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The Role of Grammatical Gender in Spanish-English Switched DPs and Copula Constructions

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The Role of Grammatical Gender in Spanish-English Switched DPs and Copula Constructions

Presentada por Tamara Gómez Carrero
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A Pili, Santos, Jon & Pablo

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ABSTRACT

Codeswitching is a language-contact phenomenon which is characterized by the simultaneous use of the two languages of the bilingual and which has been used as a tool to investigate how these two languages interact in the mind of the bilingual. The present investigation focuses on English-Spanish codeswitching within Determiner Phrases (DP switches) and within copulative constructions with an Adjective Phrase (Adj switches). By following the minimalist premises proposed by MacSwan (1999, 2000) and by Liceras et al. (2005, 2008, 2016), two issues have been under consideration: (i) the directionality of the switch, and (ii) the gender agreement mechanisms in Spanish DP switches and in Spanish Adj switches (i.e., the analogical criterion, both [+AC] and [-AC], and the masculine as default). Experimental data have been collected via three experiments from two groups of L1 Spanish – L2 English bilingual speakers (i.e., children and adults): (i) an eyetracking during reading task, (ii) a reaction time task in Gorilla, and (iii) a visual world paradigm task. Thus, both offline and online experimental data have been elicited and analyzed, as well as compared to those in previous studies. Overall, regarding the directionality of the switch, the results indicate that English DP switches and English Adj switches are processed faster and are preferred. In the case of the gender agreement mechanisms, the results point to a hierarchy (i.e., [+AC] < masculine as default < [-AC]), which shows how strongly represented Spanish gender features are in the mind of these bilinguals for whom Spanish is their L1. However, children and adults show differences which could be attributed to (i) the complexity of the structure in terms of lexical access (i.e., Adj switches are more complex than DP switches), (ii) the type of data (i.e., different patterns are found depending on whether offline data or online data are considered), (iii) the implementation of the requirements imposed by feature strength (i.e., children's performance is affected when experimental conditions make the task harder), and (iv) the interplay between the three.

Keywords: codeswitching; Spanish grammatical gender; DP switches; Adj switches; directionality of the switch; gender agreement mechanisms; offline and online data; children and adults; L1 Spanish – L2 English.

RESUMEN

La alternancia de código es un fenómeno de contacto de lenguas que se caracteriza por el uso simultáneo de las dos lenguas del bilingüe y que se ha utilizado como herramienta para investigar cómo estas interactúan en el cerebro del bilingüe. La presente investigación se centra en la alternancia de código entre el inglés y el español en sintagmas determinante y estructuras copulativas con un sintagma adjetivo. Se parte de la premisa minimalista propuesta por MacSwan (1999, 2000) y Liceras et al. (2005, 2008, 2016) para situar el foco en dos aspectos: (i) la direccionalidad del cambio de código y (ii) la concordancia de género gramatical (el criterio analógico, tanto [+AC] como [-AC], y el masculino por defecto). Se han recogido datos experimentales de dos grupos de participantes L1 español – L2 inglés (niños y adultos) mediante tres experimentos: (i) uno de lectura con seguimiento ocular, (ii) uno de tiempos de reacción en Gorilla y (iii) uno del paradigma del mundo visual. Así, se han recogido y analizado datos experimentales *offline* y *online* y a su vez se han comparado con los de estudios previos. En general, en cuanto a la direccionalidad, los resultados indican lo mismo para ambas estructuras: mayor facilidad de procesamiento y preferencia por las estructuras donde el determinante y el adjetivo están en inglés. En cuanto a la concordancia de género, los resultados apuntan a una jerarquía ([+AC] < masculino por defecto < [-AC]) que refleja cómo de fuerte es la representación de los rasgos de género en la mente de estos bilingües para los que el español es la L1. Sin embargo, existen diferencias entre los dos grupos de participantes que se atribuyen (i) a la complejidad de la estructura en términos de acceso léxico (los sintagmas adjetivos son más complejos que los sintagmas determinantes), (ii) al tipo de datos (se han encontrado patrones diferentes dependiendo de si los datos son *online* u *offline*), (iii) a la implementación de los requisitos que impone el cotejo de rasgos (la actuación de los niños se ve afectada cuando las condiciones experimentales se endurecen) y (iv) a la interacción entre estos tres aspectos.

Palabas clave: alternancia de código; género gramatical del español; sintagma determinante con alternancia de código; sintagma adjetivo con alternancia de código; direccionalidad del cambio de código; concordancia de género gramatical; datos *offline* y *online;* niños y adultos; L1 español – L2 inglés.

LIST OF ABBREVIATIONS

[F] = gender agreement feature

3rd p. = 3rd person

AC = analogical criterion

Adj = adjective

CP = complementizer phrase

Det = determiner

DM = Distributed Morphology

DP = determiner phrase

EN = English

ƒ = feminine (Harris, 1991)

Fem. = feminine

GEN = gender feature

INF = infinitive

LF = logical form

Masc. = masculine

Masc. Def. = masculine as default

Masc. Default = masculine as default

MLF = Matrix Language Frame

MP = Minimalist Program

n = nominalizing head

N = noun

NP = noun phrase

P = preposition

PF = phonological form

Sing = singular

SP = Spanish

TP = tense phrase

V = verb

VP = verb phrase

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CHAPTER 1. INTRODUCTION

Codeswitching is a language-contact phenomenon which is characterized by the simultaneous use of the two languages of the bilingual. During the last decade, codeswitching has been of wide interest for researchers from multiple fields (e.g., sociolinguistics, psycholinguistics, formal linguistics), as it is an excellent scenario to investigate issues such as how the properties of the two language systems interact in the bilingual mind (e.g., Arnaus Gil et al., 2021; Cantone & MacSwan, 2009; Fairchild & Van Hell, 2017; Fernández Fuertes et al., 2019; Jorschick et al., 2011; Liceras et al., 2008, 2016; López, 2020; Valdés Kroff et al., 2017).

Many have been the frameworks from which codeswitching has been approached and discussed. Some have attempted to impose specific constraints which determine which switching points are allowed and which linguistic elements can be switched (i.e., the constraint-based approaches), while others have attempted to analyze bilingual speech using the same mechanisms as in monolingual speech (i.e., constraint-free approaches). Among the latter, the study of codeswitching within the Minimalist Program (MacSwan, 1999, 2000) aims at keeping only the essential theoretical assumptions to account for linguistic data in general and specifically so in the case of data involving codeswitching.

In the present investigation, the minimalist premises proposed by MacSwan (1999, 2000) and by Liceras et al. (2005, 2008, 2016) are taken as a point of departure to examine both the directionality of the switch as well as Spanish grammatical gender in codeswitching, as this framework puts gender features at the forefront and uses the gender valuation mechanisms to explain the bilingual's codeswitching preferences and processing.

The present investigation focuses on English-Spanish codeswitching within two structures: (i) the Determiner Phrase (DP) switches, which involve language alternation between a functional category, i.e., the Determiner (Det), and a lexical category, the Noun (N), as in (1); and (ii) the Adjective (Adj) switches, where codeswitching occurs

between the DP subject and the copulative verb with an Adjective Phrase (AdjP) as subject complement, as in (2) [1].

1. [2]

a) The *casa*	/	The *libro*	[English Det + Spanish N]
the house $_{\text{SP fem. N}}$	/	the book $_{\text{SP masc. N}}$	
"the house"	/	"the book"	
b) *La* house	/	*El* book	[Spanish Det + English N]
the $_{\text{SP fem. Det}}$ house	/	the $_{\text{SP masc. Det}}$ book	
"the house"	/	"the book"	

2.

a) *La casa* is white	/	*El libro* is white	[Spanish DP + English Adj]
the house $_{\text{SP fem. DP}}$ is white	/	the book $_{\text{SP masc. DP}}$ is white	
"the house is white"	/	"the book is white"	
b) The house *es blanca*	/	The book *es blanco*	[English DP + Spanish Adj]
the house is white $_{\text{SP fem. AdjP}}$	/	the book is white $_{\text{SP masc. AdjP}}$	
"the house is white"	/	"the book is white"	

The two target structures are used to examine two issues which are prevalent in the codeswitching literature: (i) the directionality of the switch, that is, which language (i.e., English or Spanish) provides the Det in DP switches, (1.a) vs. (1.b), and the Adj in Adj switches, (2.a) vs. (2.b); and (ii) the gender agreement mechanisms, where three scenarios can occur: (iia) there is gender agreement between the Det/Adj and the Spanish translation equivalent of the English N/DP ([+AC]), as in (3.a) and (4.a); (iib) there is a lack of gender agreement between the Det/Adj and the N/DP ([-AC]), as in (3.b) and (4.b); or the gender of the Det/Adj is masculine as default regardless of the gender of the Spanish translation equivalent of the English N/DP, as in (3.c) and (4.c).

[1] Along this dissertation, and in order to simplify the reference to the two target constructions, these will be referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la*$_{\text{the}}$ house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es*$_{\text{is}}$ *roja*$_{\text{red}}$).

[2] Along this dissertation, languages different from English are in italics; EN = English; SP = Spanish; fem. = feminine; masc. = masculine; masc. def./ Masc. Default = masculine as default

3.

a) *La* house / *El* book [+AC]

the SP fem. Det house = SP fem. N '*casa*' / the SP masc. Det book = SP masc. N '*libro*'

"the house" / "the book"

b) *El* house / *La* book [-AC]

the SP masc. Det house = SP fem. N '*casa*' / the SP fem. Det book = SP masc. N '*libro*'

"the house" / "the book"

c) *El* house / *El* book Masc. Default

the SP masc. def. Det house = SP fem. N '*casa*' / the SP masc. def. Det book = SP masc. N '*libro*'

"the house" / "the book"

4.

a) The house *es blanca* / The book *es blanco* [+AC]

the house = SP fem. DP 'la casa' is white SP fem. AdjP/the book = SP masc. DP '*el libro*' is white SP masc. AdjP

"the house is white" / "the book is white"

b) The house *es blanco* / The book *es blanca* [-AC]

the house = SP fem. DP 'la casa' is white SP masc. AdjP/ the book = SP masc. DP 'el *libro*' is white SP fem. AdjP

"the house is white" / "the book is white"

c) The house *es blanco* / The book *es blanco* Masc. Default

the house = SP fem. 'la casa' is white SP masc. def. Adj/ the book = SP masc. '*el libro*' is white SP masc. def. AdjP

"the house is white" / "the book is white"

The two structures (i.e., DP switches and Adj switches) have been selected because the two target issues (i.e., directionality of the switch and gender agreement mechanisms) can be explored in both constructions. Indeed, previous studies have considered them, especially DP switches, but they have never been compared. The way gender features are valued in each case and the number of lexical categories involved in each structure can allow us to further explore the two target issues more in depth.

These two issues are explored by analyzing experimental data, both offline data (e.g., judgments and word selection data) and online data (i.e., eyetracking data and reaction times), as three different experiments have been implemented (i.e., an eyetracking during reading task, a reaction time task in Gorilla and a visual world paradigm task). This data combination allows us to have a broader perspective on (i) how

the two languages interact in the bilingual mind in terms of the activation and the inhibition of Spanish grammatical gender features; and (ii) how Spanish grammatical gender is represented in the mind of the bilingual speaker and how this representation influences the bilingual's processing and preferences. Indeed, by using two types of experimental data, the present investigation contributes more data to the study of Spanish grammatical gender in switched DPs which allows for different analyses that can contribute to broaden our understanding of codeswitching (e.g., Fairchild & Van Hell, 2017; Fernández Fuertes et al., 2011, in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d; Liceras et al., 2008; Litcofsky & Van Hell, 2017, among others). Furthermore, this study offers a new window in the analysis of codeswitching by adding a structure which has not yet been paid much attention, i.e., Adj switches (e.g., Fernández Fuertes et al., 2011; Gómez Carrero & Fernández Fuertes, 2021d; Klassen & Liceras, 2017; Liceras et al., 2017; Valenzuela et al., 2012).

The data from the three experiments have been collected from two groups of participants: L1 Spanish – L2 English bilingual adults and L1 Spanish – L2 English bilingual children. Although they have the same linguistic profile in terms of Spanish being their L1, they differ in age, which allows us to examine whether participants show different processing costs and preferences based on their age. That is, we will be able to shed some light on whether both groups are guided by the same grammatical operations and to what extent this guidance is similar, or whether differences between them appear due to age difference. This could be particularly relevant in the case of processing data like the ones examined here, given adults' higher experience with language.

Thus, the present dissertation is divided into the following 6 chapters. Chapter 2 presents a description of the codeswitching phenomenon and how it has formally been accounted for along the last decades. Special attention has been given to the two issues under study (i.e., the directionality of the switch and the gender agreement mechanisms) and how they have been described from a minimalist point of view. Finally, a note on how the formal features involved in codeswitching might be dealt with during language processing is provided.

Chapter 3 offers an empirical approach to the phenomenon of codeswitching with a focus on the two issues under consideration. In this chapter, the findings from previous

studies are presented taking into account the type of data they make use of (i.e., spontaneous or experimental data), as well as the profile of the participants involved (i.e., L1 Spanish, L1 English, HL Spanish or HL English).

Chapter 4 consists of the description of the three experiments implemented in the study as well as of the participants that took part in the investigation. Also, the data codification procedure and the statistical methods used in the data analysis are detailed.

Taking as a point of departure the revision done in chapters 2 and 3, chapter 5 presents the three research questions which guide the present dissertation. Predictions are outlined for each research question, too.

Chapter 6 is dedicated to the analysis of the data elicited with the experiments described in chapter 4 and following the research questions presented in chapter 5. These results are then discussed in chapter 7, in which formal and empirical accounts on codeswitching and Spanish grammatical gender are taken into account. The main conclusions drawn from this study are presented at the end of chapter 7. The main contributions as well as the limitations which have been found along the development of the present study are outlined, which also gives way to suggestions for further work.

CHAPTER 2: FORMAL ACCOUNTS ON BILINGUAL PROCESSING AND CODESWITCHING

In this chapter, the focus is set on providing a detailed description of the formal proposals under which codeswitching has been explored during the last decades and the role gender features play in switched structures when the two languages involved differ in terms of grammatical gender (i.e., English and Spanish). In particular, two switches are under consideration: (i) between a Det and an N, as in (5); and (ii) between a DP subject and an AdjP subject complement in Adj switches, as in (6)[3].

5.

a) The *casa*	/	The *libro*	[English Det + Spanish N]
the house $_{\text{SP fem. N}}$	/	the book $_{\text{SP masc. N}}$	
"the house"	/	"the book"	
b) *La* house	/	*El* book	[Spanish Det + English N]
the $_{\text{SP fem. Det}}$ house	/	the $_{\text{SP masc. Det}}$ book	
"the house"	/	"the book"	

6.

a) *La casa* is white	/	*El libro* is white	[Spanish DP + English Adj]
the house $_{\text{SP fem. DP}}$ is white	/	the book $_{\text{SP masc. DP}}$ is white	
"the house is white"	/	"the book is white"	
b) The house *es blanca*	/	The book *es blanco*	[English DP + Spanish Adj]
the house is white $_{\text{SP fem. AdjP}}$	/	the book is white $_{\text{SP masc. AdjP}}$	
"the house is white"	/	"the book is white"	

In example (5), the switch involves a functional category, the Det, and a lexical category, the N. In this case, two structures can result depending on the language that provides the functional category: in (5.a) English provides the Det, while in (5.b) Spanish provides this category. Example (6) illustrates codeswitching between the DP subject and the AdjP subject complement. In this case, the focus is set on two lexical categories, the

[3] Along this dissertation, and in order to simplify the reference to the two target constructions, these are referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la*$_{\text{the}}$ house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es*$_{\text{is}}$ *roja*$_{\text{red}}$).

N and the Adj. Again, two structures can result from the combination of English and Spanish: in (6.a) Spanish provides the DP subject while English provides the copulative verb and the AdjP subject complement, while in (6.b) the DP subject is in English while the AdjP subject complement and the copulative verb are in Spanish.

This chapter is organized into three major sections: section 2.1. provides information about bilingual processing in general terms; section 2.2. examines codeswitching as a bilingual phenomenon and describes the most relevant frameworks under which it has been explored; section 2.3. provides an account of the Spanish grammatical gender system and offers a detailed description of how gender features in Spanish are instantiated in switched structures, as well as how the relevance of these formal features is manifested in processing. Finally, the main issues discussed in the chapter appear in a summary section which establishes the main theoretical foundations of this dissertation.

2.1. Bilingual processing: one mind, two languages

A bilingual is not two monolinguals in one person (Grosjean, 1989), although a logical assumption could be that the bilingual mind is organized into the two independently represented language systems (e.g., Fernández Fuertes & Liceras, 2018b). Yet, it has been demonstrated that bilinguals show certain degree of simultaneous activation and interaction of the two languages, even in situations totally driven by just one of the languages (e.g., Bialystok et al., 2012; Kootstra, 2015; Kroll et al., 2012). That is, the two languages are activated at the same time when one is used; they can never be turned off although they can be "turned down" (Tokowicz & Perfetti, 2005, p. 174). Although the activation of the dominant language while using the weaker language is not surprising (e.g., Kroll et al., 2015, 2016; MacWhinney, 2005), it has been shown that the weaker language can also be active while the dominant language is used (e.g., Gullifer et al., 2013; Kroll et al., 2015; Van Hell & Dijkstra, 2002). Moreover, parallel activation has been found in spoken word recognition and production (e.g., Kroll et al., 2006; Kroll & Gollan, 2014; Marian & Spivey, 2003), as well as in reading (e.g., Kroll et al., 2016).

In this joint or parallel activation, the two languages are competing for selection at the level of the lexicon and grammar. This selection results in the suppression of one of the two languages, that is, the inhibition of the non-target language (Bialystok et al.,

2012). Two types of inhibition can be distinguished: global inhibition and local inhibition (de Groot & Christoffels, 2006). While global inhibition refers to the complete suppression of one of the two languages, local inhibition indicates the suppression of a specific competing alternative (e.g., a translation equivalent) (see section 2.3.3 for more detailed information). Both types of inhibition have linguistic and cognitive consequences for bilinguals, such as reduced speed and fluency of lexical access (Bialystok et al., 2012; Olson, 2016). At the same time, both activation and inhibition are modulated by contextual, linguistic, and cognitive factors (Bialystok et al., 2012).

Joint activation and constant interaction are manifested through the existence of phenomena such as crosslinguistic influence or codeswitching (Fernández Fuertes & Liceras, 2018b) (see section 2.2. for more details). Codeswitching consists in the alternation of two languages within the same discourse, so there is a constant interplay between activation and inhibition. Encountering a codeswitched structure while reading, for example, supposes certain degree of crosslinguistic conflict (Adler et al., 2020) and, therefore, certain degree of processing costs when integrating codeswitching (e.g., Altarriba et al., 1996; Litcofsky & Van Hell, 2017; Meuter & Allport, 1999; Moreno et al., 2002) (see section 2.3.3. for more details). Yet bilinguals usually resolve this conflict and rarely arrive at the wrong interpretation of codeswitched sentences (e.g., Beatty-Martínez & Dussias, 2017; Fricke et al., 2016; Guzzardo Tamargo et al., 2016; Kootstra et al., 2012; Valdés Kroff et al., 2017). Thus, bilingual minds differ from monolingual ones, not because of the advantages or disadvantages bilingualism may create, but because "bilinguals recruit mental resources different from monolinguals" (Kroll & Bialystok, 2013, p. 2).

2.2. Codeswitching, a bilingual phenomenon

The joint activation and constant interaction of the two languages may result into codeswitching, a bilingual phenomenon which arises in contexts where languages are in contact. Since it cannot be considered a mere slip of the tongue but an inherent ability of bilinguals, codeswitching has been used to explore how the properties of the two languages interact in the bilingual mind (e.g., Arnaus Gil et al., 2012; Burkholder, 2018; Fairchild & Van Hell, 2017; Fernández Fuertes et al., 2019; Jorschick et al., 2011; Klassen & Liceras, 2017; Liceras et al., 2008, 2016; Valdés Kroff et al., 2017; Valenzuela et al.,

2012). This bilingual phenomenon has been defined as "the ability to alternate between languages in an unchanged setting, often within the same utterance" (Bullock & Toribio, 2009, p. 2) or simply as a "back-and-forth motion between two languages" (López, 2018, p. 2).

