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The acquisition of grammatical gender in L1 bilingual Spanish*

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Abstract

We analyze the emergence of grammatical gender in the spontaneous longitudinal Spanish production of a set of Spanish/English bilingual twins from the FerFuLice corpus (Fernández Fuertes & Licerias 2009). We take as a point of departure theoretical accounts on gender assignment and gender concord and previous empirical work on the acquisition of gender by monolinguals and bilinguals. Our study deals with how gender incorporates in the case of L1 Spanish bilinguals; how concord within the determiner phrase (DP) operates; and how monolingual and bilingual Spanish pattern in the same way in this respect. We conclude that DP syntax and the gender concord valuation mechanism are in place from very early stages and that morphology and semantics are not determinant factors in this process.

Key words

DP syntax, grammatical gender, gender features, bilingual Spanish, gender concord

1. Introduction

Nouns in Spanish, as the DP examples in (1) show, are traditionally classified with regards to gender as masculine (*niño* ‘boy’ in 1a) and feminine (*niña* ‘girl’ in 1b):

- (1) a. *los niños listos*
the-M boys-M clever-M
‘the clever boys’
b. *las niñas listas*
the-F girls-F clever-F
‘the clever girls’

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The examples in (1) also show how these masculine and feminine nouns agree in gender with the rest of the DP components (i.e. determiners and adjectives), a type of concord that is also reflected in the morphology.¹ That is, preceding the plural suffix *-s*, the determiners (D), nouns (N) and adjectives (A) in (1) carry the *-o* suffix traditionally said to refer to masculine gender (1a) and the *-a* suffix traditionally said to refer to feminine gender (1b) (e.g. Alonso & Henríquez Ureña 1964, p. 63; Fernández Ramírez 1986, p. 114; also see Roca 2005 for an overview).² However, this correlation between, on the one hand, *-o* suffix and masculine gender and, on the other hand, *-a* suffix and feminine gender falls short of the characterization of grammatical gender in Spanish, as we will see. This work analyzes the emergence of grammatical gender in the spontaneous longitudinal Spanish production of a set of Spanish/English bilingual twins from the FerFuLice corpus (Fernández Fuertes & Licerias 2009) in CHILDES (MacWhinney 2000). In order to do so, we take as a point of departure theoretical accounts on gender assignment and gender concord (e.g. Harris 1991, Roca 2005-2006, Carstens 2010) as well as previous empirical work on the acquisition of gender by both monolingual and bilingual speakers (e.g. Pérez-Pereira 1991, Pizzuto & Caselli 1992, Müller 1994, Kupisch, Müller & Cantone 2002, Hawkins & Franceschina 2004, Licerias, Díaz & Mongeon 2000). The aim of our work is to characterize the emergence of grammatical gender in L1 bilingual Spanish with a view to determining (i) how gender incorporates into L1 grammars in the case of Spanish/English bilinguals; (ii) how D-N-A concord operates and, in particular, whether (a) the assignment of a [ugender] feature in D (or the appropriate functional head) activates the appropriate set of root Ns and whether (b) there is an early phase of development in which children base their selection of articles on issues such as noun phonology/morphology; and (iii) whether monolingual and bilingual Spanish pattern in the same way in this respect.

¹ To distinguish the type of agreement found within the DP from the canonical spec-head type (i.e. subject-verb agreement) which is the focus of Chomsky's (1993) agreement theory, we will use the traditional term 'concord' following, among others, Carstens (2000, p. 323) and Radford et al. (2007, p. 241).

² This has also been argued for other languages with a nominal classification system (i.e. masculine and feminine), like French (Mel'cuk 1958, Tucker, Lambert & Rigault 1977).

Our study is organized as follows: section 2 deals with how Spanish grammatical gender has been accounted for in linguistic theory and for this we review, on the one hand, Roca's (1989, 2005-2006) and Harris' (1991) works that distinguish among semantic, phonological, morphological and syntactic traits in the description of Spanish gender, and, on the other hand, Carstens' (2010) proposal which provides a minimalist account of (Spanish) grammatical gender and gender concord; section 3 offers a review of some of the empirical work that has been conducted on the acquisition of grammatical gender, both monolingual and bilingual; in section 4 we state the aims of our study and we propose a series of research questions and hypotheses that guide the empirical research that we present in section 5; finally the conclusions of our study appear in section 6.

2. Spanish grammatical gender

The proposals that constitute the basis for our analysis of Spanish grammatical gender are the distinction among four different but interrelated domains in the structure of gender (Harris 1991, Roca 2005-2006) and the minimalist account of gender features and gender concord in terms of feature valuation (Carstens 2010).

2.1. The structure of gender: semantics, morphology, phonology and syntax

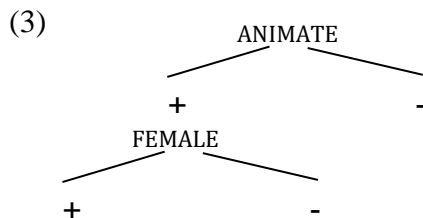
In the analysis of Spanish grammatical gender, several authors (e.g. Harris 1991, Roca 1989, Roca 2005-2006) have established a formal distinction among four interrelated but autonomous domains: semantics, morphology, phonology and syntax. Although grammatical gender as such refers to the syntactic dimension of gender, we will review below the different domains, first to show their specific and differing properties and then to point to the way these are interrelated. It is not our aim, though, to offer an exhaustive account of all the facts in these domains, which are extensively discussed by

these authors. Rather, we present the main facts regarding the four domains and their interconnections with a view to exploring how Spanish grammatical gender emerges in bilingual acquisition.

With regards to semantics, Spanish [+animate] nouns incorporate the relevant semantic features [male] and [female], as reflected in (2):

| | | SEMANTIC FEATURES | |
|-----|----------------------------------|-------------------|----------|
| (2) | a. <i>niño</i> 'male child' | [+animate] | [male] |
| | b. <i>niña</i> 'female child' | [+animate] | [female] |
| | c. <i>libro</i> 'book' | [-animate] | |

Roca (1989, p. 27) offers the semantic tree in (3) to capture these binary semantic features which in the case of gender he describes as [+/- female]:³



In terms of morphology, the examples in (2), repeated in (4) below, also illustrate how Spanish nouns, both [+animate] and [-animate], include the final suffixes *-o/-a* which, as proposed by Harris (1980, 1985, 1991), are referred to as word markers (WM):⁴

| | | WORD MARKERS | |
|-----|----------------------------------|--------------|--|
| (4) | a. <i>niñ-</i> 'male child' | <i>o</i> | |
| | b. <i>niñ-</i> 'female child' | <i>a</i> | |
| | c. <i>libr-</i> 'book' | <i>o</i> | |

In fact WMs *-o/-a* belong to a set of morphemes whose primary morphological property “is that their appearance marks a derivationally and inflectionally complete word [...] and cannot be followed by any other suffix, derivational or inflectional, except for plural” (Harris 1991, p. 30).⁵ The nouns in

³ A similar classification has also been proposed by Lumsden (1992, p. 477).

⁴ Harris (1980) referred to these affixes as *terminal elements*. Further refinement of his initial proposal followed in Harris (1983) and later in Harris (1985) where the term *word marker* was proposed. Substantial differences appear in the way WMs are considered in Harris (1985) and Harris (1991). What follows refers to Harris (1991).

⁵ For an account of the different properties of these suffixes in Spanish, see also Roca (2005, p. 27).

the examples below illustrate the most common WMs: the five suffixal vowels (in 5) as well as final *-s* (both with an additional WM, as in 6a, or without a WM, as in 6b). The examples in (7) correspond to nouns with no WM:⁶

| | | WORD MARKERS |
|-----|----|---|
| (5) | a. | <i>map-</i> <i>a</i> 'map' |
| | b. | <i>carn-</i> <i>e</i> 'meat' |
| | c. | <i>bikin-</i> <i>i</i> 'bikini' |
| | d. | <i>man-</i> <i>o</i> 'hand' |
| | e. | <i>espírit-</i> <i>u</i> 'spirit' |
| (6) | a. | <i>mecen-</i> <i>as</i> 'patron' |
| | b. | <i>torak-</i> <i>s</i> 'thorax' |
| (7) | a. | <i>sol</i> \emptyset 'sun' |
| | b. | <i>doctor</i> \emptyset 'doctor' |
| | c. | <i>col</i> \emptyset 'cabbage' |
| | d. | <i>madr[e]</i> ⁷ \emptyset 'mother' |

[examples taken from Harris 1991 & Roca 2005]

The description of these affixal vowels or WMs could be, in fact, reduced to the combination of the phonological features [+back] and [+low] which distinguish between WM *-o* and WM *-a* as well as these from the rest of the vowel paradigm in Spanish (Roca 1989, p. 23; also Harris 1991, p. 45), as reflected in the examples in (8):

| | | PHONOLOGICAL FEATURES OF WMS |
|-----|----|---|
| (8) | a. | <i>map-</i> <i>a</i> [+back], [+low] 'map' |
| | b. | <i>man-</i> <i>o</i> [+back], [-low] 'hand' |

Grammatical gender, the syntactic dimension of gender and the focus of interest here, is captured in the masculine/feminine distinction. Harris (1991) defends that the formal representation of

⁶ Roca (2005, p. 42) proposes the feature [+/-D] (where D stands for *desinencia* 'marker') to distinguish between words having a marker and therefore being [+D] (e.g. *sol-o* 'alone') and words having no marker and therefore being [-D] (e.g. *sol- \emptyset* 'sun').

⁷ In some cases, final *-e* appears to make certain segments syllabifiable in Spanish (e.g. *pa-dr-e* 'father') (Roca 1989, p. 21; Harris 1991, p. 31).

grammatical gender involves one non-binary gender mark, i.e. *f*(eminine), masculine being the unmarked or default gender in Spanish which he interprets as “the absence of any information about gender in lexical entries” (p. 44). Roca (1989, 2005-2006) identifies as the source of grammatical gender an abstract feature present in the lexical stem, i.e. [+/-F], and he also considers masculine as the default gender. Both approaches to grammatical gender in Spanish are illustrated in (9):

| GRAMMATICAL GENDER | | |
|--------------------|----------------------------------|--------------------------|
| | HARRIS (1991) | ROCA (1989) |
| (9) | a. <i>niño</i> 'male child' | (empty as unmarked) [-F] |
| | b. <i>niña</i> 'female child' | <i>f</i> [+F] |
| | c. <i>libro</i> 'book' | (empty as unmarked) [-F] |

Regardless of the different representations of Spanish grammatical gender, there is consensus in that concord requires gender (and also number) matching and that the form of the components is irrelevant here, as the examples in (10) suggest (see section 2.2. below on concord):

| | | |
|------|--|---------------------|
| (10) | a. <i>el niño es listo / inteligente / belga</i> the-M child-M is clever-M / intelligent-M / Belgian-M ∅ -o -o ∅ -a [-F] [-F] [-F] [-F] [-F] | WMs gram. gender |
| | b. <i>la niña es lista / inteligente / belga</i> the-F child-F is clever-F / intelligent-F / Belgian-F -a -a -a ∅ -a [+F] [+F] [+F] [+F] [+F] | WMs gram. gender |

