a certain array of formal features play a definite role in the production of mixed DPs, a fact that follows from the Grammatical Features Spell-Out Hypothesis (GFSH). We have also shown that checking the EPP feature on a head-to-head relationship (providing accurate person agreement markers in Spanish) is easier than checking the EPP feature on a Spec-Head relationship (the projection of Spec-TP to host English nominative pronominal subjects).

We would like to suggest that the differences between simultaneous and sequential bilinguals when it comes to production and interpretation of mixed Spanish DPs have to do with the way in which both groups access the input. Namely, in L1 acquisition, input data are analyzed following a bottom-up strategy, that is, native speakers deal with the morpho-phonological material that enables them to activate the abstract features. In L2 acquisition, non-native speakers employ a top-down strategy which leads them to process larger units such words or even phrases rather than morpho-phonological material. This implies that these learners make morphological adjustments (agreement, word order, etc.) in a local way, construction by construction, rather than taking abstract features as the basis for agreement relationships or word order requirements (Liceras 2003, Spradlin et al. 2003). This same strategy is also responsible for the differences between the native control group and the L2 Spanish speakers (sequential bilinguals L1 English/French) when it comes to the interpretation of Spanish deverbal compounds and Spanish definite determiners and accusative clitics.

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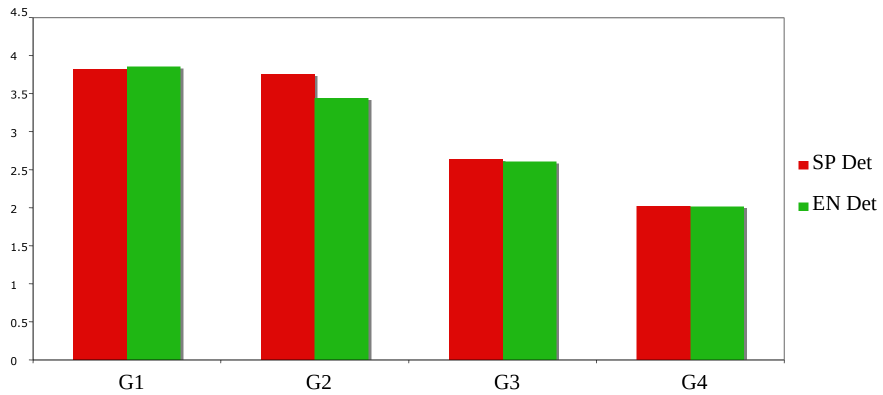
Tables and figures

TABLE 1. Spanish and English DET in simultaneous bilingual children			
		Spanish DET	*English DET*
Manuela	[Deuchar, CHILDES]	16	2
Mario	[Fantini 1985]	43	0
Leo	[Fernández F. et al.2002-2005]	22	5
Simon	[Fernández F. et al.2002-2005]	5	0
5 children	[Lindholm and Padilla 1978]	18	3

TABLE 2. Spanish and English DET in simultaneous bilingual adults		
	Spanish DET	*English DET*
Milian´s corpus (1996)	63	4
Pfaff´s corpus (1979)	747	10
Jake et al. (2002)	161	--

Figure 1: Spanish and English DET in experimental child bilingual data



G1 Kindergarten (4 years old)
G2 Grade 2 (7 years old)
G3 Grade 3 (8 years old)
G4 Grade 4 (9 years old)

TABLE 3. Developmental stages in the subject production of Simon and Leo		
Stage	*Date*	*Age range*
STAGE #1	May-June 2001	2;04 – 2;06
STAGE #2	January-October 2002	3;01 – 3;09
STAGE #3	April-November 2003	4;04 – 4;11

(16)