By taking the complementizer phrase (CP) as a reference, linguists distinguish between two types of switches: inter-sentential switches occur at the boundaries of the CP, as in (7.a), while intra-sentential switches occur within the CP, as in (7.b).

7.

a) *Fui al supermercado*, and I bought some milk

I went to the supermarket $_{SP\ CP}$, and I bought some milk $_{EN\ CP}$

"I went to the supermarket, and I bought some milk"

(Valdés Kroff et al., 2020, p. 2)

b) *Mi hermano* bought some ice-cream

My brother $_{SP\ DP}$ bought some ice-cream $_{EN\ VP}$

"My brother bought some ice-cream"

(MacSwan, 2009, p. 309)

The preference in the production of one type of switch over the other may depend on individual factors such as language proficiency (Miccio et al., 2009; Muysken, 2000; Poplack, 1980; Toribio, 2001, 2011; Valdés Kroff & Fernández-Duque, 2017; Zentella, 1981, 1997), as well as on social factors such as the language pairs involved (Poplack, 1988) or the location of the community (Aaron, 2015; Toribio, 2011).

Intra-sentential codeswitching, the one under investigation in this dissertation, has been widely attested in the spontaneous data of both bilingual adults and bilingual children with various language pairs such as Spanish-English (e.g., Fernández Fuertes & Liceras, 2018b; Guzzardo Tamargo et al., 2016; Liceras et al., 2005; Moyer, 1992; Myers-Scotton & Jake, 2000b; Poplack, 1980; Ramírez Urbaneja, 2020; Torres Cacoullos & Travis, 2016; Valdés Kroff, 2016), Spanish-German (e.g., Arnaus Gil et al., 2012; Eichler et al., 2012; González-Vilbazo, 2005; Poeste et al., 2019), German-Italian (e.g., Cantone & Müller, 2008; Jansen et al., 2012), Welsh-English (e.g., Deuchar, 2006; Herring et al., 2010), or English-Norwegian (e.g., Grimstad et al., 2018; Riksem, 2018), among others.

Codeswitching has been studied under diverse perspectives since the 1970s. Some of them have advocated for a third grammar or at least have imposed some codeswitching-specific constraints (section 2.2.1); others have attempted to analyze bilingual speech as monolingual speech, where "exactly the same principles which apply to monolingual speech apply to codeswitching" (Mahootian, 1993, p. 3) (section 2.2.2). Some of the most influential proposals and theories discussed in the codeswitching literature will be described along the following sections.

2.2.1. Constraint-based approaches to codeswitching

2.2.1.1. The early studies

The term codeswitching was originally introduced by Vogt (1954) in his review of Weinreich's (1953) seminal work *Languages in Contact.* Weinreich (1953), among other early scholars, considered codeswitching as a "deviant language behavior" and ascribed it to deficits in intelligence and in linguistic mastery (e.g., Espinosa, 1917; Haugen, 1953; McKinstry, 1930). Nonetheless, the negative perception of codeswitching has been strongly rejected by an extensive body of research along the last decades and, instead, codeswitching has been considered a "suggestive indicator of the degree of bilingual competence" (Poplack, 1980, p. 616).

In the 1970s, codeswitching began to be regarded as an independent topic of study and researchers approached it from diverse perspectives, mainly focusing on the social and grammatical perspectives of this phenomenon. Early researchers intended to set the foundations for a descriptive framework with a focus on the social factors that motivated switching behaviors in natural conversations and the social implications of this bilingual behavior (e.g., Blom & Gumperz, 1972; Gumperz, 1982; Gumperz & Hernández-Chávez, 1971; Valdés Fallis, 1976). At this point, researchers observed that language switching, like other linguistic behavior, was systematic and rule-governed and that there were some grammatical restrictions on this phenomenon which established where codeswitching could or could not occur (Lipski, 1978; Pfaff, 1979; Timm, 1975, 1978).

Poplack (1980, 1981) and Sankoff and Poplack (1981) articulate this observation in two theoretical constraints: The Equivalence Constraint and the Free Morpheme Constraint. The former contends that codeswitching is only possible at points where the

surface structures of the two languages involved in the switch are similar, so that the grammar of neither language is violated.

8.

a) *told *le, le* told

I told $_{EN}$ to him $_{SP}$, to him $_{SP}$ I told $_{EN}$

"I told him"

b) *him *dije*, *dije* him

him $_{EN}$ I told $_{SP}$, I told $_{SP}$ him $_{EN}$

"I told him"

(Poplack, 1981, p. 176)

This would make example (8) not allowed in English-Spanish codeswitching because the word order in both (8.a) and (8.b) is impossible in both languages and, thus, this would violate their grammars.

Under the Free Morpheme Constraint, a bound morpheme cannot be attached to a lexical item unless the latter is phonologically integrated in the language of the bound morpheme. Thus, example (9) would be disallowed since the English verb, 'to eat', is a lexical item which is not phonologically integrated in Spanish, so that, the Spanish suffix '*-iendo*' cannot be affixed to the verb.

9. **estoy* eat*iendo*

I am eat $_{EN}$ -ing $_{SP}$

"I'm eating"

(Poplack, 1980, p. 586)

Within the Government and Binding framework, Di Sciullo et al. (1986) propose the Government Constraint which posits that, where government holds, switching is inhibited; that is, the language of the head determines the syntax of the maximal projection. Therefore, a switch between a verb and its complement, as in (10), or between a preposition and its complement, as in (11), would be ruled out. However, even

if they do not abide by the Government Constraint, these examples are indeed attested in the literature, and they occur in the case of different language pairs (MacSwan, 2009).

10. This morning *mi hermano y yo fuimos a* <u>*comprar* some milk</u>
    This morning $_{EN}$ my brother and I went to buy $_{SP\ V}$ some milk $_{EN\ DP}$
    "This morning my brother and I went to buy some milk"
11. *J'ai joué* <u>*avec* il-ku:ra</u>
    I have played with $_{French\ P}$ the ball $_{Arabic\ DP}$
    "I have played with the ball"

(MacSwan, 2009, p. 317)

Belazi et al. (1994) propose the Functional Head Constraint which is based on Abney's (1987) proposal regarding the special relationship between functional and lexical categories, which he called *feature selection* (phi-selection)—the notion that functional heads select the features of their complements—, as well as on Chomsky's (1993) assumption of the phi-selection as "a member of a set of feature-checking processes" (Belazi et al., 1994, p. 228). Thus, the concept of language feature ([+Spanish] or [+English]) is introduced in the bilingual literature by assuming that [language] is "one of the relevant features being checked" (Belazi et al., 1994, p. 228). Besides, as functional categories are now conceived as responsible for the selection of complements with specific feature matrices, together with the Functional Head Constraint, Belazi et al. (1994) propose that the language feature of the complement selected by the functional head must match the language feature of the functional head. Thus, according to the authors, the Functional Head Constraint limits switches between a functional head and its complement due to the strong relationship between them. This way, switching would be disallowed between a Det and an N, as in (12), since we are dealing with a functional category, that is, an English Det, and its complement, which is a lexical category, a Spanish N.

12. *He is <u>a *demonio*</u>

    He is a $_{EN\ Det}$ devil $_{SP\ N}$

    "He is a devil"

(Belazi et al., 1994, p. 227)

Although most of these researchers do not believe in the necessity of a third grammar to account for switched utterances (e.g., Belazi et al., 1994; Di Sciullo et al., 1986; Lipski, 1985; Pfaff, 1979; Woolford, 1983), their proposals include specific constraints which attempt to determine which switching points are allowed and which linguistic elements can be switched. This research line was also followed by Myers-Scotton (1993) when proposing the Matrix Language Frame model which assumes that codeswitching is constrained by a set of rules of the languages involved. Due to the relevance of the Matrix Language Frame model within codeswitching theory, a more detailed description can be found in section 2.2.1.2.

2.2.1.2. The Matrix Language Frame

The Matrix Language Frame (henceforth, MLF) model (Myers-Scotton, 1993, 1997) has been one of the most influential frameworks under which codeswitching has been analyzed.

The MLF model is based on the notion of asymmetry, and it is structured under the hypothesis that the "participating languages do not play equal roles in the bilingual clause" (Myers-Scotton & Jake, 2009, p. 339). Thus, the languages involved in the bilingual production are classified as the Matrix Language, i.e., the dominant language, which is responsible for providing the morphosyntactic frame, and the Embedded Language, which contributes content items. In order to understand the roles of the participating languages, the MLF model is articulated by two principles: the Morpheme Order Principle and the System Morpheme Principle. The Morpheme Order Principle claims that "the surface morpheme order will be that of the Matrix Language" in bilingual structures (Myers-Scotton, 1995, p. 239). This is observed in (13), a Welsh-English utterance in which Welsh, the Matrix Language, imposes its N-Adj word order and, thus, the English Adj 'brilliant' is placed after the Welsh N, even though English Adjs are always prenominal.

13. *oedd gynnon ni ystafell yn Plas yn Dref, ystafell* brilliant

be with-us room in Plas yn Dref room $_{\text{Welsh N}}$ brilliant $_{\text{EN Adj.}}$

"we had a room in Plas yn Dref, a brilliant room"

(Deuchar, 2006, p. 1994)

The System Morpheme Principle defends that "all syntactically or externally relevant system morphemes come only from the Matrix Language" (Myers-Scotton, 1995, p. 239). In this case, constituents are classified into two main groups: content morphemes and system morphemes. On the one hand, content morphemes are defined as being the ones conveying the semantic and pragmatic meaning of the word. Their main characteristic is that they receive or assign thematic roles and that they are accessed at the mental lexicon level. Examples of content morphemes are Ns, Vs or Adjs. As for the system morphemes, Myers-Scotton (1993, 1997) first defined them as the categories which do not receive or assign thematic roles. The system morphemes were later redefined with the introduction of the 4-Morpheme model (4-M model) (Myers-Scotton, 2006; Myers-Scotton & Jake, 2000a, 2000b, 2017). The classification offered by the 4-M model is based on how these morphemes are activated in a model of language production, what they call the Differential Access Hypothesis (Myers-Scotton, 2006). Regarding where they are accessed and the relationships they establish with the rest of the constituents, this hypothesis proposes three types of system morphemes: early system morphemes, and two types of late system morphemes: bridge system morphemes and outsider system morphemes.

The main difference between early and late morphemes is where they are activated – early morphemes are activated at the mental lexicon level and would depend on content morphemes, while late morphemes are activated at the formulator level and are considered "the cement that holds the clause together" (Myers-Scotton, 2006, p. 269). The main contrast between the two late morphemes is where they obtain the information to configure their forms. That is, bridge system morphemes occur between phrases in order to create a larger constituent, while outsider system morphemes depend on the information outside their immediate maximal projection. The latter are the ones which must come from the Matrix Language according to the System Morpheme

Principle (Jake et al., 2002). An overview of the 4-M model classification is shown in Figure 1.

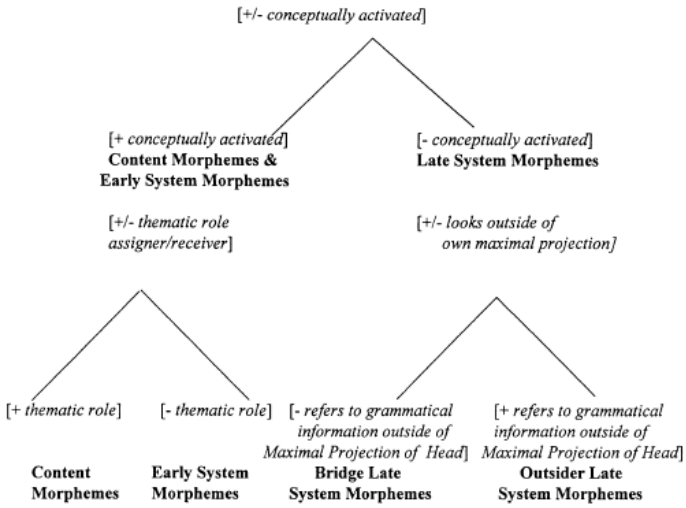


Figure 1. Feature-based classification of morphemes in the 4-M model (Myers-Scotton & Jake, 2000a, p. 1062).

Therefore, following the System Morpheme Principle, system morphemes have to be in the Matrix Language, while content morphemes are in the Embedded Language. Indeed, the morphological inflection of the subject-verb agreement indicates the Matrix Language. Thus, in (14), the Matrix Language is Welsh since the verb is in Welsh and the morphological inflection of the verb agrees with the English subject (both are third person singular).

14. *mae* *o-'n* *reit* camouflaged *yn dydi*
be Welsh 3rd p. sing. present he 3rd p. sing. quite camouflaged EN Adj be 3rd p. sing. present negative
"he's quite camouflaged, isn't he?"

(Deuchar, 2006, p. 1998)

The desire to strengthen the MLF model (with the redefinition provided by the 4-M model) as a model of codeswitching resulted into the Uniform Structure Principle (Jake et al., 2002) whose main motto is "no chaos is allowed", emphasizing again the concept of asymmetry. This underlying principle of the MLF model applies to both unilingual and bilingual speech as follows:

> A given type of any language has a uniform abstract structure and the requirements of well-formedness for this constituent type must be observed whenever the constituent appears. In bilingual speech, the structures of the Matrix Language (ML) are always preferred. Embedded Language (EL) islands (phrases from other varieties participating in the clause) are allowed if they meet EL well-formedness conditions, as well as those ML conditions applying to the clause as a whole (e.g., phrase placement). (Myers-Scotton, 2002, as cited in Myers-Scotton & Jake, 2009, p. 337)

Following from the Uniform Structure Principle, Jake et al. (2002) proposed the NP Bilingual Hypothesis to explain codeswitching between a Det and an N. This hypothesis is also structured under the notion of asymmetry, so the content morpheme, the N, would come from the Embedded Language while the Det, the system morpheme, would come from the Matrix Language, establishing the morphosyntactic frame. Besides, according to this hypothesis, the language of the Det has to coincide with the language of the inflected verb within the same clause. This is illustrated in (15), where the Matrix Language is Spanish, as it is the language of the verb as well as that of the Det, a system morpheme.

15. … *eso ya lo pusimos dentro* <u>*del*</u> time

    […this (we) already it included $_{SP\ V}$ within] $_{SP}$ the $_{SP\ Det}$ time $_{EN\ N}$

    "… we already included this within the time"

(Jake et al., 2002, p. 21)

The MLF has been supported by data from different language pairs in Myers-Scotton and colleagues' own works (e.g., Jake et al., 2002; Myers-Scotton, 1993, 1997; Myers-Scotton & Jake, 2009, 2017), as well as in other studies (e.g., Blokzijl et al., 2017; Carter et al., 2011; Deuchar, 2006, 2012; Parafita Couto & Gullberg, 2019; Parafita Couto & Rodríguez-González, 2019). However, the NP Bilingual Hypothesis falls short in explaining why patterns such as that in (16), where Spanish provides the Det but there is no Matrix Language which can be assigned—the verb *hacer* is non-finite—, or (17), where the Matrix Language is English (as the verb is finite and it is in English), but the system morpheme, the Det, is in Spanish, can also be found in literature. Also, cases such as (18), where English provides the functional category, have also been shown to be accepted by

bilingual speakers not only in the case of judgment data but also with eye-tracking data (e.g., Fernández Fuertes et al., 2019, in preparation; Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2020a, 2021a, 2021d; Herring et al., 2010; Liceras et al., 2008, 2016).

16. *Y después de* *hacer* *el* research
    And after of do SP INF V the SP Det research EN N
    "And after doing the research"

(Jake et al., 2002, p. 83)

17. We have it planned for October twenty-ninth *a las seis en el* Methodist
    we have it planned EN V for October twenty-ninth at six at the SP DET Methodist
    Student Center
    Student Center EN N
    "we have it planned for October twenty-ninth at six at the Methodist Student Center"

(Poplack, 1980, p. 311)

18. the *suelo*
    the EN Det floor SP N
    "the floor"

(Liceras et al., 2016, p. 119)

Moreover, the codeswitching literature has highlighted theoretical shortcomings regarding the MLF model. First of all, the model takes the Matrix Language and the Embedded Language as "theoretical primitives", that is, "it assumes that the language faculty would identify individual languages to give them the roles of Matrix Language or Embedded Language" (Riksem, 2018, p. 49). Besides, this model is concerned with bilingual performance and not with competence, so the two principles proposed under the MLF (Morpheme Order Principle and the System Morpheme Principle) should only be considered as observational generalizations (Åfarli & Subbarao, 2019; González-Vilbazo & López, 2011). Furthermore, the MLF model has been regarded as a "extremely limiting" view of codeswitching, since it pays little attention to dependencies (López,

2020). That is, according to López (2020), codeswitching is not merely "putting pieces from two puzzles together" but "it involves establishing a network of dependencies among the disparate constituents that conform a sentence structure" (p.6). Therefore, the MLF is not able to explain cases like (19), where the Spanish clitic '*lo'* is masculine—and feminine would be unacceptable in this case—, while its referent, the German DP '*das buch'*, is neuter.

19. Das Buch, Hans *lo* *hizo* verkaufen
the book German neuter Hans it SP clitic masc. did SP V sell
"Hans sold the book"

(López, 2020, p. 5)

Finally, and contrary to the Minimalist Program (see section 2.2.2.1), the MLF model assumes a special machinery to explain the codeswitching phenomenon, while, according to the advocates of a constraint-free approach (see section 2.2.2 below), nothing else different from what is required for the analysis of monolingual phenomena should be assumed in order to explain bilingual phenomena.

2.2.2. Constraint-free approaches to codeswitching

Codeswitching has also been studied under constraint-free approaches whose main purpose was to account for this bilingual phenomenon in the same manner as other instances of monolingual production. According to the constraint-free approaches, "exactly the same principles which apply to monolingual speech apply to codeswitching" (Mahootian, 1993, p. 3). The most relevant constraint-free proposal to account for codeswitching data is the one by MacSwan (1999, 2000, 2009, 2014) as proposed within the Minimalist Program framework (Chomsky, 1995, 2001). As this dissertation will follow minimalist assumptions to analyze codeswitching data, a more detailed description of both the Minimalist Program and its application to codeswitching can be found in the subsequent sections (2.2.2.1 and 2.2.2.2), as well as an overview of other recent constraint-free proposals (2.2.2.3).

2.2.2.1. The Minimalist Program

The Minimalist Program (MP) is a theoretical framework within the generative tradition (Chomsky, 1965, 1995, 2001, 2013). It assumes the theoretical foundation established by the Principles and Parameters framework with economy and simplicity as its leading principles. Its aim is to keep only the essential theoretical assumptions to account for linguistic data.

The MP is framed within the lexicalist approach since it relies on the lexical entries listed in the lexicon and their inherent formal features to build syntactic structures. The MP assumes two components of grammar: a computational system for human language (C_{HL}) and a lexicon. The former is invariant across languages and, in it, derivations are generated through operations such as Select, Merge and Agree; while the lexicon, whose properties may change across languages, is the "repository of all (idiosyncratic) properties of particular lexical items" (Chomsky, 2015, p. 26) and specifies the items which would enter in the computational system.

As a refined version of the Government and Binding Theory, the MP eliminates the D-structure and the S-structure constructs and preserves the Phonological Form (PF) and the Logical Form (LF) as the two levels of representation, as two interfaces. In fact, PF and LF are conceptually necessary since the aim is to characterize the mapping between meaning and form.

The MP is concerned with the properties of the derivational system more than with explaining the "burden that can be borne by constraints on levels of representation" (Chomsky, 2013, p. 483). As represented in Figure 2, lexical items fully inflected with phi-features (e.g., number, person and gender) are selected from the lexicon by the operation Select and inserted into the Numeration. The operation Merge takes items from the Numeration and creates hierarchically arranged syntactic structures which are accommodated by the operations Move and Agree. At the *overt component*, a subsystem of the computational system for human language (C_{HL}), the lexicon is mapped into Spell-out. At PF, the elements stripped away at the Spell-out are mapped by the *phonological component*, and what remains is mapped into LF by the *covert component*.