To summarize, all of the above intends to capture how the male/female distinction in (11a) versus (11b), which pertains to semantics, should be set apart (i) from the masculine/feminine distinction which refers to grammatical gender, i.e. a syntactic phenomenon, and (ii) from the WM class which the *-o/-a* suffixes belong to and which deals with morphology (and has specific phonological implications):

| | | | SEMANTICS | SYNTAX | MORPHOLOGY |
|------|--------------------|-------------|-------------------|-------------------------|--------------------|
| | | | biological gender | gender & gender concord | WM |
| (11) | a. <i>niño</i> | 'boy' | male | masculine | niñ- o |
| | b. <i>niña</i> | 'girl' | female | feminine | niñ- a |
| (12) | a. <i>libro</i> | 'book' | X | masculine | libr- o |
| | b. <i>mapa</i> | 'map' | X | masculine | map- a |
| | c. <i>gorila</i> | 'gorilla' | male/female | masculine/feminine | goril- a |
| | d. <i>héroe</i> | 'hero' | male | masculine | héro- e |
| | e. <i>síntesis</i> | 'synthesis' | X | feminine | síntes- i-s |

| | | | | | |
|----|---------------|----------|------|-----------|-----------------|
| f. | <i>sol</i> | ‘sun’ | X | masculine | <i>sol-Ø</i> |
| g. | <i>doctor</i> | ‘doctor’ | male | masculine | <i>doctor-Ø</i> |

In the examples in (11) there is a correspondence between the 3 domains and so the WM *-o* in (11a) coincides with a male noun and a masculine noun, and the WM *-a* in (11b) is attached to a female noun and a feminine noun (Harris’ Human Gender and Human Cloning rules). But as the examples in (12) show, this correspondence may not hold in all cases and the WM *-o* might not be attached to a male noun (12a) or the WM *-a* to a female noun (12b), setting apart morphology and semantics. Besides, regarding morphology and grammatical gender, WM *-a* need not be attached to a feminine noun but it could rather be so to a masculine one (as in 12b) or to both a masculine and a feminine one (as in 12c). Also, a WM different from *-a* and *-o* can appear with a noun with masculine or feminine grammatical gender (as in 12d and 12e respectively). In fact, a word might not even have a WM and still be assigned grammatical gender (as in 12f) or both grammatical gender and semantic gender (as in 12g).

For Harris (1991, p. 28 & 60), therefore, grammatical gender is not fully predictable although there is some partial predictability (as seen in 11a and 11b). In particular, he systematizes these correlations on the bases of three hierarchically related classes (i.e. inner-core, outer-core and residue). This three-class division captures numerical preponderance and productivity (the core versus the residue) and historical drift (from the residue to the core). In the inner-core class, WM *-o* correlates with masculine gender and WM *-a* with feminine gender both for [+/-animate] Ns (as in 11 and 12a);⁸ the outer-core class involves words with no WM (as in 7 and in 12f-12g), some of which are masculine (7a, 7b, 12f and 12g) and some of which are feminine (7c and 7d); finally, the residue includes words that are not part of the core and that could be masculine (5c and 5e) or feminine (5b).

⁸ This is captured in Harris’ (1991, p. 44) Feminine Marker Rule (for inner-core feminine nouns) and Marker Realization Rule (a purely morphological rule).

For Roca (1989, p. 24), these correlations have a specific directionality: the gender suffix (WM) could be predicted from the gender feature ([+/-F]), and not the other way around. This is illustrated in the ‘Learnt Rule’ in (13):⁹

$$(13) \quad [\quad] \rightarrow \left(\begin{array}{c} +\text{back} \\ <+\text{low}> \end{array} \right) / \left(\begin{array}{c} \text{---} \\ <+\text{F}> \end{array} \right)$$

If otherwise unspecified in the lexicon (thus the empty space at the beginning of the rule), for a noun that has the [+F] feature (e.g. *niñ-* ‘child’), the vowel supplied would have a plus value for [back] and, additionally, a plus value for [low] (i.e. *-a*, rendering *niñ-a* ‘child_{fem}, girl’). If a noun does not have the [+F] feature, the vowel supplied would have a plus value for [back] only (i.e. *-o*, rendering *niñ-o* ‘child_{masc}, boy’).

All of the above suggests (i) that the analysis of grammatical gender within the DP, as in (10), is linked to the grammatical gender of the different DP components (i.e. D, N and A) as well as to the gender concord mechanism that is established among these components; and (ii) that, although related, the analysis of grammatical gender should be separated from the semantic as well as the morphological-phonological domains. The question now is how grammatical gender is encoded in the DP and how gender of the DP components and gender concord are instantiated. These issues are addressed in the following section.

2.2. A model of gender assignment and gender concord in the DP

In accounting for nominal gender and gender concord, different proposals have been put forward, and, although there seems to be a consensus that nouns are gender bearers, the nature of gender concord is explained differently both in (pre-)minimalist accounts (e.g. Lumsden 1992, Lumsden & Halefom 2000, Carstens 2000, 2008, 2010, Kihm 2005, Baker 2008, Liceras, Fernández Fuertes &

⁹ Roca (1989) proposes the Learnt Rule, a redundancy rule, in the spirit of Archangeli’s (1984) phonological systems. Redundancy rules apply in the absence of a specification in the lexicon.

Pérez-Tattam 2008) and non-minimalist accounts (e.g. Roca 1989, 2005-2006, Harris 1991). We will focus here on Carstens' (2010) proposal and point to the link that could be established between hers and Harris' (1991) and Roca's (1989, 2005-2006) proposals outlined above (section 2.1.).

For Roca (1989, p. 10) gender is an abstract morphological property (the [+/-F] feature) which is syntactically transmitted from the head noun to its modifiers. He argues that nouns are the actual gender bearers, what he calls the grammatical gender triggers, from which gender can then be transmitted to the various targets (p. 5). This also points to concord being in fact one of the integral parts of grammatical gender since, under his analysis, grammatical gender is established via agreement (Roca 2005, p. 25). Along the same lines, Harris (1991) defends that only nouns have (grammatical) gender and that concord targets like determiners and adjectives are genderless in the lexicon (p. 44) and acquire gender only through concord.

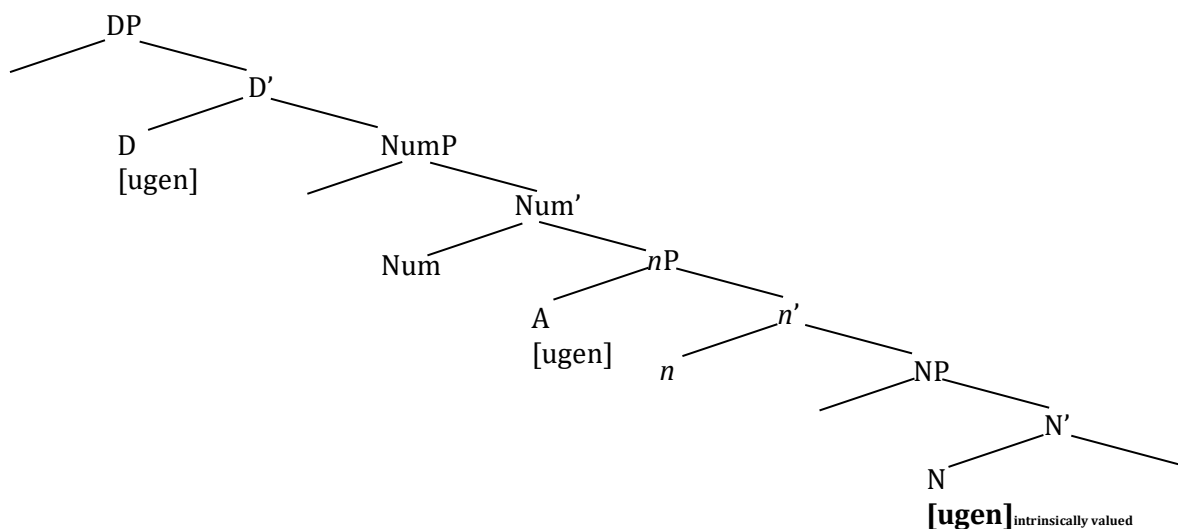
Under the minimalist program, features (including gender) come in two variants, i.e. interpretable and uninterpretable features (Chomsky 1995) or valued and unvalued features (Chomsky 2001). Interpretable features are interpreted at the LF/CI (Logical Form / Conceptual-Intentional) interface, while uninterpretable ones have to be deleted by LF/CI. Uninterpretable features trigger matching operations and, once they are matched, they are deleted so that the derivation does not crash at LF/CI. Carstens (2010) builds on Carstens' (2000) minimalist account of gender concord facts and focuses on concord within DPs in Bantu and Romance languages. She departs from Chomsky's (2001) distinction between interpretable/valued features and uninterpretable/unvalued features, which has been mainly applied to person and number features, in order to account for grammatical gender. In particular and implementing Pesetsky and Torrego's (2007) feature typology, she points out that valued and uninterpretable can go together in the case of gender because of two main reasons (p. 32). First, many nouns are invariant for gender and are assigned gender arbitrarily which means that grammatical gender must be listed for each noun in the lexical entries, that is, each noun comes with its own gender specification from the lexicon. This implies that gender is valued. Second, in spite of this gender specification, there is also a high degree of semantic arbitrariness which in fact makes

grammatical gender meaningless. This implies that gender is uninterpretable. If gender of nouns is uninterpretable and agreement in gender is also uninterpretable, she argues, then grammatical gender is a feature with no semantic interpretation. This conclusion is in tune with Harris' and Roca's proposals regarding the autonomy between the semantics of gender and the syntax of gender. Carstens, as Harris and Roca did, also refers to the existence of "strands of semantic unity in grammatical genders" (p. 37) while maintaining the two domains separate.

If the gender of nouns is intrinsically valued, then its value is not determined through Agree relations and so it never deactivates. Therefore, regarding gender concord in DP, Carstens (2010) follows Epstein, Kitahara and Seely (2010) to account for the fact that nominal gender is not deactivated through Agree: uninterpretable nominal gender features need not be deleted in order to avoid a crash at the CI interface (as argued by Chomsky 2001), but are rather ignored. She argues that "as an uninterpretable feature, gender has no role at the CI interface, but, as an intrinsically valued feature, gender never undergoes syntactic valuation" (p. 54).

So, as shown in (14), DP syntax involves the interpretable person feature in D, the interpretable number as the head of a functional category between DP and NP, and, crucially for us, gender as a lexical property of nouns:

(14)



The representation in (14) shows that (i) gender is a functional feature that does not project its own phrase and, in this respect, it is different from number; (ii) DP syntax involves (at least) two

intervening phrases between DP and NP, namely, Number Phrase and the ‘light’ *n* phrase (*nP*); (iii) the *nP* shell, parallel to the *vP* one in the clausal domain, is strong in Spanish which triggers head-to-head movement of N; and (iv) adjectives are merged in the specifier of a functional projection (following Cinque 1994, 1995), which is *nP* in this case.¹⁰ Regarding gender features, these are uninterpretable in both N and its probes (i.e. D and A), but they are valued in N and unvalued in D and A (as the bold type in [ugen] in N suggests). The relevant N, selected from the lexicon, has its gender feature intrinsically valued and establishes a valuation relation with D or with D and A.