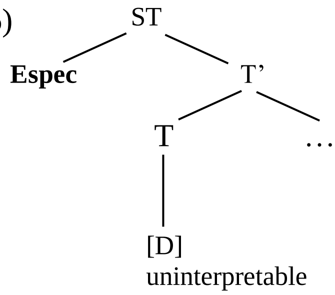
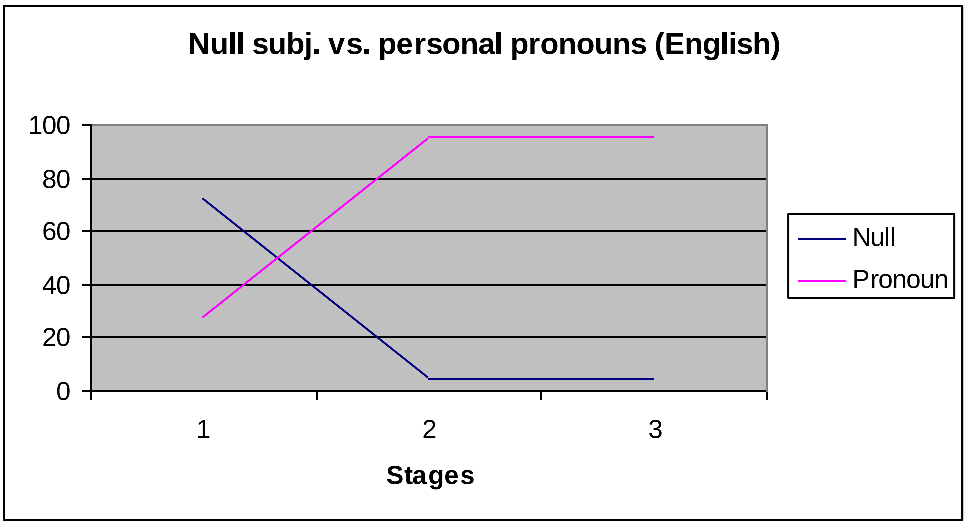
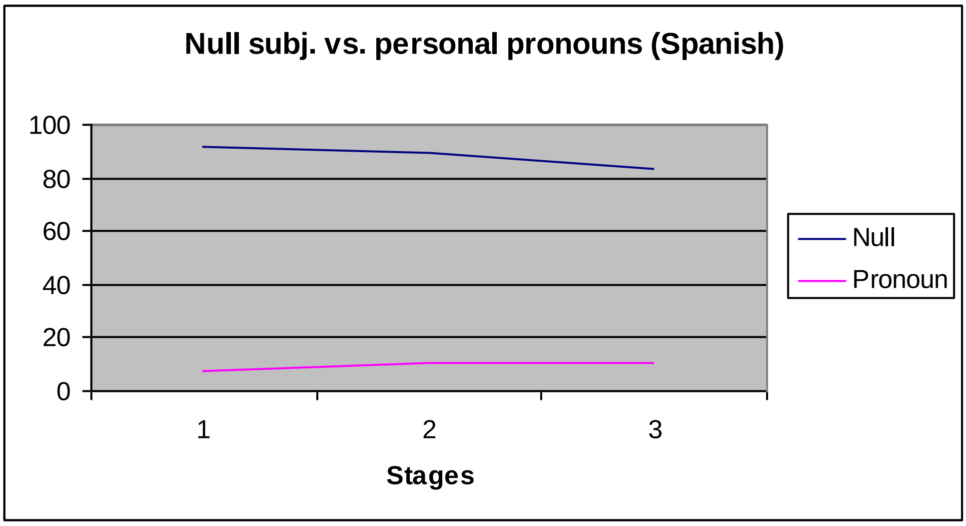


TABLE 4. Percentage of null subjects versus personal pronouns (Simon and Leo)									
	Stage #1			*Stage #2*			*Stage #3*		
	Null	Pronoun	%	Null	Pronoun	%	Null	Pronoun	%
English	34	13	(72.34)	12	237	(4.82)	39	771	(4.81)
Spanish	173	15	(92.02)	701	84	(89.29)	698	135	(83.79)

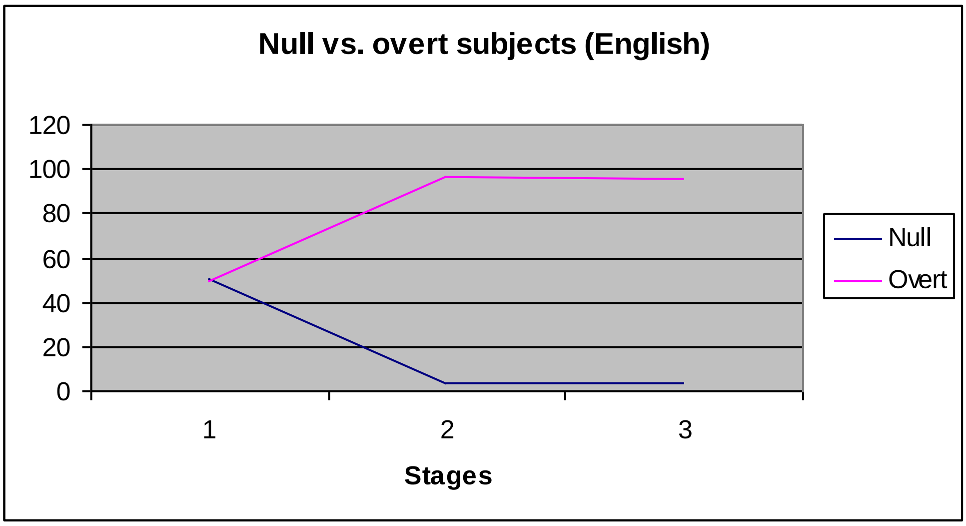
TABLE 5. Omission of Spanish verbal agreement markers (Simon and Leo)			
	Stage #1	*Stage #2*	*Stage #3*
RIs	2	3	1
[-Personal] (participle)	5	4	1
Bare form	1	5	25
Mistmatches	1	4	10
Omission/Total verb forms	9/210 (4.28%)	16/1062 (1.51%)	37/1036 (3.57%)