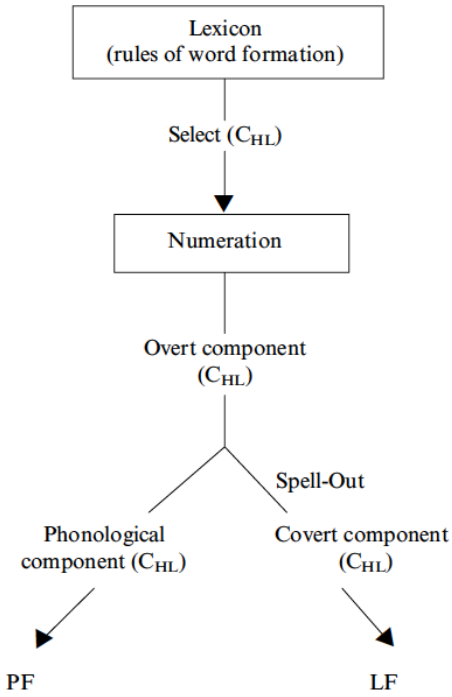


Figure 2. The Minimalist Framework (MacSwan 2000, p.44)

One key assumption of Minimalism is that lexical items coming from the lexicon can present valued or unvalued features. Unvalued (uninterpretable) features do not play a role in determining meaning, while valued (interpretable) features contribute meaning. While valued features are fully specified in the lexicon, some unvalued features need to be checked along the derivation, that is, they should "receive their value from a valued instance of the same feature, present on another lexical item" (Pesetsky & Torrego, 2007, p. 263). This is done through the Move and Agree operations. That is, elements move in order to value morphological properties as captured in phi-features. As features can be weak or strong, movements can be overt or covert. Overt movements are driven by strong features and are visible at the PF level, where they are articulated (i.e., pronounced), and at the LF level, where they are interpreted; while covert movements are driven by weak features, and they are only available at the LF level. In order for the Full Interpretation Principle, one of the Principles of Economy, to be satisfied, unvalued features which require valuation must be valued at all levels of representation, that is, both at PF and LF, since "every element of the representation has a (language-independent) interpretation" (Chomsky, 1995, p. 27). An unvalued feature will remain

unvalued if there is no matching feature; and, if it requires valuation but it cannot, the derivation crashes (Adger, 2003).

Chomsky (2001) later introduced the idea of derivation by phase and described agreement as the relation between a *probe* and a *goal*: since a probe searches for a goal in its local domain so it can assign a value to the unvalued phi-features of the goal, so that clause structure is built up in phases. Each phase plays an important role in derivation since they are the point at which an intermediate result of the derivation is spelled out.

In sum, the MP aims at accounting for language generation in a more simplified manner by considering only the minimal theoretical assumptions. Although this proposal was first conceived to describe the generation of monolingual sentences, it has also been used as the frame for diverse approaches to codeswitching during the last decades, as will be seen next (e.g., Bandi-Rao & den Dikken, 2014; González-Vilbazo & López, 2011; Hok-Shing Chan, 2003; Liceras et al., 2005, 2008, 2016; MacSwan, 1999, 2000, 2005, 2009, 2014; Moro Quintanilla, 2014, 2016; Radford et al., 2007).

2.2.2.2. The Minimalist Program in codeswitching

As a lexicalist framework, the MP contextualizes the building structures from an array of lexical items inflected with formal features, thus allowing codeswitching researchers to investigate the structural consequences of lexical items from specific languages instead of tracking which language contributes which lexical element during the final stage of lexical insertion (MacSwan, 2009). At the same time, maintaining only the minimal theoretical assumptions to account for linguistic data results in a constraint-free theory which approaches codeswitching data in the same way as it approaches monolingual data, instead of a theory which only involves codeswitching-specific mechanisms.

With the proposal that "nothing constraints codeswitching apart from the requirements of the mixed grammars" (MacSwan, 2000, p. 43), MacSwan (1999, 2000) introduces a model for the bilingual mind formed by two lexicons, one per language, and one computational system for human language (C_{HL}). His proposal of the bilingual language faculty, derived from the minimalist framework proposed in Figure 2 is illustrated in Figure 3. It follows from the lexicalist nature of the MP, that all crosslinguistic variation is lexically encoded, that is why there are two lexicons, one per language, and

syntactic operations are assumed to be invariant, that is why there is just one computational system for human language (C_{HL}). Therefore, languages differ in terms of the strength of the features of their lexical and functional elements, "allowing a great simplification in our conception of bilingualism" (MacSwan, 2000, p. 44).

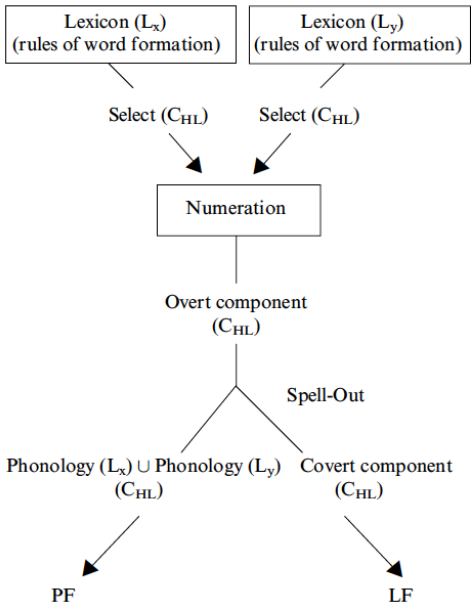


Figure 3. Minimalist proposal of the bilingual language faculty (MacSwan, 2000, p.52)

In this model no mediating mechanisms are involved, and the derivational operations which participate in the generation of monolingual utterances are used, at the same time, in the creation of codeswitched structures (see section 2.2.2.1. for a description of the MP). According to MacSwan (2013), the constraint-free nature of this model does not imply that there are no unacceptable codeswitched sentences, but that "all of the facts of codeswitching may be explained just in terms of principles and requirements of the specific grammars used in each specific utterance" (p.337).

By proposing this constraint-free configuration of the bilingual mind based on the MP, MacSwan shed some light on the possibility of intra-sentential codeswitching, such as codeswitching within the DP, as in (20), which was considered ungrammatical in previous studies (e.g., Belazi et al., 1994; Di Sciullo et al., 1986; Joshi, 1985; Poplack, 1980; Toribio, 2001), but which has been widely attested in the literature (e.g., Azuma, 1993; Cantone & Müller, 2008; Jorschick et al., 2011; Liceras et al., 2008; Moro Quintanilla,

2014; Moyer, 1992; Myers-Scotton & Jake, 2001; Parafita Couto & Gullberg, 2019; Poplack, 1980; Radford et al., 2007; Valdés Kroff, 2016; among many others).

20.

a) *Otro* book

another $_{\text{SP masc.}}$ book

"another book"

(Liceras et al., 2005, p. 235)

b) *un* sheep

a $_{\text{SP masc.}}$ sheep

"a sheep"

(Spradlin et al., 2003, p. 304)

In this type of switches, gender features (gender and gender agreement) are at stake. Under the minimalist framework proposed by MacSwan (1999, 2000) and later adapted by Liceras et al. (2005, 2008, 2016) to explain switched DPs, unvalued gender features (gender and gender agreement) must be valued against the corresponding valued features, so that the derivation does not crash. By underlining the strength of formal features as crucial for the understanding of the bilingual speakers' preferences in terms of switched DPs, Liceras et al. (2005, 2008, 2016) take Pesetsky and Torrego's (2001, 2007) double feature valuation proposal and apply it to gender in order to explain examples such as those in (20). A more detailed explanation of Liceras et al.'s (2005, 2008) framework is presented in section 2.3., since it is the one used for the analysis of codeswitching data in this dissertation.

Thus, under the minimalist framework, many studies have explored the role gender features play in the production, judgment and processing of English-Spanish switches within the DP (e.g., Fernández Fuertes et al., 2019, in preparation; Gómez Carrero, 2015; Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, & Martínez, 2019; Gómez Carrero & Fernández Fuertes, 2017, 2020a, 2021d; Moro Quintanilla, 2014) and within copula constructions with an AdjP (e.g., Fernández Fuertes & Liceras, 2018a; Gómez Carrero, Fernández Fuertes, & Martínez, 2019; Gómez Carrero

& Fernández Fuertes, 2021d; Klassen & Liceras, 2017; Liceras et al., 2017; Valenzuela et al., 2012). This will constitute of the focus of section 2.3.

2.2.2.3. Other constraint-free approaches: the non-lexicalist proposals

Recently, there has been an increasing interest in incorporating other constraint-free approaches, such as the non-lexicalist approach, in the study of codeswitching with the belief that previous models (i.e., the MLF model or the MP) fell short in explaining certain switched sequences, such as word-internal switches (Åfarli, 2015; Åfarli & Subbarao, 2019; Alexiadou & Lohndal, 2018; González-Vilbazo & López, 2011) or because these proposals were too restrictive to analyze switches within, for example, the DP (Burkholder, 2018; Grimstad et al., 2018; López, 2020; Riksem, 2018).

Within the non-lexical approaches, the exoskeletal models have been widely used in the analysis of both monolingual and, more recently, bilingual data. Although each model has its own specificities, they all share the assumption that structures are generated independently of the lexical items that make them up. Thus, contrary to what it was assumed by the MP, lexical items do not have functional features which determine the derivation; instead, functional features are defined by syntactic structures.

The exoskeletal analysis proposed for the study of codeswitching builds on some aspects of the Distributed Morphology framework (Halle & Marantz, 1993). The information which, according to the MP, is stored in the lexicon (phonological information, semantic information, category and syntactic features) is now distributed into three lists: syntactic terminals (list 1), vocabulary items (list 2), and encyclopedia (list 3), which are accessed at different points in the derivation (Kramer, 2015).

The syntactic terminal list (list 1) consists of two elements: bare lexical roots and abstract morphemes. The former has no morphosyntactic features while abstract morphemes contain morphosyntactic features. These two types of elements are selected at Numeration and combine to create morphologically complex words (Burkholder, 2018). Yet, the resulting syntactic terminals still have no phonological or semantic information. Thus, at Spell-out, once the syntactic derivation is complete, the derivation is sent to the PF or the LF. At the PF, vocabulary items from list 2 are mappings of the syntactic terminals with phonological information. However, these vocabulary items from list 2 are morphologically underspecified, so they compete for insertion into the fully

specified syntactic nodes. According to the Subset Principle (Halle, 1997), functional exponents have to match all or a subset of functional features specified in the structure to be inserted. Thus, if there are two functional exponents, the one matching most features wins. On the other hand, substantial exponents, i.e., roots, are inserted in the slots but they do not need to accomplish any feature matching requirements. Finally, list 3, the encyclopedia, houses the semantic information.

This model has been used to analyze English-Norwegian DPs (Grimstad et al., 2018; Riksem, 2018) and English-Norwegian word-internal mixes (Grimstad et al., 2015) as well as French-English DPs (Burkholder, 2018). Although their analyses may vary in the case of switched DPs, Grimstad et al. (2018), Riksem (2018) and Burkholder (2018) share the conception that structures are generated independently from the lexical items.

In the case of the English-Norwegian DPs, Grimstad et al. (2018) introduce a functional projection called F, in which features are generated, while the N stem is generated as a complement of F. This is illustrated in Figure 4.

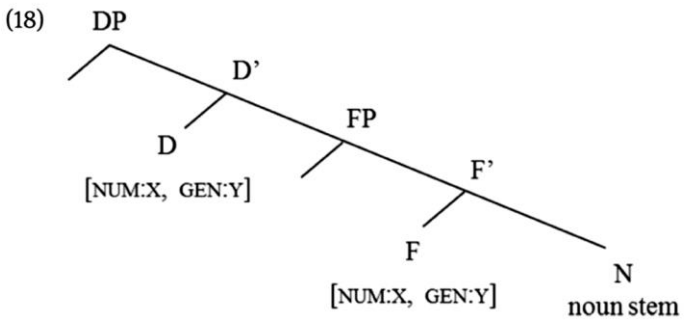


Figure 4. Exoskeletal representation of the DP (Grimstad et al., 2018, p.204)

According to Grimstad et al. (2018), the N stem from any language will acquire the grammatical properties of the language that specifies the syntactic frame. So that, this makes switching "fairly free" (p.205). This means that, as illustrated in Figure 5, where Norwegian provides the Det and English provides the N ('*denne* cheese' – 'this cheese'), gender and number are determined by the syntactic frame, which in this case is Norwegian. Following the Subset Principle, functional exponents, i.e., the Det, must provide the best match to the functional features in the structure. In this case in which

the syntactic structure is provided by Norwegian, the functional projection includes number and gender features, and its complement position can be filled by an English N.

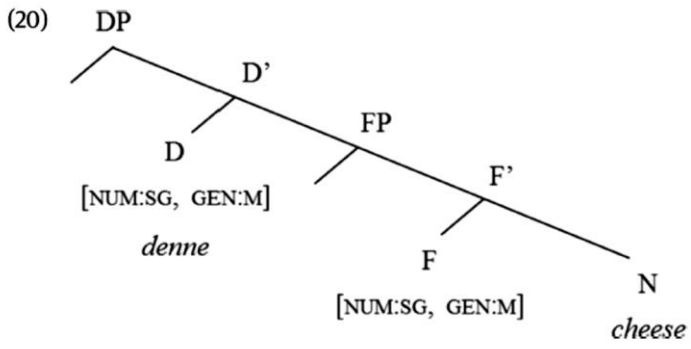


Figure 5. Exoskeletal representation of the Norwegian-English DP (Grimstad et al., 2018, p.206).

With this exoskeletal proposal, Grimstad et al. (2018) analyze structures in which English provides the Det as well as the syntactic structure, and at the same time, they compare them to the English Det + Spanish N switches ('the $_{\text{EN Det}}$ *casa* $_{\text{SP N}}$' – 'the house') which Moro Quintanilla (2014) considered ill-formed. Both the English Det + Norwegian N and the English Det + Spanish N structures shown in Figure 6 are possible under exoskeletal premises. The problem with the gender feature would be solved up because the syntactic frame is English, and English has no grammatical gender.

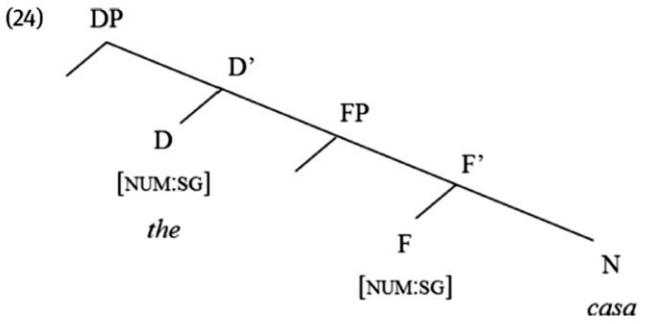


Figure 6. Exoskeletal representation of the English Det + Spanish N switches (Grimstad et al., 2018, p.208)

Burkholder (2018) also uses the Distributed Morphology to account for codeswitching within the DP. She proposes a model for English-Spanish switched DPs and takes this proposal to analyze French-English switched DPs. She assumes two separate

distributed lexicons and, during the codeswitching mode, constituents from each language compete for insertion.

Following the Distributed Morphology framework, Burkholder's (2018) proposal for Spanish-English switched DPs goes in line with unmixed Spanish DPs. In unmixed Spanish DPs, Spanish bare lexical roots merge with a nominalizing head, *n*, which is bundled together with unvalued gender features (u[+feminine] or u[-feminine]), while English *n* is plain as it has no grammatical gender features. Burkholder (2018) includes Kramer's (2015) theme nodes which are appended to *n* after Spell-out, and this is done according to vocabulary insertion rules. In Spanish Det + English N switches ('*la* $_{\text{SP Det}}$ house $_{\text{EN N}}$'— 'the house'), Burkholder's (2018) proposal contends that an English bare lexical root merges with the corresponding Spanish *n*, which is bundled together with the unvalued gender features (u[+feminine] or u[-feminine]). In this case, the Spanish Det values its unvalued phi-features against the feature bundle containing the corresponding gender feature. As according to Burkholder's (2018) proposal it is assumed that Spanish has two *n*s (u[+feminine] and u[-feminine]), three results are possible depending on which Spanish *n* the English root will be licensed under in the context of mixed DPs: (i) completely arbitrary; (ii) licensing English roots under the u[-feminine] by default (e.g., '*el* $_{\text{masc. def.}}$ house' or '*el* $_{\text{masc. def.}}$ book' – 'the house' or ' the book'); or (iii) licensing English roots under the *n* of its translation equivalent (e.g., u[+feminine] in '*la* $_{\text{fem.}}$ house $_{\text{= SP fem. '}casa\text{'}}$' – 'the house' or u[-feminine] in '*el* $_{\text{masc.}}$ book$_{\text{= SP masc. '}libro\text{'}}$' – 'the book').

English Det + Spanish N switches ('the $_{\text{EN Det}}$ *casa* $_{\text{SP N'}}$— 'the house') are blocked in Burkholder's (2018) proposal. In this case, a Spanish bare lexical root merges with an English *n*, which has no grammatical gender. Thus, as the theme node insertion rule applies, nothing is inserted, so the bound root cannot get a theme vowel to complete its phonological form. The only possibility for the theme node to be inserted and, therefore, to have a successful phonological realization of the N, is that the Spanish root merges with a Spanish *n*. However, this would only lead to the insertion of the Spanish Det '*la*', since the Det terminal node has a feminine feature, thus resulting in a unilingual DP ('*la* $_{\text{SP Det}}$ *casa* $_{\text{SP N}}$'— 'the house').

Another model under which codeswitching data has been studied is the Minimalist Distributed Morphology (López, 2020), which combines the realizational

morphology implemented by the Distributed Morphology with the assumptions of the MP in an attempt to provide a unified system that explains the bilingual grammar.

The Minimalist Distributed Morphology takes the Distributed Morphology assumption that the lexicon is no longer central and that it is divided into two lists (list 1 and list 2). In opposition to MacSwan's (2000) minimalist conception (Figure 3), and to Burkholder's (2018) proposal, the Minimalist Distributed Morphology defends the existence of just one lexicon (1Lex Minimalist Distributed Morphology). List 1 contains abstract roots and grammatical features, while list 2 is a set of rules of vocabulary insertion which assigns a phonetic shape to the syntactic terminals. López (2020) argues that bilinguals have one computational system consisting of only one list 1, one list 2 and one set of vocabulary insertion rules (p.17). This means that bilinguals have one list containing roots from their two languages and one list containing vocabulary insertion rules from the two languages.

With this model, López (2020) has explored gender assignment and concord in switched DPs with diverse language pairs (Spanish-English, Spanish-Basque, Spanish-Nahuatl and Spanish-German) in order to examine the empirical consequences this model has for codeswitching.

In the case of English-Spanish switched DPs, the structure that concerns us in this dissertation, López (2020) proposes that the same root may have two different spell-outs (i.e., '*mes-*' and 'table') and that it combines with *n*. In the case of English, *n* has no extra properties, while for Spanish, *n* has two values corresponding to gender ([+feminine] and [-feminine]). Also, the relationship between the gender feature and the N ending involves diverse rules which go from /a/ and /o/ being (almost) exclusively related to feminine and masculine genders respectively to zero realization when the N ends in a consonant. In Figure 7, López's (2020) proposal for '*mesa'* and 'table' are shown.

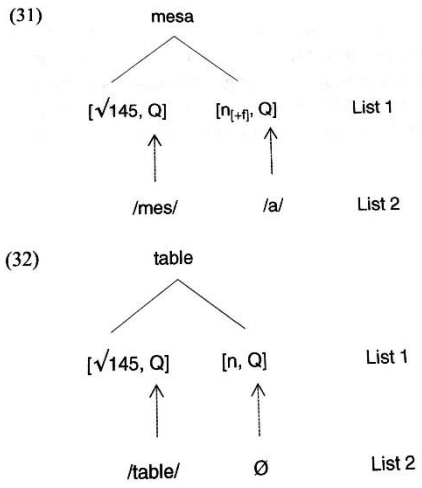


Figure 7. Representation of 'table' and '*mesa*' in the 1Lex Minimalist Distributed Morphology model (López 2020, p.93).