This proposal allows us to formally separate grammatical gender from semantics and morphology, in the spirit of Harris (1991) and Roca (1989, 2005-2006), and to do so under minimalist premises. In particular, D-N concord is seen as a syntactic valuation relation between the uninterpretable (i.e. with no semantic interpretation) and intrinsically valued feature of N and the corresponding uninterpretable and unvalued feature of D.

2.3. Gender internalized system

Given the analyses of gender assignment and gender concord above, the question is, from the point of view of acquisition, what the child acquiring Spanish has to learn about gender, that is, how this model of grammatical knowledge is deployed. In other words, the question is whether, and if so how, these proposals can provide a basis for an account of the acquisition data.

If gender in nouns is valued (i.e. each noun comes with its own gender specification from the lexicon) and uninterpretable (i.e. has no semantic interpretation), the L1 acquisition process, in the case of languages with grammatical gender like Spanish, is a matter of vocabulary learning; and with respect to gender concord, a matter of valuation of the unvalued gender features of noun probes (i.e.

¹⁰ Carstens (2000, p. 320) assumes a “shell” above the NP core that she analyzes as *nP*, a “light” noun, following Chomsky’s (1995) treatment of external arguments of verbs. This has also been suggested, among many others, by Carroll (1989) -for whom nouns have as part of their lexical entry a feature indicating the class they belong to- and by Marantz (1997). Kihm (2005) also applied it to noun class and gender. With regards to the syntactic derivation of adjectives, see also Bouchard (2002, 2005) as well as Cinque (2010).

determiners and adjectives). If this is so, semantics and morphology would not interfere with grammatical gender and so errors due to either semantics (e.g. relying, in the case of animate nouns, on the correlation between male and masculine grammatical gender and female and feminine grammatical gender, but not being able to do so for non-animate nouns) or morphology (e.g. relying on *-o* interpreted as masculine and *-a* as feminine) would be scarce in the L1A (acquisition of the first language) process.

However, the existence of correlations between morphology and grammatical gender in the case of animate nouns (WM *-o* = masculine grammatical gender and gender concord; WM *-a* = feminine grammatical gender and gender concord), as in (1) above, could involve, from the point of view of language acquisition, the overextension of this partial predictability leading to structures in which the gender feature ([+/-F]) is made to correlate with morphology (WMs *-o*, *-a*) (see below).

As Harris (1991) points out, these correlations and, related to them, the existence of certain pairs (like those in 1) versus the absence of some other pairs (e.g. *tindra*_{masc} / *tindro*_{fem}), pertain to the knowledge the speaker has and that involves both “universal principles that constitute part of human genetic endowment and the language-particular generalizations that can be based on available linguistic experience” (p. 29).¹¹ So, what is the task of a child acquiring Spanish, in this respect? Are these correlations (e.g. *-o*/masculine, *-a*/feminine) overextended in the initial stages? And if so, how is this reflected on gender concord relations? Does the [+/-animate] distinction play a role, too?

Roca (1989) phrases it differently but he also assumes the morphology-semantics-syntax correlation. For children to be able to organize the Spanish gender system, they might depart from quasihomophonous pairs (like the examples in 1 above) where the sex-related lexical doubling in nouns with a human referent runs parallel to the *-o/-a* suffixal opposition. The implications of both studies (Harris 1991 and Roca 1989) is that (i) input plays a very important role in that children would initially rely on the presence of pairs (e.g. *niñ-o* / *niñ-a*, ‘boy/girl’) in order to develop the grammatical

¹¹ Karmiloff-Smith (1979) and Pérez-Pereira (1991) make use of nonce nouns (like Harris’ *tindra/tindro* example) in their analysis of L1 children’s experimental production on the basis of possible pairs in the language versus non-possible ones.

gender system for Spanish; and (ii) this could entail that, in the initial stages of acquisition, children would tend to overregularize this parallelism (as they do with regular verbal inflection, for instance) and move to the inner-core nouns that are not so, as suggested in (15a), and even transfer this to the concord chain within the DP, as in (15b), in a “direct phonological implementation” (p. 4):

- (15) a. *el árbol* (= árbol)
the-M tree-M
 \emptyset -o \emptyset WMs
[-F] [-F] [-F] grammatical gender
- b. *el libro azul* (= azul)
the-M book-M blue-M
 \emptyset -o -o \emptyset WMs
[-F] [-F] [-F] [-F] grammatical gender

Having this in mind, the favored correlations that could be established are outlined in (16):

- (16) ROBUST CORRELATIONS
- a. grammatical gender (masc.) → morphology (-o)
 - b. grammatical gender (fem.) → morphology (-a)
 - c. semantics (male) → grammatical gender (masc.)
 - d. semantics (female) → grammatical gender (fem.)

To these correlations in (16), we may add that, if feminine gender is the superordinate and so masculine is seen as the default option (Roca 1989), both (16b) and (16d) could correlate with default masculine grammatical gender and, therefore, trigger masculine gender concord.

However, some clarifications should be made to the correlations in (16). With regards to morphology and grammatical gender (16a & 16b), the directionality of the correlation is, as we have seen above, a matter of importance: the gender suffix (WM) could be predicted from the gender feature ([+/-F]), and not the other way around (Roca 1989, 2005). Any disagreement must be specifically entered in the lexicon (i.e. the so-called marked alternatives) and, in the absence of a suffix specification in the lexicon (as suggested by the empty space in the entrance brackets in (17)), the output value is assigned in a given context (i.e. the so-called redundancy rules):

- (17) []□ → [O] /[-F]
[]□ → [A] /[+F]

With regards to semantics and grammatical gender, if we assume that this correlation (based on a sex distinction) is irrelevant to nouns with inanimate referents, the correlations in (16c) and (16d) would only hold in the case of [+animate] nouns (as in 18a) and not for [-animate] nouns (as in 18b):

- (18) a. *gorilo* (= gorila)
 gorilla-M
 -o -a WMs
 [-F] [-F] grammatical gender
- b. *dío* (= día)
 day-M
 -o -a WMs
 [-F] [-F] grammatical gender

Since all nouns have grammatical gender, regardless of whether they are animate or inanimate, the absence of these two correlations would involve treating animate and inanimate referent nouns in the same way with respect to gender assignment.

In terms of how the relationship among semantics, morphology and syntax is represented in the mind, the above proposals place the locus of parametric variation in the lexicon rather than in overt morphological distinction or semantic considerations.¹²

The issues we would like to address are the following: (i) whether in the construction of N roots the obligatory grammatical feature [+/-F] is adequately selected; (ii) whether it is the morphology of words or the semantics of words that play a role in the acquisition of grammatical gender, that is, whether there is an early phase of development in which children base their selection of articles on issues such as noun phonology/morphology; and (iii) when the N root selected enters syntactic derivations and is merged with other categories (articles and adjectives) in order to give an extended nominal projection, whether the assignment of an [ugender] feature in D activates the appropriate set of root Ns to establish the expected (i.e. adult matching) concord operation. In order to investigate whether data from (bilingual) Spanish first language acquisition can contribute to determine these issues, we will first review previous works on the monolingual and bilingual acquisition of grammatical gender that we will put into perspective with our own data analysis.

3. The acquisition of grammatical gender

¹² That is, concord, as a syntactic operation, does not change across languages. What may change from one language to the next are the features involved in this operation.

The precociousness of gender concord in monolingual and bilingual first language acquisition of languages with grammatical gender has been attested in numerous studies using both spontaneous and experimental data (e.g. Hernández Pina 1984, Pérez-Pereira 1991, López Ornat 1997, Licerias, Rosado & Díaz 1998, Rosado 1998, Lleó 1998, Licerias, Díaz & Mongeon 2000, Serra et al. 2000, Gathercole 2002, Mariscal 2008, for Spanish; Pizzuto & Caselli 1992, Bates et al. 1996, for Italian; Grégoire 1947, Clark 1985, Kupisch, Müller & Cantone 2002, Foynard 2002, for French; Gillis & De Houwer 1998, Schiller & Caramazza 2003, for Dutch; Mills 1986, for German; Name & Corrêa 2003, for Brazilian Portuguese).¹³

All these works point to the early emergence of gender of DP components and gender concord within the DP. In some of these studies, also, the role played by the phonological/morphological cues in the acquisition of both gender of DP components and gender concord has been one of the main arguments. Licerias, Díaz and Mongeon (2000), and previously Licerias, Rosado and Díaz (1998) and Rosado (1998), provide an analysis of L1 and L2 child Spanish naturalistic data. They focus on the acquisition of N-drop productivity in Spanish and how this is in fact indirectly related to the acquisition of the morphological vocabulary (in their words, the ‘word marker/gender’ feature) (p. 42). Their study deals with two pieces of evidence that we consider relevant for our study. First, they analyze the non-tonic vowels which occur before nouns at the early stages of L1 acquisition, i.e. protodeterminers or ‘monosyllabic placeholders’ (MPHs), like those in (19):¹⁴

- | | | | | |
|------|----|--|---------------|--------------|
| (19) | a. | <i>e</i> (=el) <i>pie</i> the-M foot-M | (María, 1;07) | [Ornat 1994] |
| | b. | <i>a</i> (=la) <i>bota</i> the-F boot-F | (María, 1;08) | [Ornat 1994] |

¹³ Deuchar and Quay (2000) do not refer to gender and gender concord patterns but they do include as anecdotal one example of gender mismatches in the spontaneous production of Manuela, an English/Spanish bilingual child: *la baño* ‘the_{fem} bath_{masc}’ (2;00). Fantini (1985), in his analysis of the spontaneous data of Mario, an English/Spanish bilingual child, does not refer to gender either. In a review of the examples included in the appendix, three cases of gender mismatches appear: *la parque* ‘the_{fem} park_{masc}’ (2;07), *la pie* ‘the_{fem} foot_{masc}’ (2;07) and *otra libro* ‘other_{fem} book_{masc}’ (3;02).

¹⁴ Licerias, Díaz and Mongeon (2000) indicate that “the term MPH refers to the innate presence of basic syntactic structure which has to be filled in with data selected from the environment (a given language). The assumption is that the input provides the elements that will fill in the ‘held places’ with actual free morphemes” (p. 43).

They classify the use of these MPHs in terms of matching cases (i.e. use of *e* with masculine nouns, as in 19a, and of *a* with feminine nouns, as in 19b) and non-matching cases (i.e. the use of *e* with feminine nouns and of *a* with masculine nouns). The results show that non-matching cases are rather scarce overall and that they drop by the age of 1;09 and virtually disappear at the age of 2;01. They conclude that, at the early stages of acquisition, these vowels are not used as gender markers but as MPHs, that is, as part of the projection of the DP syntax so that “it is not their phonological status what is relevant but the fact that they identify a syntactic position” (p. 41).

Liceras, Díaz and Mongeon (2000) also deal with gender (and number) mismatches, like those in (20):

- | | | | | |
|------|----|---|---------------|--------------|
| (20) | a. | <i>este</i> (=esta) <i>tapa</i> this-M lid-F | (María, 1;07) | [Ornat 1994] |
| | b. | <i>una</i> (=un) <i>cuento</i> a-F story-M | (María, 1;07) | [Ornat 1994] |

They show that mismatches are rather irrelevant in absolute terms (0.57% for María and 2.26% for Magín, tables 8 & 9, p. 50-51) and that, in the case of gender mismatches these mainly occur with MPHs and disappear after the age of 2;05 for Magín and earlier (2;03) for María. The authors argue that gender mismatches cease to occur once the [+word marker/gender] feature is activated, that is, once DP syntax is implemented.