Figures 2 and 3: Null subject versus personal pronouns in English and Spanish





Figures 4 and 5: Null versus overt subjects in English and Spanish



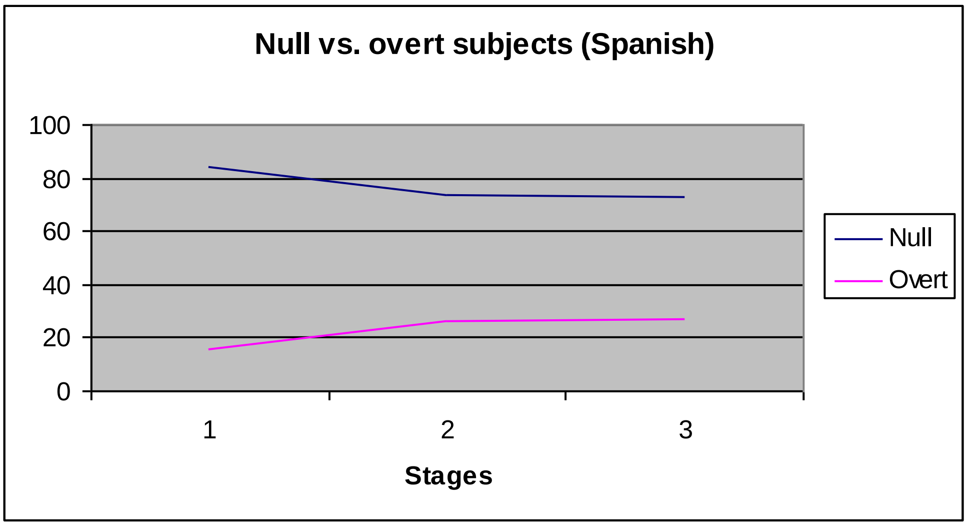


Figure 6: Spanish and English DET in experimental adult non-native data

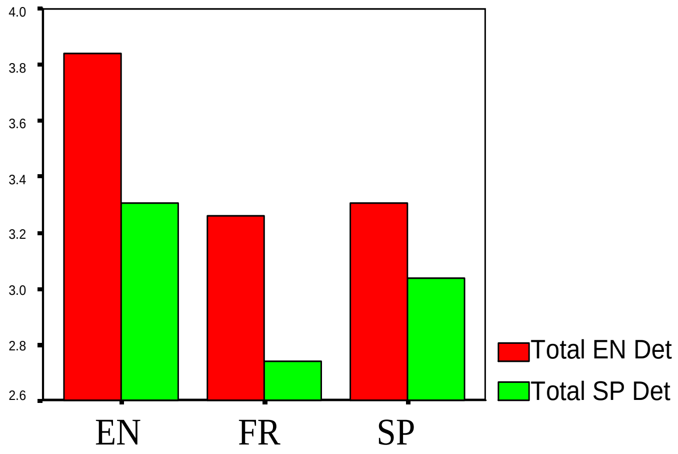


Figure 7: Spanish equivalent vs non-equivalent DET in experimental adult non-native data