In switched DPs, the two vocabulary insertion rules exemplified in Figure 7 are available for the bilingual speaker. Thus, /table/ can be selected by n[+feminine] and thus realized as '*la* table', as in Figure 8, while 'the *mesa*', according to López (2020), is the selection of n[+feminine] by a featureless English Det, as in Figure 9 (p. 94).

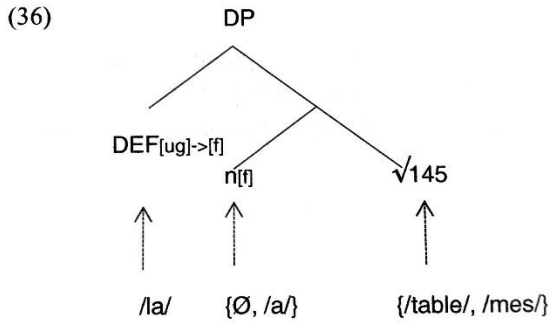


Figure 8. Representation of '*la* table' within the 1Lex Minimalist Distributed Morphology model (López, 2020, p. 96)

In Figure 8, as 'table' and '*mes*-' are alternative spell-outs of the same root (p. 96) because there is just one list 1 for both languages, the root (/table/, /*mes*-/) merges with an *n*[+feminine] and the latter merges with a Det with an unvalued gender feature. The unvalued gender feature of the Det is valued against the *n*[+feminine]. According to López (2020), '*la* table', as in (21.b), is possible because 'table' is one of the possible spell-outs of the root. Although both 'table' and '*mes*-' are the possible spell-outs of the same root,

López (2020) takes 'table' as the only spell-out to propose other possible outcomes shown in (21) (p.97):

21.

a) DEF + n + [√145, /table/] : the table

b) DEF $_{[uGEN]}$ + n$_{[+fem]}$ + [√145, /table/] : *la* table

c) DEF $_{[uGEN]}$ + n + [√145, /table/] : the table

d) DEF + n$_{[+fem]}$ + [√145, /table/] : the table

In (21.a), the root spells out as 'table' and it is selected by an English *n*, which is plain, and the English *n* is selected by an English Det. As in Figure 8 above, in (21.b) '*la* table' is possible because 'table' merges with an *n*[+feminine], and the unvalued gender feature of the definite (DEF) Det is valued against the *n*[+feminine]. Thus, the Spanish Det is inserted. In the case of (21.c), the definite (DEF) Det with unvalued gender features selects an English *n* which is plain, so that the unvalued gender features would remain unvalued. In this case, only the English Det can be inserted because the Spanish Dets do have gender features. Finally, in (21.d) the Spanish *n*[+feminine] is selected by a definite English Det which has no unvalued gender feature. If instead of 'table', the spell-out of the root is '*mes-',* (21.d) would be 'the *mesa*' as illustrated in Figure 9.

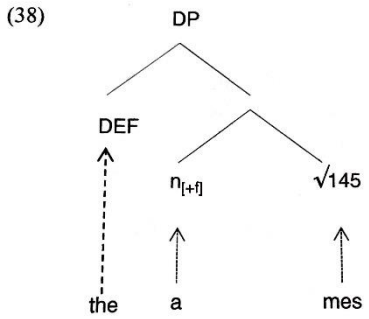


Figure 9. Representation of 'the *mesa*' within the 1Lex Minimalist Distributed Morphology model (López, 2020, p. 98)

In Figure 9, the root /mes-/ is realized with the N ending /-a/, which is the spell-out of *n*[+feminine], so the NP is feminine, yet the Det has no gender features because it is in English.

In sum, Lopez's (2020) 1Lex Minimalist Distributed Morphology framework attempts to avoid the overgeneralization of unacceptable switched structures which he contends are produced by the MP (where two lexicons are involved). According to López (2020), MacSwan's (1999, 2000) proposal for codeswitching is "too restrictive and hard to apply" so he puts forward an alternative based on restrictions like selection combined with the analyses of the grammatical features of the languages involved (p. 196).

Although the varied non-lexicalist proposals present interesting approaches to codeswitching data, some of them, like the Distributed Morphology proposed by Burkholder (2018), fail to explain structures where English provides the functional category, as in (18), and which have been widely accepted in judgment data by bilinguals with different linguistic profiles. The exoskeletal framework (Grimstad et al., 2018) as well as the 1Lex Minimalist Distributed Morphology model (López, 2020) are more flexible in terms of the directionality of the switch, that is, they are able to explain why both English Det + Spanish N and Spanish Det + English N are possible and accepted in codeswitching. However, they fail to explain how some common gender agreement strategies, i.e., the masculine as default gender, can also arise and are widely accepted and produced by bilingual speakers (e.g., Liceras et al., 2008; Valdés Kroff, 2016). In fact, the Minimalist Distributed Morphology model describes this combination as "aberrant" and unlikely to occur within this framework (p. 188).

In short, codeswitching has been framed within varied perspectives and models; some of them imposing constraints and trying to create a specific grammar for codeswitching (section 2.2.1), while some others have explored codeswitching data with just the requirements of the languages involved (section 2.2.2). For the purpose of this dissertation, constraint-free approaches will be used in the analysis of codeswitching data; in particular, DP switches and Adj switches will be examined following minimalist premises, in which gender features are put at the forefront and the gender valuation mechanisms are used to explain codeswitching preferences as well as how these structures are processed by the bilingual speaker. The role of formal features in codeswitching as well as their consequences in terms of processing are examined in the subsequent sections.

2.3. English-Spanish codeswitching: the role of formal features

The processing and production of Spanish gender features in English-Spanish switched structures have been central to provide an insight into the specific characteristics of the bilingual grammar and the diverse psycholinguistic mechanisms involved. In fact, the focus on this language pair and on these specific structures (i.e., the DP switches and the Adj switches) allows us to understand how features are represented in the bilingual mind (e.g., Fernández Fuertes, Álvarez de la Fuente, et al., 2016; Fernández Fuertes et al., 2019, in preparation; Klassen & Liceras, 2017; Liceras et al., 2017; Valenzuela et al., 2012).

In this dissertation, the focus is set on grammatical gender, the syntactic dimension of gender, in English-Spanish switched sequences; in particular, in two specific structures: (i) switched DPs where the codeswitching happens between a Det and an N, as in (22), and (ii) Adj switches where the codeswitching occurs between a DP subject and an Adj, as in (23).

22. The *casa* / *La* house
    the $_{\text{EN Det}}$ house $_{\text{SP N}}$ / the $_{\text{SP Det}}$ house $_{\text{EN N}}$
    "the house"
23. *La casa* is white / The house es blanca
    the house $_{\text{SP DP}}$ is white $_{\text{EN AdjP}}$ / the house $_{\text{EN DP}}$ is white $_{\text{SP AdjP}}$
    "the house is white"

In both switched sequences, the languages involved differ in terms of the presence/absence of grammatical gender: English has no grammatical gender while Spanish has a dual gender system with masculine and feminine.

In Spanish, gender is an inherent feature of the N. Although semantically animate Ns can be classified as masculine or feminine according to their biological sex (male or female), as in (24), the distribution of Spanish grammatical gender in inanimate Ns is considered an arbitrary phenomenon (Corbett, 1991; Roca, 1989) since it is impossible to establish a conventional classification of the properties which are strictly masculine (25) or strictly feminine (26).

24.

a) *niño*	"male child"	[Masc. N]
b) *niña*	"female child"	[Fem. N]

25.

a) *libr-**o***	"book"	[Masc. canonical N]
b) *lápi-**z***	"pencil"	[Masc. non-canonical N]

26.

a) *cas-**a***	"house"	[Fem. canonical N]
b) *carn-**e***	"meat"	[Fem. non-canonical N]

Harris (1991) argues that the formal representation of grammatical gender in Spanish involves a non-binary gender mark (i.e., *f*) which stands for 'feminine'. Thus, masculine is considered the unmarked or default gender. This default status has been supported with the nominalization of verbal infinitives (e.g., '*es un decir*' – 'it is a saying'), compound Ns, even when they involve a feminine N, (e.g., '*un abrelatas*'– 'a tin opener') or in coordinated phrases involving Ns with different gender values (e.g., '*los bonitos pueblos* masc. *y aldeas* fem. *de la region*' – 'the beautiful towns and villages of the region') (Ambadiang, 1999, p. 4861). Roca (1989, 2005a, 2005b) also considers masculine the default gender in Spanish, yet he identifies a binary gender formally represented as [+/- feminine].

In general terms, the distribution of Ns in the masculine-feminine paradigm can be explained morphologically through final suffixes or word markers (Harris, 1991): Ns ending in -o are normally masculine (25.a), while Ns ending in -a tend to be feminine (26.a). Yet, there are also masculine Ns which end in a consonant or a vowel different from -o (25.b), and feminine Ns which end in a consonant or in a vowel different from -a (26.b) (see Fernández Fuertes, Álvarez de la Fuente, et al., 2016 for a more detailed account).

Gender is formally expressed on other words such as Dets through the operation of concord, as in (27), or Adjs (in copulative constructions) through the operation of agreement, as in (28).

27.

a) El lápiz

the SP masc. Det pencil SP masc. N

“the pencil”

b) La pared

the SP fem. Det wall SP fem. N

“the wall”

28.

a) El libro es rojo

the SP masc. Det book SP masc. N is red SP masc. Adj

“the book is red”

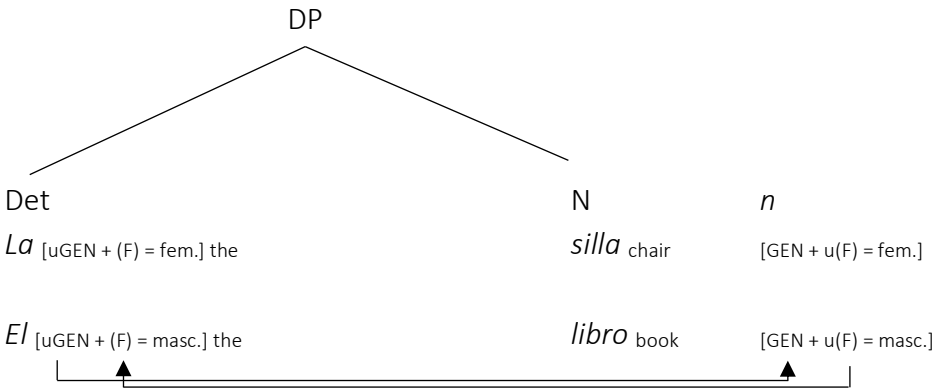
b) La casa es amarilla

the SP fem. Det house SP fem. N is yellow SP fem. Adj

“the house is yellow”

Following minimalist premises, as explained in section 2.2.2.1, features like gender can be valued or unvalued (Chomsky, 1995, 2001). Carstens (2010), following Pesetsky and Torrego’s (2001, 2007) feature typology proposal, argues that valued and interpretable features go together in the case of gender and that a double gender feature valuation process takes place. As introduced in section 2.2.2.2., Liceras et al. (2008, 2016) take this feature valuation process as a point of departure and apply it to unilingual DP structures in Spanish as well as to Spanish-English switched DPs. Starting with Spanish DPs, the two features that need to be valued are the gender feature ([GEN]) and the gender agreement feature ([F]). The gender feature ([GEN]) is an N feature. It is an inherent lexical feature of N which has a functional category, *n*, working as a normalizer (Kihm, 2005; Kramer, 2015). The gender agreement feature ([F]) is a Det feature. The double gender feature valuation in Spanish DPs proceeds as in (29).

29.

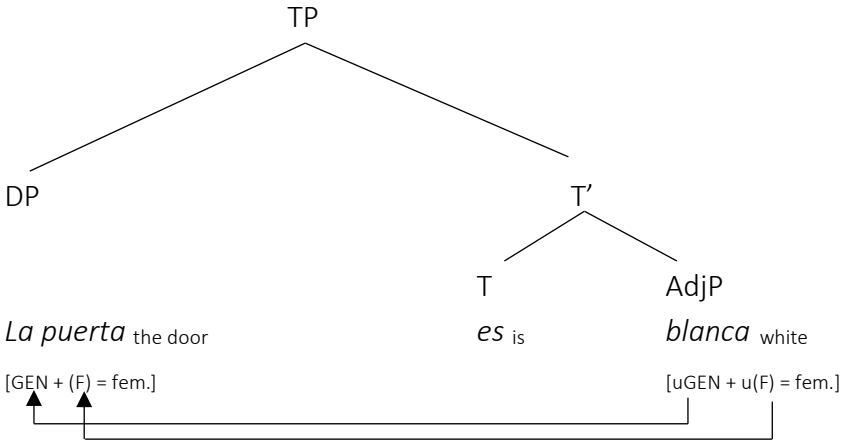


(Liceras et al., 2008, p. 836)

Thus, as illustrated in (29), Liceras et al. (2008, 2016) claim that, for the derivation not to crash, the unvalued gender feature ([uGEN]) in the Spanish Det is valued against the gender feature ([GEN]) in the N. The same process is followed by the unvalued gender agreement feature ([uF]) of the Spanish N, which is valued against the one in the Spanish Det ([F]).

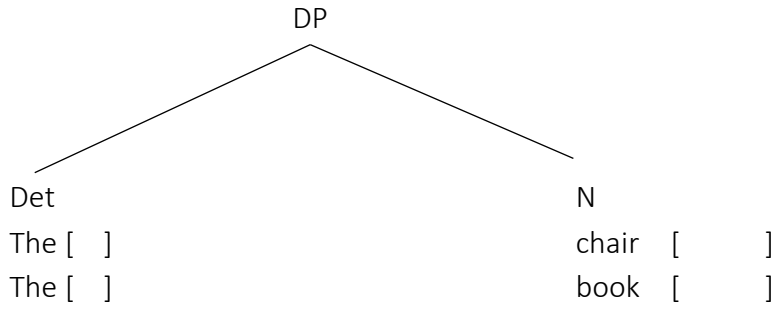
The same double gender feature valuation enforced in Spanish DPs will apply in the case of switches involving an Adj (e.g., Fernández Fuertes & Liceras, 2018a; Klassen & Liceras, 2017; Liceras et al., 2016, 2017; Liceras & Fernández Fuertes, 2018, 2018; Liceras & García-Alcaraz, 2019; Valenzuela et al., 2012). However, as it is illustrated in (30), the valuation is done unidirectionally. In this case, the Adj, a lexical category, bears two unvalued features (i.e., the unvalued gender feature, [uGEN], and the unvalued gender agreement feature, [uF]) which are checked against the two valued features in the Spanish DP subject (gender and gender agreement features).

30.



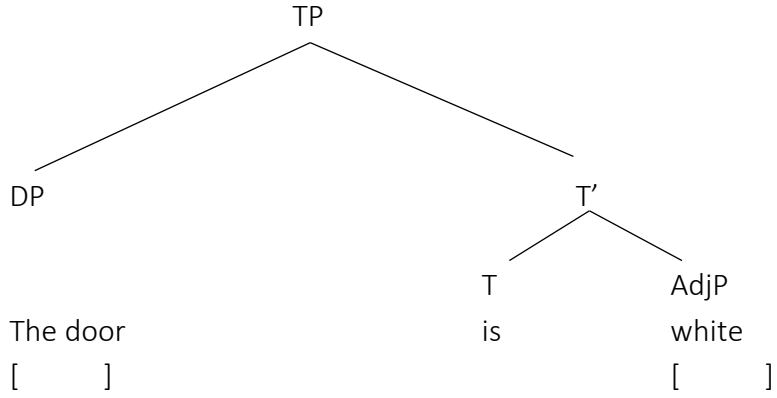
On the other hand, as English has no grammatical gender, the double gender feature valuation process does not take place since there are no gender ([GEN]) or gender agreement ([F]) features which need to be valued. This is represented in (31) for the DP and in (32) for the copulative constructions with an AdjP subject complement.

31.



(Liceras et al., 2008, p. 836)

32.



The double gender feature valuation represented above is relevant to understand how codeswitching is possible within DPs and in the structures involving an Adj when only one of the two languages involved in the switch has grammatical gender features. A description of this process in English-Spanish switched sequences is presented in the following subsections where two issues are addressed: the implications for the directionality of the switch in DP switches and in Adj switches; and the possible gender agreement mechanisms that can be used in the case of Spanish Det switches and in the case of Spanish Adj switches. A section indicating the implications that the feature strength and the double gender valuation mechanisms have in the case of the processing of switched DPs and Adj switches is included at the end.

2.3.1. The directionality of the switch within DP switches and in switches involving an Adj

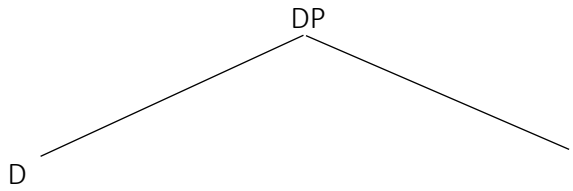
Functional-lexical switches, as in the case of switches within a DP between a functional category (i.e., Det) and a lexical category (i.e., N), have been central in the study of codeswitching due to their pervasiveness and high acceptance by English-Spanish bilingual speakers (e.g., Herring et al., 2010; Jake et al., 2002; Liceras et al., 2005, 2008, 2016; López, 2020; Moro Quintanilla, 2014; Moyer, 1992; Parafita Couto & Gullberg, 2019; Pfaff, 1979; Poplack, 1980; Valdés Kroff, 2016). One of the questions which has been pivotal to codeswitching research has been the bilinguals' preference for one language over the other in the production of the functional category, i.e., whether they prefer English Det with Spanish N sequences, as in (33), or Spanish Det with English N switches, as in (34). While the former has been considered scarce in the spontaneous production of English-Spanish bilingual children and adults, the Spanish Det + English N switches have been widely attested in both bilingual adult and child corpora (e.g., Blokzijl et al., 2017; Jake et al., 2002; Liceras et al., 2008; Moro Quintanilla, 2014; Moyer, 1992; Myers-Scotton & Jake, 2001; Ramírez Urbaneja, 2020; Valdés Kroff, 2016).

33. The *casa* / the *libro*
    the house $_{\text{SP fem. N}}$ / the book $_{\text{SP masc. N}}$
    "the house" / "the book"
34. *La / el* house
    the $_{\text{SP fem./masc. Det}}$ house
    "the house"

Following MacSwan's (1999, 2000) rationale (section 2.2.2.2), Moro Quintanilla (2014) addresses the lack of English Det switches in Moyer's (1992) bilingual data and classifies DPs like (33) as ill-formed. As in (35), the phi-features of the functional category, i.e., the Det, need to be valued with the corresponding phi-features of the N during the derivation. This needs to be done in a "one-fell-swoop" operation so that the phi-features are deleted as a unit (Moro Quintanilla, 2014, p. 223). In (35.a), the phi-features of the English N are a subset of the phi-features of the Spanish Det, so the latter can be valued. However, in the case of English Det switches, as in (35.b), the derivation crashes because

the gender features on the Spanish N cannot be valued against those of the English Det, which is devoid of "the complete set of agreement features".