Serra et al. (2000) offer a review of previous works on the acquisition of Spanish and they also refer to the relation between MPHs and full articles as well as to different errors in the DP structure. With regards to MPHs, these initially co-exist with full articles and they tend to disappear around the age of two (Hernández Pina 1984, Mariscal 1998, Serrat, Capdevilla & Serra 1994). With regards to errors they distinguish between errors of omission (i.e. when the determiner is omitted) and errors of commission (including both gender and number mismatches). Omissions have been attested in different studies. These errors disappear gradually and so, in the case of Mariscal’s (1998) study, while children at the age of 1;07 produce 43.5% of omission, at the age of 2;01 omissions drop to 8.6%. In Serra et al.’s (1999), older children’s omission drops from 4% at the age of 3;06 to 1.8% at

the age of 4;06. Gender mismatches are said to occur until around the age of 2;07-3;00 and some examples include the ones in (21):

- (21) a. *un (=una) llave* (1;06-2;00)
a-M key-F
b. *el (=la) galleta* (2;00)
the-M biscuit-F
c. *una (=un) pájaro* (1;06-2;00)
a-F bird-M
d. *tierra azula (=azul)* (2;08)
land-F blue-F
e. *mota (=moto) roja*
motorbike-F red-F

[examples taken from Hernández Pina 1984]

Gender mismatches in D-N structures, as in (21a), (21b) and (21c), coexist with other types of non-adult-like matching DPs, such as the overuse of regular morphological markers in the adjective in (21d) or the selection of the wrong WM for the noun in (21e). Hernández Pina (1984) suggests that it is not clear that all types of concord are acquired at the same time and that, for example, non-adult concord with adjectives are produced up to 2;08, well after the article concord is acquired, and overgeneralization of gender marking is observed after 1;09.

Mariscal (2008) focuses on gender concord in D-N-A structures produced by children between 1;10 and 2;01 years of age using both spontaneous data and experimental data. Regarding gender concord between D and N, mismatches like those in (22) appear, although no exact number of cases is provided:

- (22) a. *e (=la) goma* (subject 1) masculine MPH for feminine D
the-M rubber-F
b. *a (=el) café* (subject 3) feminine MPH for masculine D
the-F coffee-M

As for concord between N and A, errors are reported to be scarce but no exact numbers are provided in the case of the few (acknowledged) spontaneous adjectives produced. In the case of the elicited adjectives (the task contained 12 items), errors were not very frequent and most were adjectives in *-o* used instead of adjectives in *-a*, as in (23), both with prototypical nouns (i.e. that end in *-o* / *-a*) (23a & b) and with non-prototypical nouns (23c):

- (23) a. *bruja malo (=mala)* prototypical N
witch-F bad-M
b. *caja roto (=rota)*
box-F broken-M

c. *flor rojo* (=roja)
flower-F red-M

non-prototypical N

Sánchez-Sadek, Kiraithe and Villarreal (1976) are one of the first ones to discuss grammatical gender using experimental data from monolingual Spanish children and bilingual Spanish/English children. Their aim is to determine, following Bull's (1965) proposal, whether the terminal sound of nonsense nouns played a role in establishing gender concord between the noun, the determiner and the adjective. By comparing monolingual and bilingual children, they want to determine whether the higher the amount of input received (in particular, the more exposure to noun matching patterns) makes monolinguals master adult-like gender concord patterns sooner. They conclude that, compared to English dominant bilinguals, both Spanish monolinguals and Spanish dominant bilinguals rely on terminal sound patterns to match determiners and adjectives to nonsense nouns and that for both groups higher accuracy rates appear with *-o* than with *-a* patterns. They also argue that monolinguals performed better than bilinguals but only in the higher grades.

In their work on Italian morphology (including verbs, pronouns and articles), Pizzuto and Caselli (1992) deal with the analysis of concord within the DP, in particular, between definite articles and nouns in the spontaneous production of three monolingual Italian children (from the age of 1;03 to 3;09). They found what they termed “incomplete articles” (p. 540) like those in (24) in a similar proportion for the three children (i.e. 21%, 28% and 31%):

- (24) a. *a* (=la) *tomba* (Claudia, 1;09)
the-F trumpet-F'
b. *e* (=le) *pila* (Francesco, 1;08)
the-M batteries-M

They report errors in article use in a very low proportion (3% to 4% across children) and these include both gender and number mismatches between the determiner and the noun. However, omission errors were higher (22%, 36%, 40%). In their data analysis they also point out that for the three children analyzed, the feminine article *la* is acquired earlier than the masculine article *il*, since it presents fewer cases of omissions and is more frequently correctly produced (p. 541). They attribute this to *la* (the_{fem}) being phonologically simpler (quoting Leonard et al. 1988) and the least difficult from a morphophonemic point of view if compared to *il*, *lo* and *l'* masculine forms. In any case, they

conclude that gender marking is acquired very early in Italian which they attribute to the high number of consistent contrasts the Italian language presents; that is, the more consistent morphological contrasts are in a language, the less difficulty children would have in acquiring this particular property (p. 553).

Hulk (2004) analyzes the acquisition of French DPs by comparing monolingual and bilingual data. She finds that similar patterns appear with regards to both article use and number and gender mismatches although a delay in acquiring the adult French grammar is reported for the Dutch/French bilingual child. In the data she discusses, omission of determiners drops sharply at the age of 2;08 for the bilingual and 2;05 for the monolingual. Articles are the first types of determiners used and no differences are found between definite and indefinite articles. With regards to initial mismatches these mainly affect gender but are always below 10%. Hulk argues for a stage in which only one pre-nominal position is available and so either D+N or A+N structures are found.

Jakubowicz and Roulet (2008) analyze gender concord processing by French monolingual children, both normally developing children and children with SLI (Specific Language Impairment). Their analysis of the data shows that both groups were highly sensitive to determiner-noun concord violations. Besides, they also found that the predictive value of noun endings for gender concord was not significant; that is, they analyzed whether these French children assign gender to the nouns on the basis of word endings (i.e. whether the phonological or orthographic regularity of the noun had an effect on concord, as defended by Tucker, Lambert and Rigault 1977 and Karmiloff-Smith 1979) and no such effect was found. This points to a separation between morphological cues and syntactic gender.

In their review of L1A data, Hawkins and Franceschina (2004) conclude that children initially rely on phonological cues when establishing D-N concord, a conclusion supported by both experimental data analyses (Karmiloff-Smith 1979 for monolingual French; Pérez-Pereira 1991 for monolingual Spanish) as well as by spontaneous data analyses (Müller 1994 for bilingual French). Similar conclusions are reached in other studies where gender errors are reported not to occur with nouns

whose gender could be predicted from their morphology (e.g. Levy 1983, Berman 1985, for Hebrew; Mills 1986, for German; see Corbett's 1991 extensive account of gender across languages for an overview).

Müller (1994) and Koehn (1994) analyze gender and number features in the nominal structure of German/French bilingual children. Müller assumes that these features are not available in their early grammar (p.1). Following the DP hypothesis, she argues that while nouns have gender as a lexical inherent feature (*gender attribution*) with a phonological shape and semantic properties, determiners and adjectives get gender by concord (*gender agreement*). Before 2;00, the children have not discovered the grammatical features of gender and number because the feature "definiteness" is not available either and, consequently, the children in this initial developmental stage do not show a very productive use of determiners. At 2;00/2;04 (MLU = 2,0), children start to incorporate grammatical gender, productively using definite, indefinite and possessive articles. They hardly show difficulties in marking gender, and these are mainly associated with indefinite rather than with definite articles. Müller attributes this difference to the fact that, while definite articles are functional elements, indefinite articles are initially analyzed as numerals and so they have a referential but not a grammatical function. Koehn supports these findings and she adds that phonology is used by the child as a device for gender attribution, that is, the gender of nouns is partly predictable taking into account their phonological characteristics, what she terms *schemas* (p. 32 & 45).

Kupisch, Müller and Cantone (2002) analyze gender marking on articles and argue that grammatical gender is part of the lexical entry of nouns. Thus, they distinguish between gender as an inherent feature versus gender concord which is triggered by the variable characteristics of the modifiers. In their analysis of French and Italian, they claim that gender can be predicted using not only semantic cues, but also morphological and phonological cues. This is related to gender transparency and how it facilitates the acquisition of gender, which accounts for the fewer errors reported in the Italian data compared to those in the French data. In their analysis of article omission, they conclude that children

start to produce articles when their MLU value is between 1 and 2, that is, the omission of articles ceases before 3;00.

While as suggested above, gender concord within the DP (specifically between articles and nouns) seems to pose no problem for L1 speakers (both monolingual and bilingual), different studies have shown that this is very different when it comes to L2 speakers. Even in the case of highly proficient L2 learners, non-native concord patterns are persistent regardless of whether the learners' L1 has gender or not (e.g. Andersen 1984, Carroll 1989, Bruhn de Garavito & White 2002, White et al. 2004, Tanner 2008). Hawkins and Franceschina (2004) attribute this L1-L2 difference to the ability (in the case of L1A) or inability (in the case of L2A) to represent uninterpretable gender features. In particular they argue that “while native speakers of French and Spanish acquire uninterpretable gender features as part of the lexical entries for determiners in the course of development, older L2 learners of these languages with English as their L1 do not” (p. 176). In the case of heritage speakers and in particular Spanish/English bilinguals who speak Spanish as a minority language, several studies have pointed out that gender concord is also vulnerable to language loss (e.g. Lipski 1993, Anderson 1999, Montrul & Potowski 2007, Montrul, Foote & Perpiñán 2008).

In our study, we examine the Spanish spontaneous oral production data of a set of Spanish/English bilingual twins and compare whether gender assignment and gender concord patterns are similar to those found in previous studies on monolingual and bilingual acquisition.

4. Research questions and hypotheses

Taking into consideration both the linguistic accounts on grammatical gender as well as previous works on the acquisition of gender presented in the sections above, our study aims at providing an answer to the following three research questions:

1. What developmental patterns characterize the acquisition of grammatical gender in bilingual Spanish?
2. To what extent can the patterns identified be explained within current models of linguistic description and language development? And, in particular, what do the Spanish bilingual data tell us about the development of functional projections and feature valuation in the nominal domain with respect to gender?
3. To what extent are these patterns comparable (resemble or differ) to those described for monolingual Spanish? And for other similar languages (i.e. Italian and French)?

These general research questions can be spelled out as follows.

Regarding the patterns of interactions between the syntax, morphology and semantics of gender (as discussed in section 2.1.), the questions are whether non-adult-like production of gender and gender concord correlate with:

- the semantic distinction (i.e. [+/-animate]/[+/-human]) so that children's error rates mainly affect [-animate, -human] nouns; and
- the morphological class (i.e. inner-core, outer-core, residue) so that children have less problems with nouns belonging to the core than with those belonging to the residue; and, if there are non-adult-like forms, these will have a specific directionality, i.e. nouns in the residue or in the outer-core will be made to behave as inner-core nouns but not the other way around.