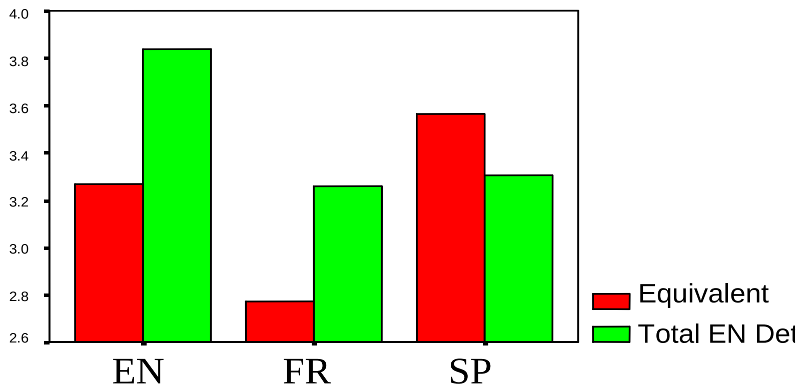


TABLE 6. Definite articles and accusative 3rd p. clitics in Spanish, French and English						
		Neuter	*Masc. Sing.*	*Fem. Sing.*	*Masc. Pl.*	*Fem. Pl.*
SPANISH	*Def. article*	lo	el	la	los	las
	Acc. clitic	lo	lo	la	los	las
FRENCH	*Def. article*	—	le	la	les	les
	Acc. clitic	le	le	la	les	les
ENGLISH	*Def. article*	the				
	Acc clitic	it	him	her	them	them

TABLE 7. Spanish definite articles in native and non-native data						
	Grammatical		*Ungrammatical*		*Correct*	
	Total	%	Total	%	Total	%
French (n=22)	282/330	**85.45%**	297/352	**84.38%**	579/682	**84.90%**
English (n=24)	301/360	**83.61%**	299/384	**77.86%**	600/744	**80.65%**
Bilingual (n=14)	170/210	**80.95%**	171/224	**76.34%**	341/434	**78.57%**
Total non-native (n=60)	753/900	**83.67%**	767/960	**79.90%**	1520/1860	**81.72%**
Total native (n=12)	180/180	**100.00%**	183/192	**95.31%**	363/372	**97.58%**

TABLE 8. Spanish 3rd person clitics in native and non-native data						
	Grammatical		*Ungrammatical*		*Correct*	
	Total	%	Total	%	Total	%
French (n=22)	226/330	**68.48%**	362/484	**74.79%**	589/814	**72.36%**
English (n=24)	278/360	**77.22%**	348/528	**65.91%**	626/888	**70.50%**
Bilingual (n=14)	167/210	**79.52%**	211/308	**68.51%**	378/518	**72.97%**
Total non-native (n=60)	671/900	**74.56%**	921/1322	**69.67%**	1596/2220	**71.89%**
Total native (n=12)	177/180	**98.33%**	257/264	**97.35%**	434/444	**97.75%**

TABLE 9. Spanish definite articles in native and non-native data: null / position						
	Null		*Position*		*Total ungrammatical*	
	Total	%	Total	%	Total	%
French (n=22)	144/198	**72.73%**	153/154	**99.35%**	297/352	**84.38%**
English (n=24)	137/216	**63.43%**	162/168	**96.43%**	299/384	**77.86%**
Bilingual (n=14)	77/126	**61.11%**	94/98	**95.92%**	171/224	**76.34%**
Total non-native (n=60)	358/540	**66.30%**	409/420	**97.38%**	767/960	**79.90%**
Total native (n=12)	102/108	**94.44%**	81/84	**96.43%**	183/192	**95.31%**

TABLE 10. Spanish 3rd person clitics in native and non-native data: null / position						
	Null		*Position*		*Total ungrammatical*	
	Total	%	Total	%	Total	%
French (n=22)	161/220	**73.18%**	201/264	**76.14%**	362/484	**74.79%**
English (n=24)	147/240	**61.25%**	201/288	**69.79%**	348/528	**65.91%**
Bilingual (n=14)	96/140	**68.57%**	115/168	**68.45%**	211/308	**68.51%**
Total non-native (n=60)	404/600	**67.33%**	517/720	**71.81%**	921/1322	**69.67%**
Total native (n=12)	117/120	**97.50%**	140/144	**97.22%**	257/264	**97.35%**

TABLE 11. Means proportions of errors (ER) and mean correct latencies (RT)						
	L1 Speakers				*L2 Speakers*	
Type of stimuli	*L-sophisticated*		*L-unsophisticated*		*Non-Native*	
	ER	RT	ER	RT	ER	RT
Real compound	.06	1271	.09	1357	.25	1737
Infinitive	.11	1296	.08	1430	.11	1541
Ø –*s* marker in N	.54	1586	.51	1691	.61	1704
Head directionality	.04	1472	.05	1526	.12	1884
Average	.19	1406	.18	1501	.27	1717

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