35.



a) *La* [person, number, gender] chair [number]
b) ~~The~~ [person, number] ~~*silla*~~ [person, number, gender]

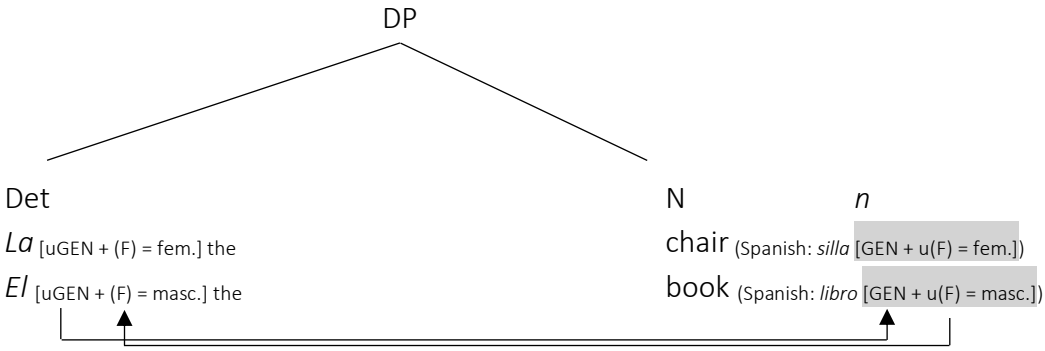
(Liceras et al., 2008, p.834)

Liceras et al. (2008, 2016) and Grimstad et al. (2018) consider this assumption to be too categorical and argue that it is only based on spontaneous data. Thus, in the spirit of MacSwan (1999, 2000), Liceras et al. (2005, 2008) explain the prevalence of Spanish Det switches over English Det switches in spontaneous data by formulating the Grammatical Features Spell-Out Hypothesis (GFSH). This hypothesis is intended to reflect how features are represented in the bilingual mind and how the bilinguals' preferences are guided by the strength that gender features have in Spanish as opposed to their absence in English. Therefore, according to the GFSH, bilingual speakers will "favor the functional categories containing highly 'grammaticized' features" (Liceras et al., 2008, p. 829). That is, although in their early proposal Liceras et al. (2005) emphasize the relevance of the number of uninterpretable features which were borne by the Det (i.e., number and gender in Spanish and only number in English), in a more refined proposal, Liceras et al. (2008) claim that the bilinguals' preference in terms of directionality has nothing to do with the number of features but "with their degree of visibility and their computational value" (p.829). This explains why Spanish Det switches, as in (34), are favored by both bilingual children and bilingual adults in their spontaneous production, regardless of the gender agreement strategy they use (see section 2.3.2).

In the cases in which Spanish provides the functional category, as in (36), a double gender feature valuation process takes place when the English N is attributed the corresponding gender features of its Spanish translation equivalent. This results into the

analogical criterion strategy (Otheguy & Lapidus Shin, 2003) which is presented more detailed in section 2.3.2.

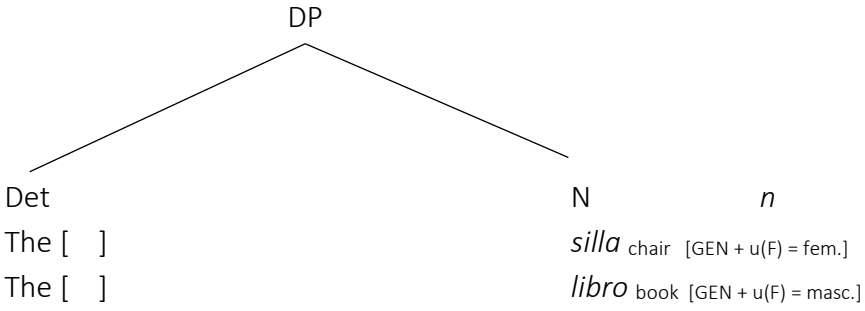
36.



(Liceras et al., 2008, p. 836)

Contrary to Moro Quintanilla (2014), Liceras et al.'s (2016) proposal does not treat the English Det + Spanish N combination, as in (33), as ill-formed. Instead, they argue that, as English has neither gender ([GEN]) nor gender agreement ([F]) features, the corresponding features in the Spanish N are left unvalued, as in (37).

37.



The GFSH is in line with the simultaneous bilingual speakers' switching preferences regarding spontaneous production (Jorschick et al., 2011; Liceras et al., 2005, 2008; Ramírez Urbaneja, 2020). Yet, codeswitching literature has also shown that English Det + Spanish N DPs are widely accepted when it comes to experimental data (e.g., Fernández Fuertes et al., 2019, in preparation; Gómez Carrero et al., 2018; Gómez Carrero & Fernández Fuertes, 2021d; Liceras et al., 2008, 2016; Liceras & Fernández Fuertes, 2018; Parafita Couto & Rodríguez-González, 2019). According to Liceras et al. (2016), this is so because the suspension of the feature matching results into a more economical operation since "having to process the English Det does not have any extra

cost" (p.112). That is, no double gender feature mechanism is enforced (i.e., the analogical criterion, as in (36)), and processing is then sped up, as it will be discussed in section 2.3.3.

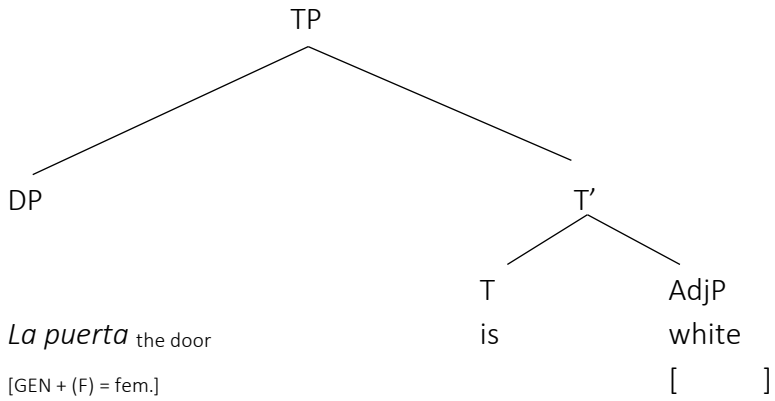
In the case of the Adj switches, as in (38), the second structure under consideration in this dissertation, the switch occurs between the DP subject and a lexical category such as the Adj. Many studies on codeswitching have focused on the gender and the placement of the Adj within switched DPs (e.g., Arnaus Gil et al., 2012; Balam & Parafita Couto, 2019; Cantone & MacSwan, 2009; de Nicolás, 2020; Moro Quintanilla, 2016; Pablos et al., 2019; Parafita Couto & Gullberg, 2019; Stadthagen-González et al., 2019; Vaughan-Evans et al., 2020), but only a few have examined switched sequences in which the Adj is outside the DP (Klassen & Liceras, 2017; Liceras et al., 2017; Liceras & García-Alcaraz, 2019; Valenzuela et al., 2012). In the case of the latter, they have mostly considered switches where Spanish provides the Adj, as in (38.b), as their focus has been on the double feature valuation mechanism and how it accounts for the gender agreement strategies (see section 2.3.2. for more details on the strategies).

38.

a) *La casa* is white	/	*El libro* is white
the house $_{\text{SP fem. DP}}$ is white	/	the book $_{\text{SP masc. DP}}$ is white
"the house is white"	/	"the book is white"
b) The house *es blanca*	/	The book *es blanco*
the house is white $_{\text{SP fem. AdjP}}$	/	the book is white $_{\text{SP masc. AdjP}}$
"the house is white"	/	"the book is white"

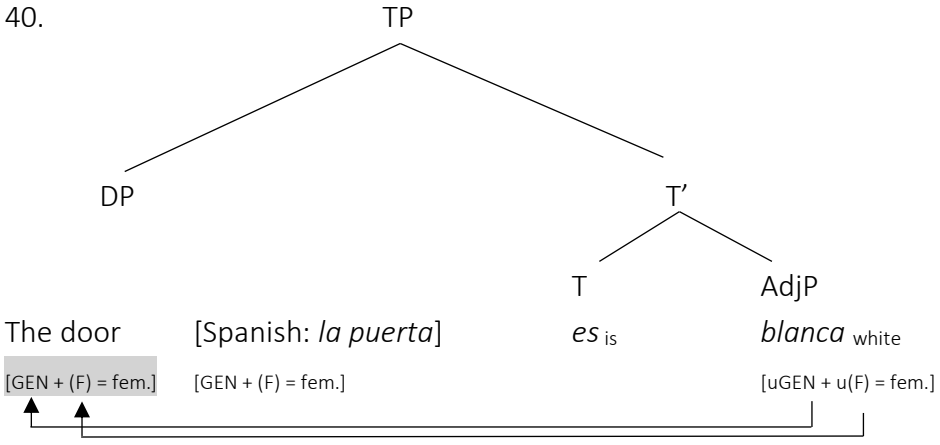
As it occurs with the English-Spanish switched DPs, in the Adj switches, two switched sequences are possible. In the Spanish DP subject with an English Adj, the Adj lacks gender features, so no gender feature valuation takes place, as it is represented in (39).

39.



On the other hand, in the English DP subject with a Spanish Adj sequence, the Spanish Adj contains unvalued gender ([uGEN]) and gender agreement ([uF]) features which need to be valued against the Spanish translation equivalent of the English DP subject. In order for the double gender feature valuation to take place, the English DP 'the door', which is devoid of these features, imports the gender features from its Spanish translation equivalent, '*la puerta*', so that the Adj unvalued gender features can be valued against those of the DP. This process is represented in (40).

40.



(Adapted from Liceras et al., 2016, p. 115)

To the best of our knowledge, no study has examined which directionality, i.e., Spanish DP subject + English Adj switches (38.a) or English DP subject + Spanish Adj switches (38.b), is preferred and produced by bilingual speakers. Yet, as the Spanish Adj contains unvalued gender and gender agreement features, it triggers the double gender feature valuation mechanisms, as in (40), so that switched sequences with a Spanish Adj are predicted to be preferred over the English Adj switches. The valuation of gender

features depicted for the Adj switches above is, therefore, parallel to the concord situation where codeswitching happens within the DP between a Det and an N (examples in (36) and (37) above). In both structures (i.e., DP switches and Adj switches) a double language directionality can appear (i.e., English-Spanish or Spanish-English order) and a double gender feature valuation mechanism can apply. However, two important differences appear across the two structures: (i) the directionality of feature checking (i.e., unidirectional in the case of Adj switches, as in (40), and bidirectional in the case of DP switches, as in (36)); and (ii) the number of lexical categories that need to be accessed (i.e., one in the case of the DP switches, the N, and two in the case of the Adj switches, the N and the Adj) (Klassen & Liceras, 2017; Liceras et al., 2017).

2.3.2. Gender agreement mechanisms: the analogical criterion and the masculine as default

As described in section 2.3.1., gender agreement mechanisms can be enforced in the case of one of the directionalities of the two switched structures under consideration: Spanish Det switches in the case of switched DPs, as in (41), and Spanish Adj switches in the case of Adj switches, as in (42). Yet, bearing in mind the different gender features Spanish has, two strategies must be considered when Spanish provides the functional category Det, as well as when Spanish provides the Adj: (i) the analogical criterion ([+/-AC]) and (ii) the masculine as the default form.

41.

a) *La* house

   the SP fem. Det house = SP fem. N '*casa*'

b) *El* book

   the SP masc. Det book = SP masc. N '*libro*'

c) *El* house

   the SP masc. Det house = SP fem. N '*casa*'

d) *La* book

   the SP fem. Det book = SP masc. N '*libro*'

42.

a) The house *es blanca*

the house = SP fem. DP 'la casa' is white SP fem. AdjP

b) The book *es blanco*

the book = SP masc. DP '*el libro*' is white SP masc. AdjP

c) The house *es blanco*

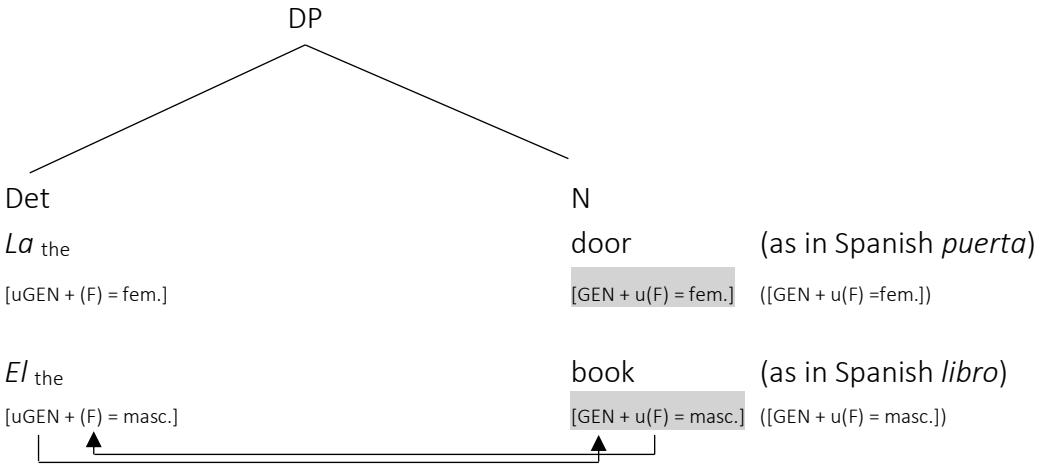
the house = SP fem. DP 'la casa' is white SP masc. AdjP

d) The book *es blanca*

the book = SP masc. DP 'el *libro*' is white SP fem. AdjP

The analogical criterion (AC) (Otheguy & Lapidus Shin, 2003), formalized for codeswitching as the Gender Double Feature Valuation Mechanism (Liceras et al., 2008, 2016) and which has been introduced in section 2.3.1, consists of valuating "the phi-feature through the gender specification of the translation equivalent" (Liceras et al., 2016, p. 113). In other words, in switched DPs, the English N inherits[4] the gender features from its Spanish translation equivalent, so that the English N enters in the valuation process with the Spanish Det. According to Liceras and colleagues (2016), abiding by the analogical criterion implies the enforcement of gender valuation upon the switch, thus the Gender Double-Feature Valuation Mechanism which is implemented in Spanish DPs (section 2.3.) is also implemented in switched DPs, as in (43).

43.



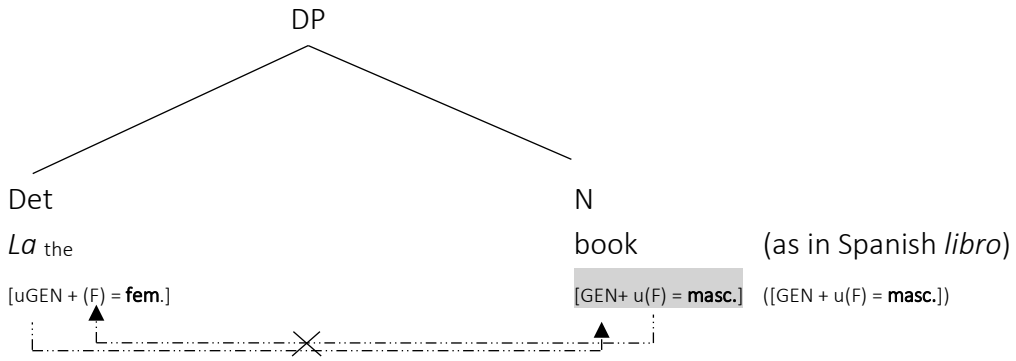
(Adapted from Liceras et al., 2016, p. 113)

[4] The gender features inherited from the corresponding Spanish translation equivalents of the English Ns/DPs are highlighted in gray in the examples along this dissertation.

In (43), the Spanish Det '*la'* has an unvalued feminine gender feature ([uGEN]) and an inherent feminine gender agreement feature ([F]). The N 'door' takes the gender features of the Spanish translation equivalent '*puerta'*, so it bears an unvalued feminine gender agreement feature ([uF]) and a feminine inherent gender feature ([GEN]). The valuation of the two unvalued features takes place bidirectionally, that is, the unvalued feminine gender feature ([uGEN]) of the Spanish Det is valued by the feminine gender feature ([GEN]) that the English N has obtained from the Spanish translation equivalent; and the unvalued gender agreement feature ([uF]) of the Spanish translation equivalent of the English N is valued by the inherent gender agreement feature ([F]) of the Spanish Det. Thus, (43) results into a [+AC] switched DP.

In switched DPs such as that in (41.d) and represented in (44), the analogical criterion is not satisfied ([-AC]) because, even if the English N, 'book', inherits the masculine gender features from the Spanish translation equivalent, its features do not match with those of the Spanish Det. That is, its masculine unvalued gender agreement feature ([uF]) inherited from the Spanish translation equivalent cannot be valued by the feminine gender agreement features ([F]) borne by the Spanish Det. Thus, it results into a crash of the double feature valuation mechanism.

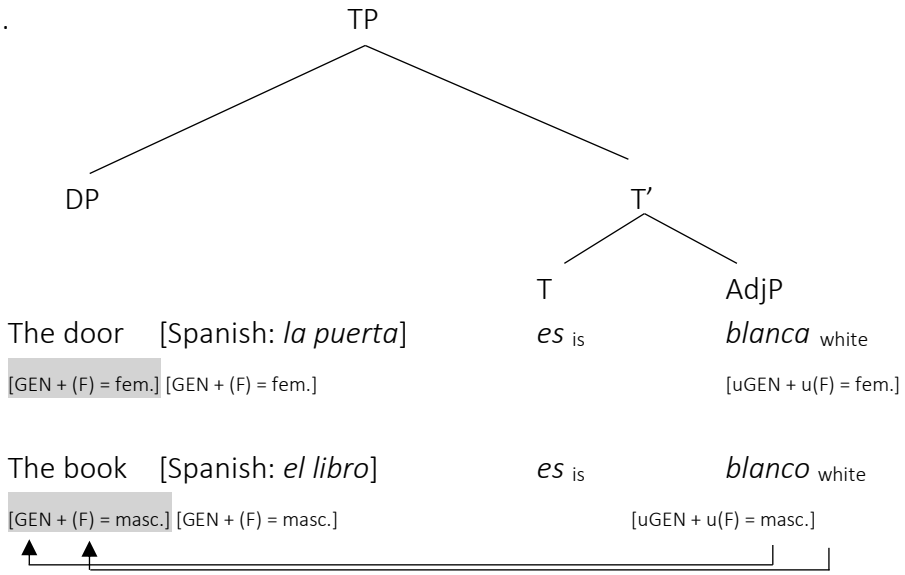
44.



As introduced in Section 2.3.1, the Double Feature Valuation Mechanism can also be enforced in Adj switches where there is an English DP subject and a copulative predicate with a Spanish verb and a Spanish Adj subject complement, as in (42). In this case, a parallelism with the way it is implemented in Spanish monolingual copula constructions takes place (see example (30)) (Klassen & Liceras, 2017; Liceras et al., 2008, 2016; Liceras & García-Alcaraz, 2019).

In (45), the Adj '*blanca'* bears two unvalued features, gender ([uGEN]) and gender agreement ([uF]), which need to be valued and deleted. Klassen & Liceras (2017) and Liceras et al. (2016) explain that, as the English DP, 'the door'*,* has no gender features, it inherits both the feminine valued gender ([GEN]) and the feminine gender agreement ([F]) features from its Spanish translation equivalent*, 'la puerta'*. This means that the feature valuation takes place unidirectionally between the English DP subject and the Spanish Adj. Therefore, (45) results into a [+AC] Adj switch.

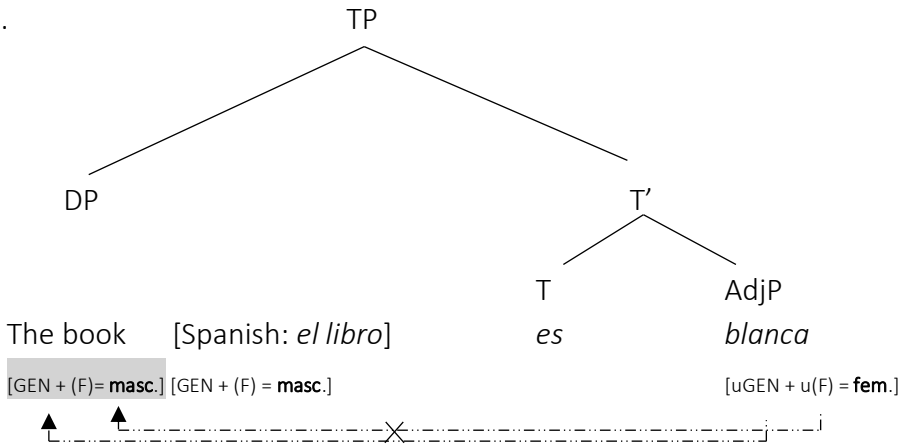
45.