Regarding developmental patterns, and since previous works have suggested that grammatical gender is related to morphological and phonological cues (WMs) (although morphology and phonology are in fact distinct interrelated domains in the analysis of gender, as discussed in section 2.1.), the questions are:

- whether determiner omission errors characterize the initial stage (as in Pizzuto and Caselli 1992, Müller 1994, Serra et al. 2000 and Hulk 2004);

- whether the MPH stage correlates with gender mismatches (as suggested by Liceras, Díaz and Mongeon 2000);
- whether the feminine article *la* is acquired before the masculine one (as in Hernández Pina 1984 and Pizzuto and Caselli 1992 but contrary to Mariscal 1998);
- whether a difference is found between definite and indefinite articles so that the first ones are acquired sooner (as suggested by Müller 1994 and Koehn 1994);
- whether, in the initial stages of acquisition, bilinguals rely on the phonology of N (and their morphological counterparts, i.e., WMs) so that, in the case of core Ns, children's selection of D will be based on the noun's suffix so that nouns in *-a* will trigger feminine determiner *la*, while nouns in *-o* will trigger masculine determiner *el* (as argued by Sánchez-Sadek, Kiraithe and Villarreal 1976, Tucker, Lambert and Rigault 1977, Karmiloff-Smith 1979, Kupisch, Müller and Cantone 2002, Hawkins and Franceschina 2004; and contrary to Jakubowicz and Roulet 2008 and Boloh, Escudier and Royer 2012); in the case of non-core Ns (i.e. residue Ns), and related to the question above on patterns of interaction, the selection of D in the initial stages could be linked to a default strategy (i.e. masculine as a default option); and
- whether there is evidence of a default form, this being the masculine form so that masculine forms of determiners, nouns and adjectives are used instead of feminine ones but not so much the other way around (as defended by Pérez-Pereira 1991, Francescina 2001, Boloh and Ibernón 2010; but contrary to what Hawkins and Franceschina 2004 suggest) and so whether higher accuracy rates initially correspond to nouns in *-o* rather than nouns in *-a* (as in Sánchez-Sadek, Kiraithe and Villarreal 1976) and *-o* adjectives are used instead of *-a* ones (as in Mariscal 1998).

Regarding DP syntax and the theoretical accounts of gender assignment and gender concord, the questions are:

- whether bilingual children establish early in development that nouns fall into two classes in Spanish, i.e. [+/-F]. Evidence for this would be children's ability to make consistent selections of Ns with their intrinsically valued gender features;
- whether, given that in the adult grammar D-N gender concord is a syntactic operation whereby the [+/-F] gender features (uninterpretable and valued) in N value the corresponding ones in D, this process is present in the case of L1A initial stages; or rather,
- whether there is a difference between the initial stage in which N phonology determines D-N concord and a later stage in which the adult grammar is implemented. If children use the phonological (morphological) shape of Ns as the main determinant of gender classification, this could involve that, under an account of D-N concord as a reflex of a checking/valuation relation between the [+/-F] feature of N and the corresponding one of D (both being uninterpretable; the one in N valued and the one in D unvalued, following Carstens 2010), children have not yet established this checking relation, that is, they have not specified D for [ugender] (and unvalued). However, they will have established that Ns fall into two classes because they will systematically select different forms of the article (although this selection is based on phonology).

Regarding a comparison between our Spanish bilingual data and findings in previous works, the question is whether bilinguals show higher non-adult-like patterns and until later if compared to monolinguals (as suggested in Anderson 1999, Gathercole 2002, Montrul and Potowski 2007).

5. Methodology

5.1. Participants

We have analyzed spontaneous data from a set of Spanish/English bilingual identical twins, Simon and Leo, from the FerFuLice corpus (Fernández Fuertes & Licerias 2009) in CHILDES (MacWhinney 2000). General information about these participants appears below. For more details, please refer to Fernández Fuertes and Licerias (2010) and to CHILDES.

The twins were born in Salamanca (Spain) where they presently live. The father is a native speaker of Peninsular Spanish and the mother is a native speaker of American English. The father always speaks to the children in Spanish and the mother always addresses them in English (the so-called rule of Grammont, the one parent-one language strategy). Therefore, this is a case of bilingual Spanish/English first language acquisition in a monolingual-Spanish social context, a type of bilingualism which is referred to in the literature as individual bilingualism (Bhatia & Ritchie 2004). The data collected cover the age range of 1;01 to 6;11. A total of 178 sessions were recorded on videotape and DVD, of which 117 were in an English context (i.e., with an English interlocutor such as the interviewer or their mother) and 61 in a Spanish context (i.e., with a Spanish interlocutor such as the interviewer or their father). The Spanish recordings were made at intervals of 2 to 3 weeks until age 3;00 (with some interruptions during the summer holidays), and then once a month after that. The English recordings were sometimes made more frequently, but the sessions were usually much shorter and recorded on consecutive days. The children were recorded in naturalistic settings, usually at home, and appeared together in the majority of the sessions. They were mostly engaged in normal play activities with the interlocutor.

5.2. Data selection

From the overall FerFuLice corpus, the data selection that we have analyzed for this study corresponds to the period between the ages of 1;01 and 5;09 and only to the Spanish sessions of the corpus, as in Table 1:

TABLE 1. Data selection

| | SESSIONS | FILES | DURATION | AGE | MLU RANGE |
|--|----------|-------|----------|-----|-----------|
|--|----------|-------|----------|-----|-----------|

| | | | | | |
|---------|--------|-----|------------------|-------------|----------|
| Spanish | 1 – 63 | 106 | 40 hours approx. | 1;01 – 5;09 | 0 – 5.65 |
| English | 1 – 10 | 10 | 5 hours approx. | 1;01 – 1;06 | 0 – 1.39 |
| TOTAL | -- | 116 | 45 hours approx. | 1;01 – 5;09 | 0 – 5.65 |

As shown in Table 1, we have also considered the initial English sessions available (from 1 to 10) since Spanish production appears in these initial English sessions and, given that this initial stage is important to study the emergence of grammatical gender in Spanish, we thought it was appropriate.

Table 2 shows a division in stages in terms of the twins' MLU values:¹⁵

TABLE 2. Stages in terms of MLU values

| | AGE RANGE | MLU RANGE [SIMON] | MLU RANGE [LEO] | AVERAGE MLU |
|---------|-------------|-------------------|-----------------|-------------|
| Stage 1 | 1;01 – 2;04 | 0 – 1.778 | 0 – 2.000 | 1.409 |
| Stage 2 | 2;05 – 2;10 | 1.391 – 2.754 | 1.570 – 2.950 | 2.185 |
| Stage 3 | 2;11 – 3;04 | 2.280 – 3.788 | 2.057 – 3.421 | 3.190 |
| Stage 4 | 3;05 – 4;00 | 1.688 – 4.780 | 2.200 – 4.915 | 3.898 |
| Stage 5 | 4;01 – 5;09 | 2.318 – 5.534 | 2.076 – 5.354 | 4.040 |

A comparison of the twins' MLUs in Spanish with the corresponding MLUs of two age-matched Spanish monolinguals (Table 3) yields very similar results.¹⁶ As argued by Hickey (1991) and Miller and Chapman (1981), among many others, MLU has consistently been found to be the most stable measure of comparison between children:

TABLE 3. MLU values in Spanish data: bilingual and monolingual

| BILINGUAL CHILDREN Simon, Leo* | | | MONOLINGUAL CHILD María** | | MONOLINGUAL CHILD Emilio*** | |
|-----------------------------------|-------|-------|------------------------------|-------|--------------------------------|-------|
| AGE | MLUS | MLUL | AGE | MLU | AGE | MLU |
| 1;05 | 1.778 | 2.000 | | | | |
| | | | 1;07 | 1.854 | | |
| | | | 1;08 | 1.958 | 1;08 | 1.297 |
| | | | | | 1;09 | 1.256 |
| 1;10 | 1.364 | 1.520 | 1;10 | 1.990 | 1;10 | 1.222 |
| 2;00 | 1.404 | 1.721 | 2;00 | 2.438 | 2;00 | 1.356 |
| 2;04 | 1.570 | 1.571 | 2;04 | 3.383 | | |
| 2;11 | 3.190 | 3.421 | | | | |
| 3;00 | 5.327 | 5.633 | | | | |
| 3;10 | 4.780 | 4.915 | 3;10 | 4.379 | 3;10 | 2.770 |
| 4;05 | 3.431 | 2.818 | | | | |
| | | | | | 4;06 | 3.104 |
| | | | | | 4;08 | 3.249 |
| 4;09 | 4.158 | 4.103 | | | | |

Black line indicates last recorded file in corpus

¹⁵ The MLU (Mean Length of Utterance) is derived from two totals: the total number of utterances and the total number of either morphemes (standard MLU) or words (MLUw) for each speaker and in each file/transcript.

¹⁶ MLU calculations for the twins were based on word measures (MLUw), while those of the English monolingual children were measured on morphemes (standard MLU). When comparing standard MLU and MLUw values, Malakoff et al. (1999) found that MLU correlates with MLUw at .97 for English, and Aguado (1988) found a correlation of .99 for Spanish (see MacWhinney 2009, p. 103).

* From the FerFuLice corpus in CHILDES (MacWhinney 2000)

** From the Ornat corpus in CHILDES (MacWhinney 2000)

*** From the Vila corpus in CHILDES (MacWhinney 2000)

Taking into account the corresponding MLUs with age-matched monolingual Spanish children, we can conclude that the twins' proficiency in Spanish is relatively equal to their respective Spanish monolingual counterparts.¹⁷

In the data selected (Table 1), we have isolated all DPs produced by either child, Simon or Leo. The proportion of DPs analyzed per child in relation to the number of utterances as well as the DP formal patterns appear in Table 4:

TABLE 4. DP data selection

| CHILD | # UTTERANCES | # DP _s | # DP FORMS | | | | | | |
|-------|--------------|-------------------|------------|-------|-------|-------|---------|---------|-----------|
| | | | (D)-N | D-(N) | D-N | D-N-A | D-(N)-A | (D)-N-A | (D)-(N)-A |
| Leo | 8,793 | 1,231 | 310 | 16 | 833 | 52 | 11 | 7 | 2 |
| Simon | 8,180 | 1,321 | 370 | 7 | 864 | 58 | 11 | 9 | 2 |
| SOL | 999 | 91 | 35 | 5 | 48 | 1 | 1 | -- | 1 |
| TOTAL | 17,972 | 2,643 | 715 | 28 | 1,745 | 111 | 23 | 16 | 5 |
| | | 100% | 27.1% | 1% | 66% | 4.2% | 0.9% | 0.6% | 0.2% |

When it was not possible to identify which of the twins was speaking (mainly because they were off-screen) transcribers used SOL (Simon or Leo). We have analyzed a total of 2,643 DPs produced by Simon and Leo or SOL. These full DPs have the pattern in (25) where parentheses indicate that one or two of the categories could be absent:

(25) (D) - (N) - (A)

In the case of determiners, only definite and indefinite articles have been considered. As the general pattern in (25) suggests, no pronouns have been analyzed, both determiners and nouns could be null and adjectives could be present or not.¹⁸ An example of each of the different DP forms appears in (26). Where null nouns were used, the referent is indicated in parentheses since gender concord takes place between the referent of the null noun and the overt determiner (as in 26c), between the referent of the null noun and the overt determiner and adjective (as in 26g) or between the referent of the null noun and the overt adjective (as in 26i):

¹⁷ These values also correlate with Pizzuto and Caselli's (1992, p. 516) MLU values in Italian, although children are younger (1;04 – 3;00).

¹⁸ To codify the data, as we will show in the next section, we focus on gender assignment and gender concord using the pattern D-N-A. Word-order arrangements (i.e. N+A and A+N) or number features are not included in the analysis but very few cases of non-adult-like DPs with either word-order errors or number mismatches appear in the data.

| | | | | |
|------|----|--|---------------|---------------|
| (26) | a. | <i>(la) leche</i> '(the) milk' | (Simon, 2;08) | (D) - N |
| | b. | <i>el otro (gato)</i> 'the other (cat)' | (SOL, 2;10) | D - D - (N) |
| | c. | <i>una (pieza) más</i> 'a (piece) more' | (Leo, 4;02) | D - (N) |
| | d. | <i>la tarta</i> 'the cake' | (Simon, 2;07) | D - N |
| | e. | <i>un pirata malo</i> 'a bad pirate' | (Leo, 3;10) | D - N - A |
| | f. | <i>un gran tiburón blanco</i> 'a big white shark' | (Simon, 3;10) | D - N - A - A |
| | g. | <i>unas (zapatillas) diferentes</i> 'a different (shoes)' | (Leo, 3;08) | D - (N) - A |
| | h. | <i>(las) piedras grandes</i> '(the) big stones' | (Simon, 4;09) | (D) - N - A |
| | i. | <i>(los hombres) malos</i> '(the) bad (men)' | (Leo, 4;01) | (D) - (N) - A |

The codification procedure appears in the next section in which we have distinguished adult-like from non-adult-like cases.

5.3. Data codification

In order to provide an analysis of grammatical gender in the data from these Spanish bilinguals and an answer to our research questions, we have used a three-way classification of the different DPs that appear in the data in terms of semantics, morphology and syntax, as indicated below.

With regards to semantics and following the classification in (3) above (Roca 1989), all nouns were classified as [+/-animate]. In the case of the [+animate] ones, a distinction between [+/- human] nouns has also been established, as the examples in (27) show:

| | | | | |
|------|----|---|---------------|--------------------|
| (27) | a. | <i>el hermano</i> 'the brother' | (Simon, 3;08) | [+animate, +human] |
| | b. | <i>el burrito</i> 'the little dunky' | (Simon, 3;02) | [+animate, -human] |

With regards to morphology-phonology and following Harris' (1991) classification, we coded all individual determiners, nouns and adjectives in terms of their morphological properties as inner-core, outer-core or residue, as the examples in (28) show for articles, (29) for nouns and (30) for adjectives.

In the case of articles, a distinction has been made between MPHs (28a) and full forms (28b):¹⁹

| | | | | |
|------|----|--|---------------|---------------------------------------|
| (28) | a. | <i>e</i> (=el) <i>zapato</i> the-M shoe-M | (Leo, 1;10) | MPH + outer-core, [-F] |
| | | <i>a</i> (=la) <i>caja</i> the-F box-F | (Leo, 1;01) | MPH + inner-core, [+F] |
| | b. | <i>el pato</i> the-M duck-M | (Simon, 2;03) | definite article + outer-core, [-F] |
| | | <i>unos bichos</i> some-M bugs-M | (Leo, 3;11) | indefinite article + inner-core, [-F] |
| | | <i>la casa</i> the-F house-F | (Simon, 2;10) | definite article + inner-core, [+F] |

Nouns were also classified in terms of adult-like (29a) and non-adult-like (29b) forms regarding morphology:

| | | | | |
|------|----|--|---------------|-------------------------------------|
| (29) | a. | <i>el pato</i> the-M duck-M | (Simon, 2;03) | inner-core, [-F] |
| | | <i>la casa</i> the-F house-F | (Simon, 2;10) | inner-core, [+F] |
| | | <i>el tigre</i> the-M tiger-M | (Leo, 2;03) | outer-core, [-F] |
| | | <i>la pared</i> the-F wall-F | (Leo, 3;08) | outer-core, [+F] |
| | | <i>una mano</i> a-F hand-F | (Leo, 3;05) | residue, [+F] |
| | | <i>un pirata</i> a-M pirate-M | (Simon, 3;05) | residue, [-F] |
| | b. | <i>un árbol</i> (=árbol) a-M tree-M | (Leo, 3;00) | from outer- to inner-core, [-F] |
| | | <i>una serpiente</i> (=serpiente) a-F snake-F | (Simon, 3;10) | from outer- to inner-core, [+F] |
| | | <i>el zapato</i> (=zapato) the-M shoe-M | (Leo, 1;10) | from inner- [-F] to inner-core [+F] |

All adjective forms used are adult-like and these include core cases (30a) and residue ones (30b):

| | | | | |
|------|----|--|---------------|------------------|
| (30) | a. | <i>los tiburones blancos</i> the-M sharks-M white-M 'the white sharks' | (Leo, 3;10) | inner-core, [-F] |
| | | <i>una pelota azul</i> a-F ball-F blue-F 'a blue ball' | (Simon, 3;04) | outer-core, [+F] |
| | b. | <i>un círculo rosa</i> a-M circle-M pink-M 'a pink circle' | (Simon, 3;05) | residue, [-F] |

With regards to syntax, all forms within the DP (articles, adjectives and nouns) were classified (i) in terms of their grammatical gender as [+/-F] when considering them individually; and (ii) in terms of gender concord as matching or non-matching, when considering them as part of a DP. In the case of

¹⁹ To isolate and classify MPHs, we have relied on the transcriptions available, that is, on the interpretation of the oral recordings done by the researchers who did the transcription. No phonetic transcription is available.

matching cases, examples appear in (31) and these include both adult-like matching cases (31a) and non-adult-like matching cases (31b-c):

| | | | | |
|------|----|--|---------------|---------------------------------|
| (31) | a. | <i>la estrella</i> the-F star-F | (Simon, 2;03) | matching, [+F] |
| | | <i>el cubo azul</i> the-M cube-M blue-M 'the blue cube' | (Leo, 4;00) | matching, [-F] |
| | | <i>la (reina) más poderosa</i> the-F (queen-F) most powerful-F 'the most powerful (queen)' | (Simon, 5;03) | matching (ref. of null N), [+F] |
| | b. | <i>uno azoto</i> (=un azote) a-M spank-M | (Leo, 2;11) | matching, [-F] |
| | | <i>uno pirata</i> (=un pirata) a-M pirate-M | (Simon, 3;10) | matching, [-F] |
| | c. | <i>(el) barquito rojo</i> (the-M) little boat-M red-M '(the) red little boat' | (Simon, 2;01) | matching, [-F] |
| | | <i>(las) pinturas blandas</i> (the-F) crayons-F soft-F '(the) soft crayons' | (Leo, 5;03) | matching, [+F] |

The examples in (31b) show that matching was produced between the components of the DP but the corresponding forms of either the determiner, the noun or both were not adult-like. Examples like these suggest that, although syntax is at place (adult-like), morphology might not be, suggesting a separation of the two domains. The examples in (31c) show matching between the noun and the adjective in DPs with non-adult-like null determiners (i.e. in DPs that should have an overt determiner). The type of gender concord in example (31c) is classified as partial matching because, while gender concord in D-N-A structures involves two operations, in (D)_{non-adult}-N-A ones it involves one operation (i.e. given that D is null, no actual gender matching could be done between D and N). Non-matching cases, as those in (32), were codified using the adult form as a referent. The codification takes into account (i) which DP component (determiner, adjective, noun or both) is responsible for the lack of matching, that is, which one is the one that does not correspond to the adult form; and (ii) which form is overgeneralized, that is, the directionality of the gender attribution (masculine instead of feminine or feminine instead of masculine):

| | | | | | |
|------|----|--|---------------|-----------------|----------------------|
| (32) | a. | <i>el tornilla</i> (=el tornillo) the-M screw-F | (Leo, 4;04) | N | [+F] instead of [-F] |
| | b. | <i>un moto</i> (=una moto) | (Simon, 2;10) | D ²⁰ | [-F] instead of [+F] |

²⁰ (32b) is a non-adult-like DP, either because the child is using the WM to classify the N as inner-core and thus wrongly considering the WM -o as an indicator of [-F] grammatical gender or because the child is selecting the wrong D. Since

- a-M motorbike-F
 c. *pequeño pupa* (=pequeña pupa) (Simon, 2;03) A [-F] instead of [+F]
 little-M injury-F
 d. *un pequeño pupa* (=una pequeña pupa) (Simon, 3;00) D&A [-F] instead of [+F]
 a-M little-M injury-F

Some clarifications are in order at this point. Self-repetitions in the same utterance were counted as one instance and in cases of self-reformulation or self-correction only the last instance was counted. Diminutive nouns were codified as any other noun (e.g. *bola* = *bolita* ‘ball = little ball’), regardless of whether the non-diminutive form coincides or not in its codification with the diminutive form (e.g. *culo* ‘butt’ = inner-core; *culete* ‘little butt’ = outer-core).

A few cases were excluded from the counting: repetitions from the adult’s utterance; incomplete DPs when children were interrupted or when half of the DP was produced by the child and half by the adult; unclear cases (e.g. *a po* could refer to the DP *el perro* ‘the dog’ or to the VP *a poner* ‘to put’ or to something else); DPs with a null N with an unclear referent since gender of the overt part of the DP could not be contrasted with the gender of the referent of N; English DPs or instances of code-switched DPs (e.g. *bunejo* = ‘bunny’ from English + ‘conejo’ from Spanish); DPs that were (part of) non-productive forms or formulaic fixed expressions (e.g. *es un rollo* ‘it’s a real bore’); proper names, either of real people or of characters; and make-up words (e.g. *maín* = plátano ‘banana’).

5.4. Data analysis and discussion²¹

5.4.1. Overview of the data and adult-like cases

Table 5 and Table 6 show general accuracy rates for both children. Out of the 2,643 cases of DPs produced, 2,219 (84%) are adult-like and 424 (16%) are non-adult-like.

Table 5 refers to adult-like DPs classified in terms of semantics ([+/-animate]) and syntax ([+/-F]):

all examples are classified in terms of morphology and syntax, this enables us to determine whether there is any correlation between non-adult-like concord and the morphological property of N. In fact, there are only 2 cases of this type in the data, i.e. of a non-adult matching DP with a residue N: *un moto* = *una moto* ‘a motorbike’ and *la cazamariposas* = *el cazamariposas* ‘the butterfly-catcher’. The other 68 residue Ns in the data appear in adult-like matching DPs.

²¹ The types of statistical analyses we have run are contrasts of proportions (z-value or standard score) and chi-square tests (χ^2 -value) in order to determine whether differences across categories were significant or not based on the p-values obtained.