(Adapted from Liceras et al., 2016, p. 115)

In switched copula constructions such as (42.d), represented in (46), the analogical criterion is not satisfied ([-AC]). In this case, the English DP subject, 'the book', inherits the masculine gender features from its Spanish translation equivalent. As the Spanish Adj subject complement, *'blanca',* has feminine gender features, their features do not match. This means that the unvalued gender feature ([uGEN]) and the unvalued gender agreement feature ([uF]) of the Spanish Adj (feminine) cannot be valued against those inherited by the English DP subject (masculine). This makes the derivation crash as per the requirements of the double feature valuation mechanism.

46.

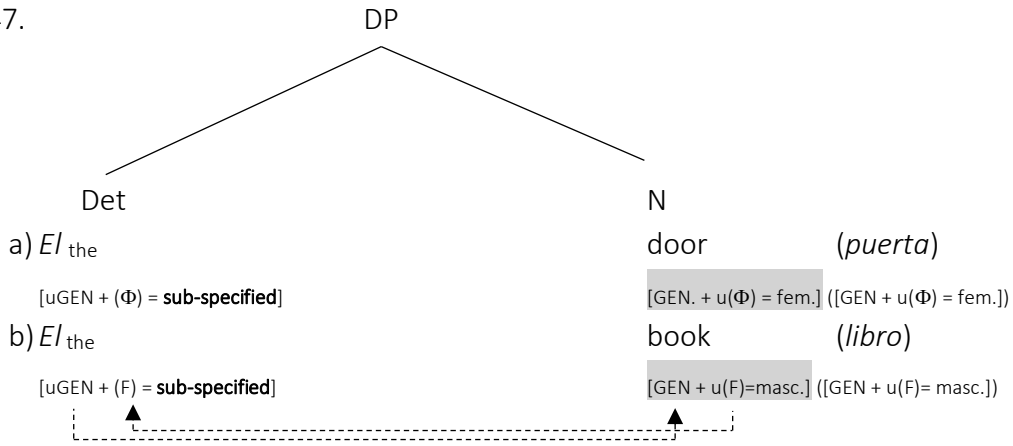


(Adapted from Liceras et al., 2016, p. 115)

The second strategy considered in Spanish Det + English N switches and in English DP subject + Spanish Adj switches is the masculine as the default form, as in (41.b)-(41.c) and (42.b)-(42.c). As in section 2.3., masculine has been formally considered the unmarked or default gender in Spanish by linguists (Harris, 1991; Roca, 1989, 2005a, 2005b). This strategy has proven to be used by bilingual speakers (e.g., Balam et al., 2021; J. Clegg, 2010; Franceschina, 2001; Liceras et al., 2008; Montes-Alcalá & Lapidus Shin, 2011; Otheguy, 2011; Otheguy & Lapidus Shin, 2003; Valdés Kroff, 2016; among others) since "it solves the problem of having no basis on which to assign gender to loanwords and reduces the demands of memory load that may be associated with maintaining the gender system" (Otheguy, 2011, p. 507).

In switched DPs such as those in (41.b) and (41.c), Liceras et al. (2016) and Klassen & Liceras (2017) argue that the default masculine does not imply a clash of features when a masculine Spanish Det accompanies a feminine translation equivalent of the English N, as in (47.a), because in this case the unvalued gender feature ([uGEN]) of the Spanish Det is sub-specified for gender. The same can occur with a masculine translation equivalent, as in (47.b).

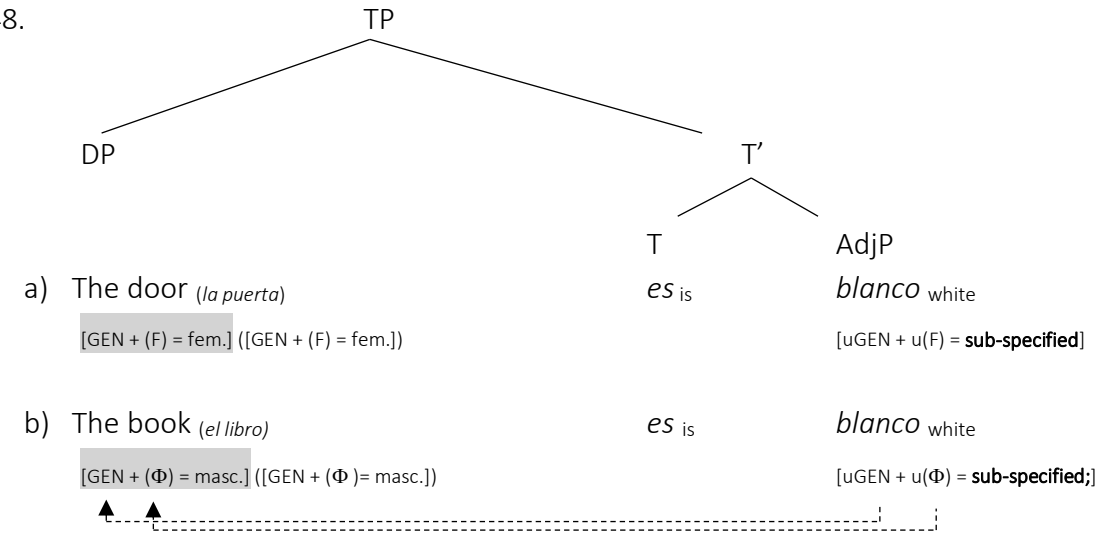
47.



(Adapted from Liceras et al., 2008, p. 838)

A parallel situation appears in the case of Adj switches with a masculine Spanish Adj, as in (42.b) and (42.c). As it is presented in (48), where the default masculine holds, the unvalued gender feature ([uGEN]) is also sub-specified in the Spanish Adj, so a masculine default Adj can co-occur with an English DP subject regardless of the gender of the translation equivalent of the DP subject.

48.



(Adapted from Liceras et al., 2016, p. 115)

In both types of structures, i.e., switched DPs and Adj switches, the masculine as default strategy can occur regardless of the gender of the Spanish translation equivalent of the English N or of the English DP subject. Yet, when the Spanish translation equivalent is masculine, as represented in (47.b) and (48.b), a double analysis can be done in this case. On the one hand, it can be treated as a switched masculine sequence which abides

by the analogical criterion, as in (43) and (45). On the other hand, it can be treated as a masculine default form as in the case of the switched sequences with a feminine translation equivalent (41.d) and (42.d).

2.3.3. The processing of Spanish grammatical gender in codeswitching

As described in sections 2.1. and 2.2., codeswitching is in a privileged position to be used to explore the parallel activation and constant interaction between the two languages in the bilingual mind. This parallel activation works hand in hand with inhibition, the suppression of the language which is not in use, and this interplay can lead to an acceleration or a slowdown in the processing of codeswitched structures.

When dealing with grammatical gender in Spanish-English switched DPs and Adj switches, two issues are under consideration: (i) the directionality of the switch (section 2.3.1.) and (ii) the gender agreement mechanisms (section 2.3.2.). The combinations which arise from them present different consequences for the processing of these structures.

On the one hand, when dealing with the directionality of the switch, as in (49) and (50), Fernández Fuertes et al. (in preparation) explain that local inhibition (i.e., suppressing a specific competing alternative like the translation equivalent) would be easier than activating that translation equivalent. This is translated into a higher processing cost associated to Spanish Det switches (49.b) in comparison to English Det switches (49.a). Fernández Fuertes et al. (in preparation) indicate that this is so because in Spanish Det switches (49.b) the Spanish translation equivalent has to be retrieved, and its activation triggers the enforcement of grammatical mechanisms (i.e., gender assignment and gender agreement).

49.

a) The *casa*	"the house"	[English Det + Spanish N]
b) *La/el* house	"the house"	[Spanish Det + English N]

50.

a) *La casa* is white	"the house is white"	[Spanish DP subject + English Adj]
b) The house *es blanca/o*	"the house is white"	[English DP subject + Spanish Adj]

This reasoning can be applied to Adj switches as in (50). Following what Fernández Fuertes et al.(in preparation) argue for switched DPs in terms of directionality, the prediction would be that English Adj switches, as in (50.a), would be processed faster than having to enforce the grammatical mechanisms that will be triggered in a switch such as that in (50.b).

Regarding the structures in which Spanish provides the Det, as in (51), or the Adj, as in (52), two possible scenarios can be found: (i) the analogical criterion ([+AC]) (51.a) and (52.a), or the lack of it ([-AC]) (51.b) and (52.b), or (ii) the masculine as default (51.c) and (52.c) (see section 2.3.2 for more details). In both cases, the Spanish translation equivalent of the English N has to be retrieved and activated. However, the processing costs of one or the other strategy are expected to be different because of the internal mechanisms that are triggered.

51.

a) La house	[+AC]
b) El house / la book	[-AC]
c) El house/book	[Masc. Default]
"the house"	

52.

a) The house es blanca	[+AC]
b) The house es blanco / the book es blanca	[-AC]
c) The house/the book es blanco	[Masc. Default]
"the house is white"	

As seen in section 2.3.2., in the case of the analogical criterion, two combinations can result: (i) the structures abide by the analogical criterion ([+AC]), as in (51.a) and (52.a), where gender agreement is enforced, that is, gender features have to go through the valuation process; and (ii) the structures where there is no such gender agreement ([-AC]), as in (51.b) and (52.b), and the valuation of gender features crashes if the translation equivalent is activated. In terms of processing, the [-AC] structures indicate a gender conflict which may lead to a slowdown in processing because when the speaker reads or hears a masculine Det or a masculine DP ('*el*' or '*el libro'*), they expect to find a

masculine N or a masculine Adj afterwards. As this is not the case, processing costs are expected to be higher (Adler et al., 2020; Beatty-Martínez & Dussias, 2017; Fernández Fuertes et al., 2019, in preparation).

In the case of the masculine as the default option, as in (51.c) and (52.c), there is a "relaxation of the gender agreement requirements" (Fernández Fuertes et al., in preparation, p. 15). Therefore, the use of the masculine as a default strategy would imply less processing costs than activating the translation equivalent and establishing the double feature valuation mechanism because the former does not involve a specification of the value of the gender features. Indeed, Fernández Fuertes et al. (in preparation) propose (53) to capture "the interaction between processing costs and feature valuation" (p.14).

53. Local inhibition	<	activation by default	<	activation proper
el/la window		*el window*		*la window*

In this scale, Fernández Fuertes et al. (in preparation) indicate that the selection and retrieval of the Spanish translation equivalent and thus, the proper valuation of its gender features, may trigger a slowdown in processing in comparison to the activation by default or to local inhibition (where no activation of the translation equivalent and no agreement take place). However, this proposal is intrinsically linked to how rooted Spanish gender features are in the minds of bilinguals. Therefore, the scale in (53) may hold for bilinguals for whom Spanish is their L1 but may need to be adapted to capture the processing of bilinguals for whom Spanish is either their heritage language or their L2. These issues will be addressed in chapter 3.

2.4. Summary

To sum up, codeswitching has been analyzed within the perspective of diverse models and theories. Two frameworks, the MLF model (Myers-Scotton, 1993, 1997) and the MP adapted by MacSwan (1999, 2000), have been widely used to account for codeswitched structures, such as DP switches and Adj switches, the two structures under study in the present work.

In this dissertation, Liceras et al.'s (2005, 2008, 2016) adaptation of MacSwan's (1999, 2000) minimalist proposal is considered and put to the test in order to provide an account of the role that Spanish grammatical gender plays within switched DPs and in the switches involving an Adj. By putting gender features at the forefront, we attempt to describe and account for (i) the directionality of DP switches (i.e., which language provides the functional category) and the directionality of Adj switches (i.e., which language provides the Adj), and (ii) the gender agreement mechanisms (i.e., the analogical criterion or the masculine default) which can apply in Spanish Det switches as well as Spanish Adj switches. These two issues as well as the consequences they have for bilingual processing will be explored in depth in chapter 3 as they have been addressed in previous studies with online and offline data and in the case of bilinguals with different linguistic profiles (i.e., heritage bilinguals (HL) and L2 speakers) and ages (i.e., children and adults).

CHAPTER 3. EMPIRICAL ACCOUNTS ON CODESWITCHING

Codeswitching has been primarily considered an oral communication mode (Grosjean, 1982; Gullberg et al., 2009), so naturalistic data have been collected and widely used to study this language contact phenomenon and the situations in which it arises (e.g., Cantone & Müller, 2008; Duran Eppler et al., 2017; Liceras et al., 2008; Milroy & Muysken, 1995; Moyer, 1992; Parafita Couto & Gullberg, 2019; Poplack, 1980; Valdés Kroff, 2016; among many others). However, lately, the rise of written codeswitching in social media and literature (e.g., Eleta & Golbeck, 2014; Montes-Alcalá, 2001, 2007) as well as the necessity to understand how switched structures are processed and the underlying cognitive mechanisms involved in this processing have urged for the application of experimental methods, both offline (i.e., acceptability judgment tasks, sentence completion tasks, etc.) and online (i.e., eyetracking, reaction tasks). This way, we can gain knowledge not only on the bilingual speaker's intuitions about different switched structures but, most importantly, on how grammatical properties of the two languages involved in the switch are represented in the mind and how they interact (Beatty-Martínez & Dussias, 2017; Fernández Fuertes & Liceras, 2018b).

This chapter presents a review of the main findings regarding codeswitching using spontaneous and experimental data. Mainly, research on English-Spanish switches within the DP and those involving an Adj[5] will be examined. The focus is set on the two issues under consideration in this dissertation, i.e., the directionality of the switch and the gender agreement mechanisms, as well as how they have been addressed with spontaneous and experimental data, both offline and online, from speakers with different linguistic profiles (e.g., HL speakers—habitual and non-habitual codeswitchers—and L2 speakers) and with different ages (i.e., children and adults). The aim of this chapter is not to provide an exhaustive list of works on codeswitching but rather to point to the two issues that constitute the focus of this dissertation (i.e., directionality of the switch and gender agreement mechanisms) and how they have been addressed so far as well as the knowledge we have gained on codeswitching processing.

[5] Along this dissertation, and in order to simplify the reference to the two target constructions, these are referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la*$_{\text{the}}$ house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es*$_{\text{is}}$ *roja*$_{\text{red}}$).

The chapter is divided as follows. Section 3.1 includes a description of the types of data (i.e., spontaneous and experimental) which have been used in codeswitching research with a view to showing how diverse data types can contribute to the analysis of codeswitching. Section 3.2 addresses the directionality of the switch and section 3.3 focuses on the main findings regarding gender agreement mechanisms. Both sections are divided according to the two targeted structures, DP switches and Adj switches. Finally, a summary of the principal results highlighted in this chapter can be found in section 3.4.

3.1 Exploring codeswitching via different elicitation techniques

Codeswitching has been used as a window to explore diverse topics of study in bilingualism from a variety of approaches (i.e., sociolinguistics, pragmatics, theoretical linguistics, psycholinguistics, etc.). The focus has been set on issues such as the role of the bilingual community or the characteristics of the bilingual speaker as well as the structures produced by these speakers in order to put forward theories which determine their plausibility. Researchers have used different types of data in order to tap into the greater picture of the characteristics of codeswitching as well as to determine how the bilingual mind deals with this phenomenon.

Due to its oral nature, researchers have collected spontaneous data to build multiple corpora in order to analyze which patterns are common in codeswitching in general, and in each bilingual community in particular. By doing so, researchers have been able to test predictions and linguistic theories in order to understand the bilingual speech. Not only have English-Spanish been the language pair under investigation for this bilingual phenomenon and which will be addressed below, but naturalistic data from other language pairs such as Welsh-English (e.g., Deuchar, 2006; Deuchar et al., 2014; Parafita Couto & Gullberg, 2019), Dutch-Papiamento (e.g., Parafita Couto & Gullberg, 2019), German-English (e.g., Duran Eppler et al., 2017; Jorschick et al., 2011) or German in contact with different Romance languages (i.e., Italian, Spanish, French) (e.g., Arnaus Gil et al., 2012) have been collected and analyzed. In the case of Spanish-English codeswitching, naturalistic data have been obtained from bilinguals from different bilingual communities so that specific-area corpora have been created. Some examples are data from Southern Arizona (e.g., Bessett, 2017; Carvalho, 2012-; Cruz, 2021; DuBord,

2004), Miami (e.g., Valdés Kroff, 2016), New Mexico (e.g., Ramírez Urbaneja, 2020; Torres Cacoullos & Travis, 2015) or Gibraltar (Moyer, 1992).

Nevertheless, the need to go deeper in how bilingual speakers perceive and process both licit and illicit switches, and thus, to overcome the intrinsic limitations imposed by spontaneous data in this respect (see MacSwan & McAlister, 2010, for a review) has triggered the rise of experimental techniques, both offline and online, above all in the study of codeswitching from a (neuro-)linguistic perspective.

When using offline experiments, time is not constrained so participants can reflect on their responses as long as they need and the variables which are linked to the outcomes of processing are measured (Garrod, 2006). The fact that participants have time to reflect on their responses involves the implication of their metalinguistic knowledge in their answers since they are doing a conscious reflection about the language and they perceive it "as a formal object with identifiable structural properties" (Fernández & Souza, 2016, p. 33). Also, the researcher controls the context and manipulates the structures so that the participant's responses give an answer to the research questions the researcher has set (Schmitt & Miller, 2010).

The most common type of tasks used to elicit offline data are acceptability judgment tests (AJT) (e.g., forced choice tasks, yes/no tasks or Likert scales are the ones commonly used) in which participants are presented a set of sentences and they have to report their own perceptions. Indeed, this type of task gives the researcher the chance to study constructions which do not occur commonly in spontaneous data and to compare them "under controlled conditions not available in a corpus" (Stadthagen-González et al., 2018, p. 68). Aguirre (1976) was the first to use grammaticality judgments as a research tool in the investigation of switched sequences. Since then, many researchers have used AJTs to make bilinguals discern between preferred and less-preferred structures, in order to tap on the principles that govern codeswitching as well as to infer the cognitive mechanisms underlying the bilinguals' behavioral responses.

One of the key features of AJTs is that the researcher can control the language pairs, the codeswitching sites and the features of the linguistic items involved (González-Vilbazo et al., 2013). The AJTs as well as other offline experimental tasks (i.e., guided

production by using a sentence completion task and a director-matcher task[6]) have been used in the study of codeswitching in a varied number of language pairs different from English and Spanish (i.e., Spanish and Basque, Spanish and German, Spanish and Dutch, Dutch and French, Spanish and Purepecha, among others) (e.g., Badiola & Sande, 2018; Bellamy et al., 2018; Boers et al., 2020; González-Vilbazo, 2005; González-Vilbazo & López, 2011; Parafita Couto et al., 2015; Vanden Wyngaerd, 2017) and for diverse codeswitching sites other than the two examined here, such as between subject and predicate (e.g., Badiola et al., 2018; Bellamy et al., 2022; Fernández Fuertes, Liceras, et al., 2016; González-Vilbazo & Koronkiewicz, 2016; Koronkiewicz, 2014, 2018, 2020; Toribio, 2001), between auxiliary verb and main verb (e.g., Giancaspro, 2013, 2015; Koronkiewicz, 2018) and also within the DP, not only between the Det and the N, as it is detailed in the following sub-sections, but also between the Adj and the N focusing on word order (e.g., de Nicolás & Robledo, 2018; Parafita Couto et al., 2015; Stadthagen-González et al., 2019; Vanden Wyngaerd, 2017). Most of these studies have dealt with codeswitching experimental data from bilingual adults with diverse profiles (i.e., HL speakers in habitual codeswitching settings, HL speakers in non-habitual codeswitching settings and L2 speakers). Yet, just a few studies have used bilingual child judgment data in their analyses (e.g., Fernández Fuertes et al., 2011, in preparation; Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d).