TABLE 5. General DP accuracy rates: semantics & gender

| SEMANTICS OF N | [+animate] | | [-animate] | | Total (per child) |
|----------------|--------------------------|-----------------------|----------------------------|---------------------|-----------------------|
| GENDER OF N | [+F] | [-F] | [+F] | [-F] | |
| LEO | 1.9% [51/69] | 9.3% [246/280] | 13.8% [364/481] | 13.8% [365/401] | 38.8% [1,026/1231] |
| SIMON | 2.6% [69/103] | 11.4% [301/365] | 14.8% [392/454] | 13.5% [358/399] | 42.3% [1,120/1321] |
| SOL | 0.07% [2/3] | 0.9% [23/25] | 1.1% [30/40] | 0.7% [18/23] | 2.8% [73/91] |
| Subtotal | 4.6% [122] | 21.6% [570] | 29.7% [786] | 28% [741] | |
| | 26.2% [692/845] | | 57.8% [1,527/1,798] | | |
| TOTAL | 84% [2,219/2,643] | | | | |

Percentages calculated over 2,643 (=100%)
[Total accurate / total, per category and child]

Table 5 shows that both children have not equally contributed to the total number of DP cases produced (2,643), as the total per child column suggests, too. Simon produces more cases of accurate DPs than Leo (p-value=.004). With regards to the distribution in terms of semantics, more [-animate] nouns appear in the data and, in terms of syntax, more masculine [-F] DPs are used.

Table 6 refers to adult-like DP cases classified in terms of morphology/phonology (inner-core, outer-core and residue) and syntax ([+/-F]):²²

TABLE 6. General DP accuracy rates: morphology & gender

| MORPHOLOGY | INNER-CORE | | OUTER-CORE | | RESIDUE | | Total (per child) |
|------------|----------------------------|-------------------------|--------------------------|---------------------------|------------------------|----------------------|------------------------|
| GENDER | [+F] | [-F] | [+F] | [-F] | [+F] | [-F] | |
| LEO | 12.3% [325/434] | 13% [343/379] | 3.2% [84/93] | 8.6% [228/248] | 0.2% [6/9] | 1.5% [40/40] | 38.8% [1,026/1,205] |
| SIMON | 15% [395/471] | 15.1% [400/455] | 2.3% [62/70] | 8.4% [222/257] | 0.2% [4/8] | 1.4% [37/40] | 42.3% [1,120/1,301] |
| SOL | 1.1% [30/39] | 0.9% [24/27] | 0.03% [1/2] | 0.5% [14/11] | 0.04% [1/1] | 0.1% [3/4] | 2.8% [73/84] |
| Subtotal | 28.4% [750/944] | 29% [767/861] | 5.5% [147/165] | 17.5% [464/516] | 0.4% [11/18] | 3% [80/84] | |
| Total | 57.4% [1,517/1,805] | | 23% [611/681] | | 3.4% [91/102] | | |

Percentages calculated over 2,643 (=100%)
[Total accurate / total, per category and child]

With regards to morphology and as suggested in Harris' (1991) classification, inner-core structures are more common than outer-core, and these ones, on their turn, are more frequent in the data than residue ones. The same gender distribution that is reflected in Table 5 is seen when classifying DPs

²² In Table 6 DPs with null nouns have been excluded because the corresponding morphological markers in the nouns were not actually uttered by the children (i.e. they were null). Therefore, although percentages are calculated in terms of the total of DPs produced (2,643), the totals in the total row add up to 2,588 instead of 2,643.

in terms of morphology so that masculine DPs are more frequent than feminine ones in the three classes (inner-core, outer-core and residue).

In what follows, a detailed account of non-adult-like cases is provided where the eighteen non-adult-like DPs produced by SOL are removed from the analysis.

5.4.2. The three dimensions of gender and non-adult-like cases

A total of 406 cases of non-adult-like DPs have been produced by Simon and Leo. Two types of non-adult-like production appear: DPs with non-adult null determiners (269 cases) and DPs with non-adult patterns (137 cases). We will deal with determiner omission errors in section 5.4.3. With regards to non-adult cases, three patterns appear, as illustrated in (33):

- (33) a. *(el) tiburón blanco* (Leo, 3;10) partial matching
(the-M) shark-M white-M
'(the) white shark'
b. *una serpiente (=serpiente)* (Simon, 3; 10) matching but non-adult form
a-F snake-F
c. *el (=la) comida* (Leo, 2;11) non-matching
the-M food-F

The first two patterns evidence that matching could occur but still result in a non-adult-like DP, either because, although matching between N and A takes place (thus the term 'partial matching'), the determiner is null while it should be overt (as in 33a; a total of 7 cases appear in the data); or because, although matching between D and N occurs, the form of the noun is non-adult (as in 33b; a total of 7 cases are found). The third pattern corresponds to non-matching DPs (as in 33c; 123 cases in total). In the tables below we concentrate on non-matching DPs.

The distribution of non-matching DPs in terms of semantics is shown in Table 7:

TABLE 7. Non-matching cases: semantics & gender

| SEMANTICS OF N | [+animate] | | | | [-animate] | | Total (per child) |
|----------------|---------------------|---------|------------------------|------------------------|---------------------------|------------------------|----------------------|
| | [+human] | | [-human] | | [+F] | [-F] | |
| GENDER OF N | [+F] | [-F] | [+F] | [-F] | [+F] | [-F] | |
| LEO | 0.8% [1/15] | [-/55] | 4.1% [5/54] | 0.8% [1/225] | 57% [70/481] | 4.1% [5/401] | 66.8% [82/1231] |
| SIMON | 3.2% [4/28] | [-/48] | 3.2% [4/75] | 0.8% [1/317] | 24.4% [30/454] | 1.6% [2/399] | 33.2% [41/1321] |
| Subtotal | 4% [5/43] | [-/103] | 7.3% [9/129] | 1.6% [2/542] | 81.4% [100/935] | 5.7% [7/800] | |
| Total | 4% [5/146] | | 8.9% [11/671] | | 87.1% [107/1,735] | | |

Percentages calculated over 123 (=100%)

[Total accurate / total, per category and child]

More gender problems appear in the data with [-animate] nouns and, in fact, a hierarchy of difficulty could be established linked to animacy and humanness, whereby [-animate] nouns are the most problematic and [+animate, +human] are the least problematic, [+animate, -human] being in between. Also, as animacy decreases more problems with [+F] nouns appear while errors with [-F] nouns are more stable across the three semantic categories. As the totals in the last column to the right suggests, Leo significantly produces more non-matching cases than Simon (p-value<.001) and this is exclusively attributed to [-animate] [+F] cases (as the rest of the contrasts are not significant: p-values>.05).

The classification of non-adult-like cases in terms of morphology yields a total of eleven cases, which amounts to 0.4% of the twins' total production (2,552). Of these eleven cases, eight correspond to nouns with non-adult morphology, five of which correspond to Leo and three to Simon. These very few cases involve more [-F] nouns and, in particular, outer-core nouns turned into inner-core nouns, as in (34a), and masculine inner-core nouns turned into feminine inner-core nouns, as in (34b):

- | | | | | |
|------|----|---|---------------|---|
| (34) | a. | uno azoto (=un azote) a-M spank-M | (Leo, 2;11) | from outer-core to inner-core, [-F] |
| | | un árbol (=árbol) a-M tree-M | (Leo, 3;00) | from outer-core to inner-core, [-F] |
| | | el escondite (=escondite) x2 the-M hiding place-M | (Simon, 4;09) | from outer-core to inner-core, [-F] |
| | | una serpiente (=serpiente) a-F snake-F | (Simon, 3;10) | from outer-core to inner-core, [+F] |
| | | unas floro (=flores) some-F flowers-M | (Leo, 4;01) | from outer-core to inner-core, [+F] |
| | b. | e(l) zapata (=zapato) the-M shoe-F | (Leo, 1;10) | from inner-core [-F] to inner-core [+F] |
| | | el tornilla (=tornillo) the-M screw-F | (Leo, 4;04) | from inner-core [-F] to inner-core [+F] |

This shows that nouns in the residue are never problematic. It also shows that, as expected, there is a specific directionality in these non-adult-like cases (from the outer-core to the inner-core) and that feminine as the superordinate only absorbs the default masculine in two occasions (corresponding to 0.07% out of the overall production).

Together with the eight cases of non-adult nouns, there are three cases of determiners with a non-adult morphology and these are the one in (34a) *uno azoto*, and the two in (35):

- | | | | |
|------|-------------------------|---------------|-------------------------------------|
| (35) | uno (=un) pirata | (Simon, 3;10) | from outer-core to inner-core, [-F] |
|------|-------------------------|---------------|-------------------------------------|

a-M pirate-M
lo (=el) aro
the-M ring-M

(Leo, 3;08) from outer-core to inner-core, [-F]

Even if there are only three cases, the same tendency is seen for Ns and Ds, i.e. a shift from the outer-core to the inner-core.

With regards to the 123 DPs with gender mismatches (4.8% of the overall production), their classification in terms of DP forms is shown in Table 8:

TABLE 8. Non-matching cases: gender concord mismatches

| DP FORM | D - (N) [/50] | | D - N [/1,859] | | D - N - A [/112] | | (D) -N - A [/16] | | TOTAL [/2,037] |
|----------|------------------|--------------|-------------------|----------------|---------------------|---------------|---------------------|-------------|---------------------|
| | FM | MF | FM | MF | FM | MF | FM | MF | |
| LEO | -- | 1.62% [2] | 6.5% [8] | 48.8% [60] | 0.81% [1] | 9% [11] | -- | -- | 66.7% [82/975] |
| SIMON | -- | -- | 4.1% [5] | 26.82% [33] | -- | 1.6% [2] | -- | 0.8% [1] | 33.3% [41/1,006] |
| Subtotal | -- | 1.6% [2] | 10.6% [13] | 75.6% [93] | 0.8% [1] | 10.6% [13] | -- | 0.8% [1] | |
| Total | | 1.6% [2] | | 86.2% [106] | | 11.4% [14] | | 0.8% [1] | |

Percentages calculated over 123 (=100%)

Overall, a higher error rate appears in Leo's production if compared to Simon's (p-value<.001). Most gender mismatches affect DPs of the type D-N. There is a clear overgeneralization of masculine determiners (MF = masculine D + feminine N; 88.6%) and very few cases where feminine determiners are used instead of masculine ones (FM = feminine D + masculine N; 11.4%) (p-value<.001).

DPs containing an adjective of the type D-(N)-A (as in 26g above) and (D)-(N)-A (as in 26i above) show no gender mismatches and the rest of the DP forms with adjectives show a very low error rate. The fact that concord errors with adjectives are rather low has been pointed out by different studies. Royle and Valois' (2007) study on N-A concord within the DP concludes that the experimental data from Spanish monolingual children show no such errors as opposed to French monolinguals.

Given the significant difference (p-value<.001) between errors attributed to morphology (0.4% out of the overall data) and those attributed to gender mismatches (4.8%), we can conclude that grammatical gender of DP components and DP gender concord do not vary as a function of the predictive value for gender of the noun ending, that is, morphology (noun ending) does not guide

syntax (gender concord) (as pointed out by Monnery 2001 and Jakubowicz and Roulet 2008 in their analyses on gender concord processing by children).

5.4.3. Developmental approach

An analysis of the Spanish bilingual data based on the five developmental stages defined in Table 2 is provided below and the total number of DPs produced by each child in each stage is shown in Table 9:

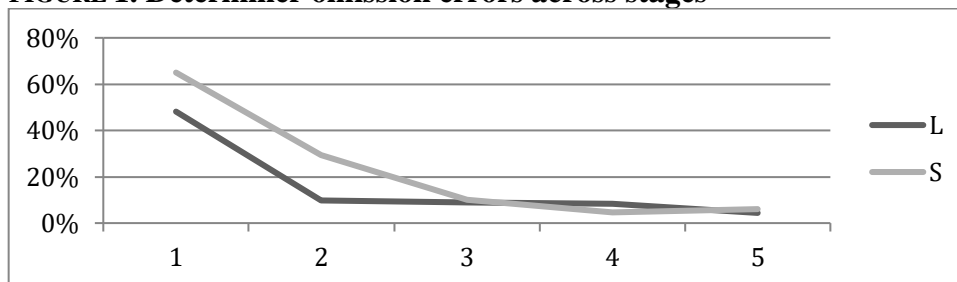
TABLE 9. DP production across developmental stages

| | 1 [1;01 – 2;04] | 2 [2;05 – 2;10] | 3 [2;11 – 3;04] | 4 [3;05 – 4;00] | 5 [4;01 – 5;09] | TOTAL |
|-----------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------|
| LEO | 3.2% [81] | 4.4% [114] | 10.4% [266] | 12.3% [314] | 17.9% [456] | 48.2% [1,231] |
| SIMO N | 3.1% [80] | 4.4% [112] | 9.4% [241] | 15.3% [390] | 19.5% [498] | 51.8% [1,321] |
| TOTAL | 6.3% [161] | 8.8% [226] | 19.8% [507] | 27.6% [704] | 37.4% [954] | 100% [2,552] |

Percentages in figures below are calculated for each stage over the total number of cases the child produced in that stage.

Regarding determiner omission errors (which correspond to 11% of the overall production), Figure 1 shows that by stage 2 (2;05-2;10) these types of errors drop for both children:

FIGURE 1. Determiner omission errors across stages



In the case of Leo, the decrease takes place by stage 2 while, in the case of Simon, it is split into two phases: one by stage 2 and a second one by stage 3. But by stage 3, determiner omission almost ceases to occur. This is similar to what has been reported in the case of monolingual Spanish (e.g. Mariscal 1998, Serra et al. 1999, 2000) as well in different studies on bilingual acquisition (e.g. Müller 1994, Kupisch, Müller & Cantone 2002, Hulk 2004).

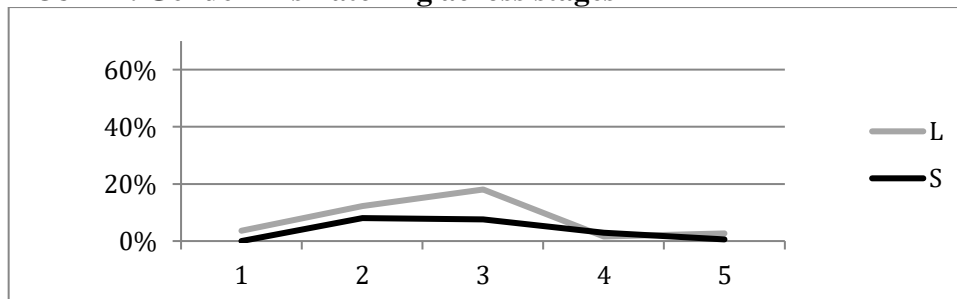
Twenty-nine cases of MPHs appear in the data and of these only seven cases of gender mismatches are produced. All of them show masculine MPHs instead of feminine ones, as the examples in (36) show:

- (36) **e** (=el → =la) cámara (Leo, 2;05) [-F] MPH + [+F] inner-core N
the-M camera-F
e (=el → =la) bolsa (Simon, 2;05) [-F] MPH + [+F] inner-core N
the-M bag-F

It could be argued that the masculine form is used as the default gender form. These gender mismatches with MPHs appear in stage 1 (2 cases at 2;01), stage 2 (4 cases at 2;05) and stage 4 (1 case at 3;05). This could be correlated to Liceras, Díaz and Mongeon's (2000) proposal regarding MPHs as the precursors of the adult grammar so that when the adult DP syntax is projected and MPHs cease to occur, gender mismatches are also reduced (by stage 4, as we will see in Figure 2). A similar argument has also been put forward by Mariscal (2008).

The distribution of gender mismatching errors (which correspond to 4.8% of the overall production) per stages is shown in Figure 2:

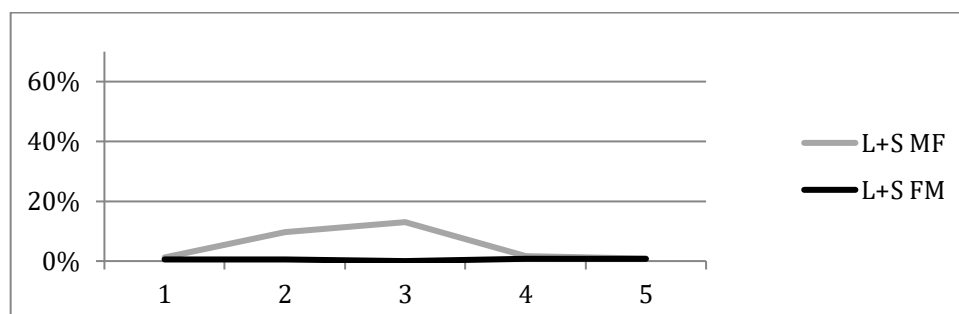
FIGURE 2. Gender mismatching across stages



Gender mismatches appear in a very low proportion in the data and most disappear by stage 4 for Leo, who is the one that produces more of these cases (see Table 8). It could then be argued that by 3;00 the adult grammar is in place after a first developmental phase of determiner omission and a second phase of MPHs and gender mismatching cases.

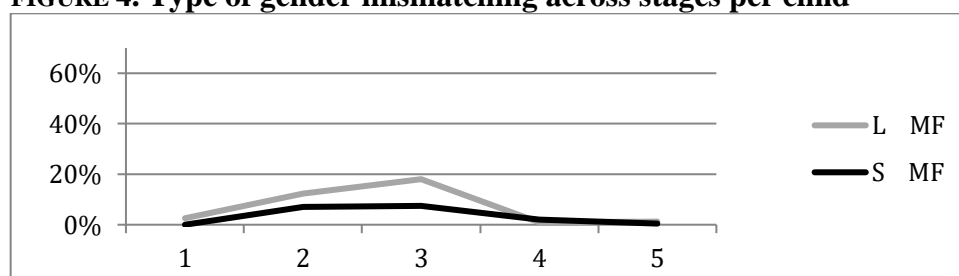
When considering whether the overgeneralized form in mismatched DPs is the masculine or the feminine one, MF patterns (masculine determiner with a feminine noun) outnumber FM ones (feminine determiner with a masculine noun) and the first ones drop sharply by stage 3, as Figure 3 shows:

FIGURE 3. Type of gender mismatching across stages



If data corresponding to the MF pattern are split for each child, as in Figure 4, the same tendency appears although Leo shows more mismatching cases:

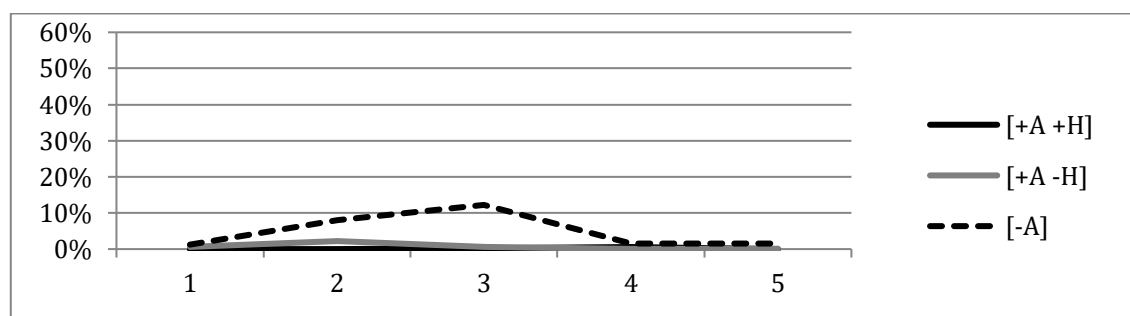
FIGURE 4. Type of gender mismatching across stages per child



Regarding commission errors attributed to morphology, these are rather anecdotal, as in (34) and (35) above. Eleven cases of this type appear and they are distributed across the 5 stages. The tendency is in most cases to turn outer-core Ns or Ds into inner-core. In the case of the determiners, definite and indefinite articles are used in the same proportion and the only three non-adult-like cases found correspond two to the indefinite article and one to the definite article. This is similar to what Müller (1994) reported which she attributed to the referential value of indefinite articles.

Figure 5 shows the interaction of gender mismatching cases in the three semantic categories ([+/-animate], [+/-human]) across stages:

FIGURE 5. Type of gender mismatching & semantics across stages



[+A +H] = [+animate, +human]; [+A -H] = [+animate, -human]; [-A] = [-animate]

As indicated in Table 7, gender mismatching cases correlate with [-animate] DPs and these cease to occur by stage 4.

6. Conclusions

We have analyzed the Spanish linguistic production data of a set of Spanish/English bilingual twins in order to account for the acquisition of grammatical gender in L1 bilingual Spanish. Our results show a high degree of accuracy (84%) and early acquisition of grammatical gender (by 3;00) and are, thus, in line with previous works on the acquisition of monolingual child Spanish (e.g. Licerias, Díaz & Mongeon 2000, Serra et al. 2000, Mariscal 2008).

The analysis reveals that N morphology (WM) and syntax (grammatical gender) are in place from the very first stage, which evidences that (i) even in the initial stages of acquisition morphology does not guide the production so that the fact that a noun ends in *-o* or *-a* does not entail that the noun is represented in the mental lexicon with masculine or feminine inherent gender features; and (ii) Ns come with their grammatical gender already valued from the lexicon. These two issues point (i) to the independence between morphology and syntax (as defended by Harris 1991 and Roca 2005); and (ii) to grammatical gender being an inherent property of Ns (as in Carstens 2010).

DP syntax (i.e. when concord requires D and A uninterpretable/unvalued features to be valued, as in (14) above) is also unproblematic and morphology is again not guiding the concord mechanism. When considering the few instances of morphology errors and gender mismatching errors, a tendency is seen in that (i) the shift goes from the outer-core to the inner-core (a directionality pointed out by Roca 1989, as in (17), and predicted in Harris' 1991 classification); (ii) DPs containing non-animate Ns are more vulnerable to errors; and (iii) masculine gender is the one being overgeneralized which accounts for its being the default gender. So, given the independence of the three domains, some correlations do appear (as predicted by Roca 1989, Harris 1991 and Carstens 2010 and as outlined in (16)).

Determiner omission errors are significantly the most common type of non-adult-like DP production and these are mainly restricted to the initial stages (Figure 1). This suggests that in an initial stage Ns are selected from the lexicon (with their valued gender feature) but DP syntax (as in (14)) is not projected yet. Once projected, the N roots selected are merged with Ds (and As) which are assigned an uninterpretable gender feature. Gender feature valuation takes place so that the uninterpretable gender feature in D activates the appropriate set of root Ns and gender concord proceeds as in the adult grammar.

Further work on this topic would involve the analysis of the Spanish input (as in Sánchez-Sadek, Kiraithe and Villarreal 1976, and as Harris and Roca also suggest). The comparison of our results with those from Spanish monolingual data classified using our codification procedure could provide a more complete picture of this approach to Spanish grammatical gender. The role of the other language of the bilinguals, i.e. English, could also be analyzed in terms of gender marking from a more semantic perspective, given that English does not have grammatical gender (as in Mills 1986, Corbett 1991 and Namai 2000).

7. References

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