In recent years, offline techniques have been normally added on to online measures not only in the study of codeswitching but in the investigation of other L1 bilingual and L2 bilingual phenomena (e.g., Fernández Fuertes et al., in preparation; Godfroid et al., 2015; Leung & Williams, 2011; Morgan-Short et al., 2010) as they provide a "richer and time-sensitive account of ongoing processing" (Godfroid, 2020, p. 2) and they allow researchers "to observe potential relationships between cognitive processes and language use" (Treffers-Daller et al., 2021, p. 2). As with offline experimental tasks, with online experimental tasks the researcher is able to control the different conditions

[6] The director-matcher task is a game-like task in which two participants, a director (the participant) and a matcher (the researcher), sit face-to-face separated by a screen. Each participant can only see their side of the screen. In front of them, they have a board with cards with identical images and the board is divided in a number of grids which are pre-arranged differently on each board. The aim is that they end up with all the images on the board and in the exact same order. The director is the one giving instructions to the matcher to place the cards on the correct place. To do so, the director has to describe the image or give a name to it, depending on the aim of the investigation.

under investigation. Yet, in this case, real-time measurements are involved and there is no time for reflection on the part of the participant or the time for reflection is indeed monitored (Fernández & Souza, 2016; Marinis, 2010). Online measurements are varied and include (i) reaction times, which indicate the amount of time the participant takes to respond and which reflects processing time; (ii) eye movements during reading or in visual world paradigms (e.g., Cooper, 1974; Rayner, 1993; Tanenhaus et al., 1995) which reflect processing costs by means of fixations and movements of the eyes measured in milliseconds; and (iii) techniques which capture neural responses such as electroencephalogram (EEG), event-related brain potentials (ERPs) or magnetoencephalogram (MEG) (Fernández & Souza, 2016) which capture brain activity during processing.

When discussing online data, and in particular, eyetracking data, reading time is linked to processing costs; that is, "the complexity of a mental process is reflected in the responses latency" (Garrod, 2006, p. 252). So that, long fixations and regressions have been linked to the difficulty that a certain category or structure entails in terms of processing (Dussias et al., 2019; Rayner, 1993; Staub & Rayner, 2007).

Codeswitching in general has been of great interest to many researchers in the psycholinguistic and neurolinguistic fields because it has shed light on how the brain reacts to certain stimuli in real time, and it has served as a source to understand the cognitive mechanisms which are involved in how bilinguals produce and process the alternation between the two languages (e.g., Abutalebi et al., 2007; Adler et al., 2020; Altarriba et al., 1996; Bosma & Pablos, 2020; Bultena et al., 2015a, 2015b; Byers-Heinlein et al., 2017; Fernández Fuertes et al., 2019; Moreno et al., 2002; van Hell et al., 2018; among many others). Indeed, codeswitching has been used as a tool to understand the cognitive processes underlying the activation and the inhibition of the languages involved in certain contexts (e.g., Bialystok et al., 2012; Fernández Fuertes et al., in preparation; Kootstra, 2015; Kroll et al., 2012).

Studies using online methodologies alone or in combination with other offline experimental tasks have shown interest in codeswitching (i) within the DP to study the relationship between a functional category, the Det, and a lexical category, the N (e.g., Fairchild & Van Hell, 2017; Fernández Fuertes et al., 2019, in preparation; Litcofsky & Van Hell, 2017; Valdés Kroff et al., 2017, see the following sections for more details), (ii) within

the DP with an Adj to study the N-Adj word order (e.g., Pablos et al., 2019; Vaughan-Evans et al., 2020), and (iii) within the VP to study the relationship between an auxiliary verb and a main verb (e.g., Dussias, 2003; Dussias et al., 2013; Guzzardo Tamargo et al., 2016).

The following sub-sections address the two topics under consideration in this dissertation, that is, the directionality of the switch (section 3.2) and the gender agreement mechanisms (section 3.3), in the two structures considered for this study, DP switches (sections 3.2.1 and 3.3.1) and the Adj switches (sections 3.2.2 and 3.3.2), and how they have been approached by using spontaneous as well as experimental data.

3.2 Directionality of the switch

The directionality of the switch (i.e., which language provides the Det in DP switches and which language provides the Adj in the case of Adj switches) has been central in the study of English-Spanish codeswitching. Previous studies based on diverse type of data have mainly focused on DP switches, as in (54), as they had been widely attested in spontaneous production in diverse language pairs (Azuma, 1993; Cantone & Müller, 2008; Jake et al., 2002; Liceras et al., 2005, 2008; Pfaff, 1979; Poplack, 1980; Valdés Kroff, 2016). Yet, to the best of our knowledge, very few have paid attention to directionality in the case of the Adj switches, as in (55) (Fernández Fuertes et al., 2011; Gómez Carrero & Fernández Fuertes, 2021d)

54.

a) *La* house	/	*El* book	[Spanish Det + English N]
the $_{\text{SP fem. Det}}$ house	/	the $_{\text{SP masc. Det}}$ book	
“the house”	/	“the book”	
b) The *casa*	/	The *libro*	[English Det + Spanish N]
the house $_{\text{SP fem. N}}$	/	the book $_{\text{SP masc. N}}$	
“the house”	/	“the book”	

55.

a) *La casa* is white	/	*El libro* is white	[Spanish DP + English Adj]
the house $_{\text{SP fem. DP}}$ is white	/	the book $_{\text{SP masc. DP}}$ is white	
“the house is white”	/	“the book is white”	

b) The house *es blanca* / The book *es blanco* [English DP + Spanish Adj]
the house is white $_{\text{SP fem. AdjP}}$/ the book is white $_{\text{SP masc. AdjP}}$
"the house is white" / "the book is white"

3.2.1. Directionality of the switch within DP switches

Focusing first on the directionality of DP switches (54.a) vs. (54.b), different results have been found depending on the type of data as well as the type of participant. The purpose of this sub-section is to describe the main findings in terms of spontaneous as well as offline and online experimental data.

Previous studies on English-Spanish DP switches using spontaneous data have indicated a clear-cut preference for Spanish Det + English N sequences, as in (54.a), in both adult (e.g., Blokzijl et al., 2017; Herring et al., 2010; Jake et al., 2002; Moro Quintanilla, 2014; Moyer, 1992; Valdés Kroff, 2016) and child data (e.g., Deuchar & Quay, 2001; Liceras et al., 2008; Lindholm & Padilla, 1978; Ramírez Urbaneja, 2020). The prevalence of Spanish Det switches has been studied through different lenses, being the MLF and the Minimalist Framework the most relevant ones (see chapter 2, sections 2.2.1.2 and 2.2.2.2). By using minimalist premises and putting gender features at the forefront, Liceras et al. (2005, 2008) explain the predominance of Spanish Det switches with the GFSH. The GFSH explains that bilinguals prefer to produce Spanish Det + English N switches because they "favor the functional categories containing highly 'grammaticized' features" (Liceras et al., 2008, p. 829), that is, the Spanish Det (for a more detailed description of the GFSH, see chapter 2, section 2.3.1).

In cases in which one of the languages does not have gender features, as in English-Spanish codeswitching, the language with grammaticized phi-features has been shown to be the language providing the functional category in the switch, Spanish in this case. This pattern has been observed in codeswitching with other language pairs such as German-English in both HL English children and L2 English adults (e.g., children: Jorschick et al., 2011; Quick et al., 2016; adults: Duran Eppler et al., 2017), in L1 Italian – English children (e.g., Radford et al., 2007), in L1 English – HL French (e.g., Swain, 1972), in L1 Basque – L2 Spanish bilingual adults (e.g., Parafita Couto et al., 2015) and in L1 English – HL Welsh bilingual adults (e.g., Deuchar, 2006; Herring et al., 2010; Parafita Couto & Gullberg, 2019).

In language pairs in which both languages have gender features, like in Italian-German, the GFSH predicts that the Det category will be provided by either language since both have highly grammaticized features (Liceras et al., 2005). Examples of this pattern have been found in Italian-German bilingual child data (Cantone & Müller, 2008).

The overwhelming prevalence of Spanish Det switches as in (54.a) in spontaneous production in the case of Spanish-English DP switches is not sustained when bilinguals are presented with both directionalities, and they have to judge them. Thus, when using offline experimental methodologies, mostly with AJTs, results indicate a preference for the opposite pattern, i.e., English Det + Spanish N switches (54.b), when both bilingual adult and child participants have to evaluate switched DPs (e.g., adult data: Liceras et al., 2008, 2016; Parafita Couto & Rodríguez-González, 2019; child data: Gómez Carrero & Fernández Fuertes, 2021d; Gómez Carrero et al., 2018; Fernández Fuertes & Liceras, 2018b; Fernández Fuertes et al., 2011, in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b).

This pattern is found across bilinguals with different linguistic profiles, language practices and age ranges. In the case of the child participants, judgment data have been collected from (i) L1 Spanish – HL English bilingual children living in Spain, where codeswitching is not a common practice (e.g., Fernández Fuertes et al., 2011; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b); (ii) L1 English – HL Spanish bilingual children living in Gibraltar, where codeswitching is a common practice (e.g., Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d); and (iii) L2 bilingual speakers, both L1 Spanish from Spain (e.g., Fernández Fuertes et al., 2011, in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b) and L1 English from Gibraltar (e.g., Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d). In the case of the adult bilinguals, offline experimental data have been elicited from (i) L1 Spanish – L2 English bilingual adults (e.g., Liceras et al., 2008); and from (ii) L1 English – HL Spanish bilingual adults (e.g., Parafita Couto & Stadthagen-Gonzalez, 2019).

Thus, it seems that when participants are asked to rate a structure which contains a DP switch, they all favor the English Det switches regardless of their L1s, that is, they opt for the most economical directionality in terms of processing (i.e., English Det

switches, as in (54.b)). In this case, no gender feature valuation needs to take place since the English Det has no gender features, resulting in faster processing (Fernández Fuertes et al., in preparation; Liceras et al., 2008, 2016) (see chapter 2, sections 2.3.1 and 2.3.3 for more details).

In the case of other language pairs, results seem to go in the same line. For instance, Parafita Couto et al. (2015) analyze spontaneous and experimental data (a director-matcher task) from Basque-Spanish bilingual adults. Like English, Basque has no grammatical gender. Although the focus of the study is set on the gender agreement mechanisms preferred by these speakers, Parafita Couto et al. (2015) point out the directionalities favored by these participants. In the spontaneous data, the researchers find a higher number of Spanish Det switches, as previous studies on Spanish-English DP switches did for the production of Spanish Det switches. However, in the director-matcher task, participants favor Basque Dets followed by Spanish Ns. Although the director-matcher task is a semi-guided task, it seems that its experimental nature leads these bilinguals to opt for the most economical directionality in terms of processing, as in the case of English-Spanish switched DPs.

The directionality of DP switches has also been explored with online data, yet to a lesser extent when compared to the number of studies that have used naturalistic data or offline experimental data. Different experiments have been used to determine which directionality entails lower processing costs. Adult bilingual data have been collected by using Det-N picture naming tasks (e.g., Fairchild & Van Hell, 2017), non-cumulative self-paced reading tasks (e.g., Litcofsky & Van Hell, 2017) or eyetracking during reading tasks (e.g., Fernández Fuertes et al., 2019; Gómez Carrero & Fernández Fuertes, 2020, 2021b), to name a few.

Besides, the linguistic profile of the bilinguals has been varied as well so as to determine how they process the different directionalities within the DP. On the one hand, L1 English – HL Spanish adults living in the USA show slower response times with Spanish Det + English N switches when they perform a Det-N picture naming task (without and with sentence context) in which online processing and guided production are combined (Fairchild & Van Hell, 2017). The authors first assume that these results are due to the difficulty participants may encounter when retrieving the English N, yet the results from a prior bare N picture naming task reveal that this is not the best explanation since the

HL Spanish participants are faster and more accurate with the English Ns. Thus, the authors argue that these results may indicate that these participants show difficulties in selecting the Spanish Det rather than retrieving the English N (Fairchild & Van Hell, 2017, p. 157).

Following the same line, Litcofsky and Van Hell (2017) elicit online data from English dominant and Spanish dominant bilingual adults by using two experiments: a non-cumulative self-paced reading task in which response times are recorded, and a rapid serial visualization presentation task in which words are presented at a fixed time while ERP and time-frequency data are recorded. Results reveal differences depending on the technique used. That is, the self-paced reading task demonstrates that switching costs are larger when participants switch into the dominant language (p. 125). However, the analyses using ERPs from the EEG recordings reveal the opposite pattern. That is, switching from the dominant into the weaker language is harder, while the analysis using the time-frequency data indicates processing costs in both directionalities. Litcofsky and Van Hell (2017) attribute these different results to the type of experiment, since the self-paced reading task "may elicit top-down endogenous control processes" as a decision is required on each word, and this mirrors the "item-based top-down inhibitory processing" (p.118); while the ERP and time-frequency data analyses indicate that larger processing costs when switching into the weaker language require "sentence-level restructuring mechanisms" (p.124).

In an eyetracking during reading study with L1 Spanish – L2 English bilingual adults, similar patterns to those in Fairchild and Van Hell (2017) have been found by Fernández Fuertes and collaborators (Fernández Fuertes et al., 2019; Gómez Carrero & Fernández Fuertes, 2020a, 2021a, 2021b). That is, L1 Spanish – L2 English bilingual adults show longer processing times in Spanish Det + English N switches when analyzing fixations in the N. This is similar to the results from the same eyetracking during reading task performed by bilingual children with the same profile (L1 Spanish – L2 English bilingual children living in Spain) (Fernández Fuertes et al., in preparation; Gómez Carrero & Fernández Fuertes, 2020b, 2021c). The authors associate this processing delay to the "enforcement of the Gender Double-Feature Valuation Mechanism" (Fernández Fuertes et al., 2019, p. 12) since the bilinguals have to go through an operation which involves the retrieval of the Spanish N (e.g., book > *libro*) and the performance of the

corresponding gender agreement operations, since the Spanish Det needs to agree in gender with the word that follows, that is, the N. Thus, "the feature valuation requirements of a Spanish Det + English N switched DP do affect processing" (Fernández Fuertes et al., in preparation, p. 26).

As the use of online techniques is still developing and their application to the study of codeswitching is still a novelty, more online data on the directionality of the switch within the DP are to be reported in future research.

In sum, the type of data collected (i.e., spontaneous vs. experimental data) influences the bilinguals' preferences in terms of the directionality of the DP switches. That is, in spontaneous production the tendency is towards a clear-cut preference for Spanish Det switches, as predicted by the GFSH (Liceras et al., 2005, 2008), while the analyses from offline experimental data point towards a preference for the most economical directionality, the English Det switches. That is, it seems that having to form a switch and having to judge the acceptability of an already formed switch make bilinguals resort to different strategies. Finally, in the case of online experimental data, the paradigm is even more complex due to the diverse types of tasks and to the different types of processing mechanisms that each task may tap into. Indeed, the scarcity of studies using online experimental methodologies to investigate the directionality of switched DPs makes it more difficult to obtain clear-cut conclusions in this respect.

3.2.2. Directionality of the switch involving an Adj

The second structure under consideration is the Adj switches, as in (55). Directionality of the switch in this structure has not been much investigated yet, since previous works have mostly focused on gender assignment and gender agreement when the Adj is in Spanish, as in (55.b) (see section 3.3.2 for a more extensive review).

In spontaneous production, few studies have dealt with the language of the Adj in Adj switches. In a quantitative analysis of conversations among Mexican Americans, Pfaff (1979) mentions the production of mixed Adjs outside the DP domain and indicates the lack of structural conflict (p.305). She does not specify the number of Adjs which are produced in Spanish or in English, but she includes examples containing English Adjs, as in (56).

56.

a) No están free

They are not $_{SP}$ free $_{EN\ Adj}$

"They are not free"

b) Mi papá es muy protective

My dad is very $_{SP}$ protective $_{EN\ Adj}$

"My dad is very protective"

(Pfaff, 1979, p. 305)

Regarding experimental offline data, Fernández Fuertes et al. (2011), and Gómez Carrero and Fernández Fuertes (2021d) examine the directionality of the switch involving an Adj by using an AJT. Both studies elicit data from bilingual children, but they focus on different linguistic profiles, thus obtaining different results. On the one hand, Fernández Fuertes et al. (2011) analyze data from L1 Spanish – L2 English and L1 Spanish – HL English bilingual children living in Spain. As in Pfaff's (1979) examples, results from their AJT reveal a preference for English Adj switches, as in (55.a). On the other hand, Gómez Carrero and Fernández Fuertes (2021d) examine judgment data from L1 English – L2 Spanish and L1 English – HL Spanish bilingual children from Gibraltar, where codeswitching is a common practice. Their results do not reveal a significant preference for either directionality, but they indicate different patterns depending on the type of bilingual. The HL Spanish participants favor English Adj switches, as in (55.a), the same pattern found by Fernández Fuertes et al. (2011), while the L2 Spanish children prefer the Spanish Adj switches, as in (55.b). Thus, bilingual children for whom Spanish is one of the L1s are shown to prefer the structures in which gender agreement operations do not need to be performed between the subject DP and the Adj, since the Adj is in English.

To the best of our knowledge, the directionality of the switch involving an Adj has not yet been explored with online experimental data. Therefore, it seems that this issue in this particular structure needs more investigation with both spontaneous and experimental data.

Summing up, the directionality of the switch in English-Spanish codeswitching has been studied with spontaneous as well as with experimental data from both children and adult bilinguals with different linguistic profiles. In the case of experimental data, diverse

procedures have been used to obtain both online and offline data (i.e., AJTs, eyetracking tasks, response time data from picture-naming tasks, ERPs from rapid-serial visualization presentation task, among others). The directionality of DP switches has mainly been examined, while little attention has been paid to the directionality of the Adj switches. However, the results obtained in terms of directionality in both types of structures reveal differences depending on factors such as the type of bilingual, the type of data and the type of task. A summary of the main results in terms of directionality in both switched structures can be found in Table 1.

Table 1. Summary of the main studies on directionality on DP switches and Adj switches.

			Directionality of the switch	
	Data type	**Participants**	**Spanish Det + English N**	**English Det + Spanish N**
DP switches	Spontaneous	children	**HL SP:** Balam et al., 2021; Deuchar & Quay (2000); Lindholm & Padilla (1978); Ramírez Urbaneja (2020). **HL EN:** Liceras et al. (2008); Ramírez Urbaneja (2020).	
		adults	**HL SP:** Aaron (2015); Blokzijl et al. (2017); Clegg & Waltermire, (2009); Herring et al. (2010); Jake et al. (2002); Montes-Alcalá & Lapidus Shin (2011); Moro Quintanilla (2014); Moyer (1992); Otheguy & Lapidus Shin (2003); Ramírez Urbaneja (2020); Valdés Kroff (2016).	
	Offline	children		**L1 SP:** Fernández Fuertes et al. (2011); Fernández Fuertes et al. (in preparation); Gómez Carrero, Fernández Fuertes, Martínez et al. (2019a,b). **L1 EN:** Gómez Carrero & Fernández Fuertes (2021d); Gómez Carrero, Fernández Fuertes, Martínez et al. (2019a, b) **HL SP:** Gómez Carrero & Fernández Fuertes (2021d); Gómez Carrero et al. (2018). Gómez Carrero, Fernández Fuertes, Martínez et al. (2019a,b). **HL EN:** Fernández Fuertes et al. (2011); Gómez Carrero, Fernández Fuertes, Martínez et al. (2019a,b)
		adults		**L1 SP:** Liceras et al. (2008). **L1 EN:** Parafita Couto & González Rodríguez (2019).
	Online	children		**L1 SP:** Fernández Fuertes et al. (in preparation); Gómez Carrero & Fernández Fuertes (2020b, 2021c).
		adults	**L1 SP:** Litcofsky & Van Hell (2017).	**L1 SP:** Fernández Fuertes et al. (2019); Gómez Carrero & Fernández Fuertes (2020a, 2021a, b). **L1 EN:** Litcofsky & Van Hell (2017). **HL SP:** Fairchild & Van Hell (2017).
			English DP + Spanish Adj	**Spanish DP + English Adj**
Adj switches	Spontaneous	children		
		adults		
	Offline	children	**L1 EN:** Gómez Carrero & Fernández Fuertes (2021d).	**L1 SP:** Fernández Fuertes et al. (2011). **HL SP:** Gómez Carrero & Fernández Fuertes (2021d). **HL EN:** Fernández Fuertes et al. (2011).
		adults		
	Online	children		
		adults		

3.3 Gender agreement mechanisms

When examining Spanish Det switches (57) and Spanish Adj switches (58), two gender agreement strategies could be used by bilingual speakers: (i) the analogical criterion ([+/-AC]), as in (57.a)-(57.b) and (58.a)-(58.b), and (ii) the masculine as the default form, as in (57.c) and (58.c) (see chapter 2, section 2.3.2 for a formal account on this topic).

57.

a) *La* house / *El* book [+AC]
the SP fem. Det house = SP fem. N '*casa*' / the SP masc. Det book = SP masc. N '*libro*'
"the house" / "the book"

b) *El* house / *La* book [-AC]
the SP masc. Det house = SP fem. N '*casa*' / the SP fem. Det book = SP masc. N '*libro*'
"the house" / "the book"

c) *El* house / *El* book Masc. Default
the SP masc. def. Det house = SP fem. N '*casa*' / the SP masc. def. Det book = SP masc. N '*libro*'
"the house" / "the book"

58.

a) The house *es blanca* / The book *es blanco* [+AC]
the house = SP fem. DP 'la casa' is white SP fem. AdjP/the book = SP masc. DP '*el libro*' is white SP masc. AdjP
"the house is white" / "the book is white"

b) The house *es blanco* / The book *es blanca* [-AC]
the house = SP fem. DP 'la casa' is white SP masc. AdjP/ the book = SP masc. DP 'el *libro*' is white SP fem. AdjP
"the house is white" / "the book is white"

c) The house *es blanco* / The book *es blanco* Masc. Default
the house = SP fem. 'la casa' is white SP masc. def. Adj/ the book = SP masc. '*el libro*' is white SP masc. def. AdjP
"the house is white" / "the book is white"

Examples (57.a)-(57.b) and (58.a)-(58.b) represent an instantiation of the analogical criterion, that is, the enforcement of gender agreement between the gender of Spanish Det and the gender of the Spanish translation equivalent of the English N, as in (57.a), or between the gender of the Spanish translation equivalent of the English DP

subject and the gender of the subject complement Spanish Adj, as in (58.a). Both structures are represented with the [+AC] feature. On the other hand, another possibility can be the lack of gender agreement between the functional category and the translation equivalent of the English N within the DP, as in (57.b), or between the Spanish translation equivalent of the English DP subject and the Spanish Adj in Adj switches, as in (58.b). This is an instantiation of the [-AC] feature.

Examples (57.c) and (58.c) illustrate the masculine as the default option. This means that the unvalued gender feature is sub-specified so a masculine Det, as in (57.c), or a masculine Adj, as in (58.c), occur regardless of the gender of the translation equivalent of the English N in switched DPs and of that of the English DP subject in Adj switches. An extensive review of the results obtained by previous studies on these gender agreement strategies for these specific structures is found in the following sub-sections.

3.3.1. Gender agreement mechanisms within DP switches

Functional-lexical switches in which Spanish provides the Det, as in (57), have been widely investigated in terms of the gender assignment and gender agreement mechanisms used by the bilingual speaker by means of the analysis of spontaneous as well as experimental data.

The strategies introduced in section 3.3 have been found in naturalistic data from bilinguals of diverse age groups (i.e., children and adults) and language pairs. In some language pairs, the two languages involved in the switch have gender, as it is the case of French-Dutch (e.g., Treffers-Daller, 1994), German-Spanish (e.g., Eichler & Müller, 2012; González-Vilbazo, 2005), Italian-German (e.g., Cantone & Müller, 2008; Eichler et al., 2012; Eichler & Müller, 2012), and French-German (e.g., Radford et al., 2007); while in other cases, one of the languages has grammatical gender while the other has not, as in the case of English-German (e.g., Gaskins et al., 2021; Jorschick et al., 2011), English-Italian (e.g., Radford et al., 2007) or Spanish-English, the language combination under investigation in this dissertation (e.g., on adults: Aaron, 2015; J. H. Clegg & Waltermire, 2009; Montes-Alcalá & Lapidus Shin, 2011; Moyer, 1992; Otheguy & Lapidus Shin, 2003; Valdés Kroff, 2016; on children: Balam et al., 2021; Deuchar & Quay, 2001; Liceras et al., 2008; Ramírez Urbaneja, 2020; among many others).

In the case of Spanish-English DP switches, results indicate that the mechanism used mainly depends on factors such as the type of bilingual (i.e., L2 vs. HL bilinguals), the dominant language (i.e., if it is the gendered language – Spanish –, or the ungendered language – English), or the community norms (i.e., habitual codeswitching communities vs. non-habitual codeswitching communities) (Bellamy & Parafita Couto, 2022; Denbaum & de Prada Pérez, 2021).

When dealing with naturalistic data, mainly data from HL bilinguals who live in codeswitching communities have been analyzed. In particular, those adult and child bilinguals who are in English dominant communities have been reported to produce more masculine default switched DPs, that is, an overproduction of masculine Dets regardless of the gender of the translation equivalent of the English N (e.g., Aaron, 2015; Balam, 2016; Balam et al., 2021; DuBord, 2004; Liceras et al., 2008; Montes-Alcalá & Lapidus Shin, 2011; Otheguy & Lapidus Shin, 2003; Valdés Kroff, 2016) because this results into "considerable savings in cognitive load" (Otheguy & Lapidus Shin, 2003, p. 216). However, this is not the pattern followed by bilingual adults from Gibraltar, a codeswitching community, too, who produce a 63% of Spanish Det switches abiding by the analogical criterion (Liceras et al., 2016).

Language pairs with gender features (e.g., German-Spanish, German-Italian, Dutch-French, Dutch-Spanish) have also been under consideration in the investigation of gender agreement mechanisms in codeswitching. By using naturalistic data, researchers examine whether bilingual speakers opt for the translation equivalent of the N or for the gender of the switched N. By using spontaneous data from German (a three-gender language) and Italian (a two-gender language) bilingual children, Cantone and Müller (2008) find that these Italian-German bilingual children favor producing DPs in which the Det encodes the gender of the switched N (26%), as in (59.a), over the analogical criterion (5%), as in (59.b), although they mostly opt for the production of Ns which have the same gender value in both languages, as in (59.c).

59.

a) *eine pentola*

eine German fem. pentola Italian fem. (German = *topf* – masc.)

"a pot"

b) *eine sole*

eine German fem. sole Italian masc. (German = *sonne* – fem.)

"a sun"

c) *una biene*

una Italian fem. biene German fem. (Italian = *ape* – fem.)

"a bee"

(Cantone & Müller, 2008, pp. 819–820)

Broadening the number of languages involved, Eicher et al. (2012) investigate bilingual children who speak a Romance language (French, Spanish or Italian) and German or two Romance languages (French and Italian) and conclude that the Det agrees with the gender of the switched N instead of that of the translation equivalent. The same pattern is reported in González-Vilbazo's (2005) Spanish-German (*Esplugisch*) spontaneous data from bilingual adults which show that most of them prefer the Spanish Det + German Ns in which the Det has the gender of the switched N. That is, when the German N is feminine, the Spanish Det is feminine. However, when the switched German N is neuter, as Spanish has no neuter gender, the Spanish Det is masculine. On the other hand, the preference for German Det switches is not as clear-cut as other features such as case, which is encoded in the German Det, may affect the selection of the German Det.

Previous studies using offline experimental data have also accounted for the above-mentioned gender agreement mechanisms in English-Spanish codeswitching. Focusing on the L1 of the bilingual speaker, data from offline experimental tasks (i.e., AJTs, sentence completion tasks, director-matcher tasks, among others) reveal diverse results. L1 Spanish bilinguals living in Spain for whom English is their L2 or their HL have shown a preference for [+AC] functional-lexical switches, that is, they prefer switched DPs in which there is gender agreement between the Spanish Det and the translation equivalent of the English N, as in (57.a) (e.g., Fernández Fuertes et al., 2011, in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Liceras et al., 2008). The same pattern is observed in the experimental data from L1 Spanish – L2 English bilingual adults living in Canada who performed a sentence selection task (Valenzuela et al., 2012).

As for HL Spanish bilinguals, bilingual children from Gibraltar exhibit the same preference as L1 Spanish bilinguals when comparing [+AC] switches and [-AC] switches in both AJT data and sentence completion data (e.g., Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, & Martínez, 2019; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d). However, when the comparison is between [+AC] and masculine default switches, these HL Spanish bilingual children from Gibraltar favor masculine default switched DPs, as in (57.c).

When dealing with offline experimental data from HL Spanish bilingual adults in the USA, the results vary depending on different factors. For instance, in a forced-choice AJT, Delgado (2018) finds that HL Spanish bilingual adults living in Chicago opt for [+AC] structures only when the translation equivalent of the English N is feminine and belongs to the familial domain. If the English N is feminine in Spanish but it does not belong to the familial domain, they prefer masculine Dets. This preference for masculine as a default option is observed as well in HL Spanish adults in Canada when performing a sentence selection task (Valenzuela et al., 2012). Yet, the researchers do not make the distinction between familial and non-familial domains. Finally, Denbaum and de Prada Pérez (2021) also investigate the gender assignment and gender agreement mechanisms preferred by HL Spanish speakers in Florida, USA. They distinguish between frequent and non-frequent codeswitchers, and how gender canonicity as well as language mode may influence their preferences when they are in a Spanish monolingual mode or in a codeswitching mode. In the case of the codeswitching mode, results from their guided-production experimental task indicate that habitual codeswitchers opt for masculine determiners with feminine translation equivalents, that is, a tendency for the masculine as the default option, while infrequent codeswitchers favor [+AC] feminine switches, and this was regardless of the canonicity of the N. Yet, canonicity does affect gender assignment in the Spanish-only mode so that Denbaum and de Prada Pérez (2021) argue that HL Spanish bilinguals demonstrate different behaviors regarding gender assignment based on the mode in which they are.

Finally, L1 English – L2 Spanish bilingual children from Gibraltar and adults from Canada exhibit a preference for masculine as the default option in AJTs (e.g., Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, & Martínez, 2019; Gómez

Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d; Liceras et al., 2008).

In sum, when dealing with offline experimental data, participants' preferences seem to be guided by their L1, in particular, by the status Spanish has for these speakers. L1 Spanish bilinguals prefer [+AC] switches regardless of the status of English, either as L2 or as HL. The pattern is different when it comes to L1 English bilingual speakers. In this case, HL Spanish bilinguals opt for the masculine as default gender when default masculine switches are compared to [+AC] switches, although when [+AC] switches are compared to [-AC] structures, they are more aware of the ungrammaticality, and they prefer [+AC] switches. In the case of L1 English – L2 Spanish speakers, the tendency seems to be always towards the masculine as default.

Codeswitching literature has also focused on gender agreement mechanisms with other language pairs in the case of offline experimental data. Switched DPs involving a gendered language and an ungendered language, as it is the case of Basque and Spanish, have also been examined using a variety of experimental tasks (i.e., 7-point AJTs, director-matcher tasks, forced-choice tasks) and with different types of bilinguals (i.e., Spanish dominant simultaneous bilinguals, sequential bilinguals – both L1 Basque and L1 Spanish). Most of these studies point to a preference for [+AC] structures (e.g., Ezeizabarrena, 2009; Iriondo, 2017; Munarriz-Ibarrola et al., 2021). Yet, others indicate that these bilinguals rely on the shape-based strategy, that is, they associate the Basque definite marker *'-a'* with the feminine gender so that they use the feminine Det as a default gender regardless of the gender of the translation equivalent guided by the ending of the Basque N (Badiola & Sande, 2018; Munarriz-Ibarrola et al., 2021; Parafita Couto et al., 2015). The shape-based strategy has also been observed in the Spanish Det + Purepecha N switched DPs, since participants assign the feminine gender to Purepecha Ns which end in -a, although the translation equivalent is masculine in Spanish (Bellamy et al., 2018).

On the other hand, online experimental data have also been elicited from Spanish-English bilingual speakers with diverse linguistic profiles and age ranges in order to determine which gender agreement strategy (i.e., the analogical criterion as in (57.a), or the lack of it, as in (57.b), and the masculine as the default strategy, as in (57.c) is processed faster and, therefore, more easily, as well as the reasons behind their processing costs. As with naturalistic and offline experimental data, results are conflicting

and depend on diverse factors such as the linguistic profile of the bilingual, the community norms or the type of task.

The structures abiding by the analogical criterion, that is, DP switches in which the Spanish Det agrees in gender with the Spanish translation equivalent of the English N, as in (57.a), have been shown to be easier to process in the case of L1 Spanish – L2 English bilingual adults and children (e.g., Beatty-Martínez & Dussias, 2017; Fernández Fuertes et al., 2019, in preparation; Gómez Carrero & Fernández Fuertes, 2020a, 2020b, 2021a, 2021b, 2021c). By using the ERP procedure with L1 Spanish adults from Granada, where codeswitching is non-habitual, Beatty-Martínez and Dussias (2017) observe a higher degree of sensitivity with the non-congruent (i.e., [-AC]) switches, above all when they involve a feminine N (e.g., *el* masc. Det 'the' spoon = SP fem. N '*cuchara*'). The same pattern has been reported in the case of eyetracking during reading data, since both children and adults exhibit more difficulties in processing the English N when it is preceded by a Spanish Det which does not agree with the gender of the Spanish translation equivalent of the English N, i.e., [-AC], as in (57.b) (e.g., Fernández Fuertes et al., 2019, in preparation; Gómez Carrero & Fernández Fuertes, 2020a, 2020b, 2021a, 2021b, 2021c). Fernández Fuertes et al. (2019) and Fernández Fuertes et al. (in preparation) claim that this delay in processing [-AC] DP switches is due to the strength that Spanish gender features has in the mind of these bilinguals, as Spanish is their L1. So that, a grammatical violation, which indeed involves a feature mismatch (see chapter 2, section 2.3.2 for more details), slows processing in this case. Thus, enforcing gender agreement mechanisms, as in [+AC] DP switches in (57.a), is "less costly than not complying with them" (Fernández Fuertes et al., in preparation, p. 27). In this case, the authors do not indicate if this pattern varies based on whether the N is masculine or feminine.

In the case of HL Spanish speakers, results are more conflicting. Fairchild and Van Hell (2017) indirectly examine if HL Spanish bilingual adults living in the USA rely on the masculine as default strategy in their online Det-N picture naming task. Yet, they observe that they only use this strategy 7.2% of the time (p.157). Beatty-Martínez and Dussias (2017) also examine the processing of gender agreement mechanisms by L1 English – HL Spanish bilingual codeswitchers living in the USA with the ERP technique. They found that, opposite to the non-codeswitchers' data, [-AC] switched DPs consisting of a masculine Det and a feminine Spanish translation equivalent (e.g., *el* masc. Det 'the' spoon = SP fem. N

'cuchara'), that is, what would be considered a masculine default Det, do not entail any processing difficulty for these bilinguals. By eliciting eyetracking data from the same type of bilinguals (L1 English – HL Spanish adults living in the USA), Valdés Kroff et al. (2017) aim at investigating whether the overwhelming production of masculine as default in switched DPs which was previously found in bilingual communities could also be attested in comprehension. The researchers find a reliance on the feminine Spanish Det to decide on the upcoming N in DP switches in a visual world paradigm task. That is, these bilinguals observe two images which are phonological competitors in English ('candle $_{fem.}$' and 'candy $_{masc.}$') with different gender values in Spanish (feminine and masculine, respectively) while they listen to a codeswitched structure (e.g., 'the kids *encontraron* 'found' *el/la 'the'*... candy while they were cleaning their room'). The researchers find that participants are faster selecting the image when they hear a feminine Spanish Det in comparison to the masculine Spanish Det. Valdés Kroff et al. (2017) argue that this is due to the status of default gender that masculine has, above all, in the codeswitching community (e.g., Królikowska et al., 2019; Otheguy & Lapidus Shin, 2003; Valdés Kroff, 2016).

To the best of our knowledge, online data from HL bilingual children (both HL Spanish and HL English) are still to be reported in order to determine if age is a critical factor when it comes to processing gender agreement in Spanish Det switched DPs in the case of the HL speakers.

3.3.2. Gender agreement mechanisms in switches involving an Adj

Gender agreement mechanisms in Spanish Adj switches, as in (58), have also received some attention in the codeswitching literature but mainly with offline experimental data (e.g., Fernández Fuertes et al., 2011; Gómez Carrero et al., 2018; Gómez Carrero, Fernández Fuertes, & Martínez, 2019; Gómez Carrero & Fernández Fuertes, 2021d; Klassen & Liceras, 2017; Liceras et al., 2017; Valenzuela et al., 2012).

In offline experimental data from a variety of bilingual children and adults (i.e., HL Spanish, HL English, L1 Spanish and L1 English), researchers have identified the same patterns already seen in DP switches (section 3.3.1). That is, L1 Spanish bilinguals favor Spanish Adj switches in which the gender of the translation equivalent of the English DP subject agrees with the gender of the Spanish Adj ([+AC]), as in (58.a). This prevalence

has been observed in both L1 Spanish – L2 English children living in Spain (Fernández Fuertes et al., 2011), as well as L1 Spanish – L2 English adults living in Spain (Klassen & Liceras, 2017) using AJT data, and in L1 Spanish – L2 English adults living in Canada completing a sentence selection task (Valenzuela et al., 2012). Thus, it seems that L1 Spanish bilingual speakers have the Spanish gender features so rooted in their minds that even in English immersion contexts such as Canada their preferences are shaped by these Spanish features.

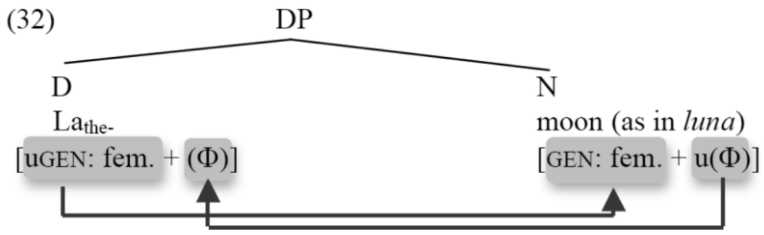
L1 English – L2 Spanish data have also been elicited from both children and adults. Adults from Trinidad and Tobago completing an AJT demonstrate no preference for either [+AC] nor [-AC] Spanish Adj switches, although they tend to give higher rates to masculine structures (Klassen & Liceras, 2017; Liceras et al., 2017). L1 English children from Gibraltar also performing an AJT show no preference for either gender agreement mechanism, that is, they give the same values to [+AC] Spanish Adj switches, as in (58.a), when compared to [-AC] Spanish Adj switches, as in (58.b), and to masculine default structures, as in (58.c), when these are compared to [+AC] Spanish Adj switches. Thus, it seems that the lack of gender features in their L1 makes them less sensitive to Spanish gender features which leads them to rate all structures in a similar way when it comes to gender agreement mechanisms.

Regarding HL speakers, offline experimental data point towards different patterns depending on which language is the HL (i.e., English or Spanish), and the type of task (i.e., AJTs, sentence completion tasks and sentence selection tasks). HL Spanish children from Gibraltar give higher rates to [+AC] Spanish Adj switches when compared to [-AC] switches and to masculine default Spanish Adj switches in AJT, although this preference is not statistically significant (Gómez Carrero & Fernández Fuertes, 2021d). The prevalence of [+AC] Spanish Adj switches has also been observed in data from HL Spanish bilingual adults in Canada when they completed a sentence selection task (Valenzuela et al., 2012). This suggests that the status Spanish has for these bilingual speakers – Spanish is one of their L1s – may be guiding these speakers' preferences when it comes to gender agreement mechanisms. Indeed, they present a similar performance to that of the L1 Spanish – L2 English speakers described above, as well as to that of the L1 Spanish – HL English bilingual children from Spain, who also favor [+AC] Spanish Adj switches (Fernández Fuertes et al., 2011). In all these cases, participants completed a task in which

they had to choose what they considered to be the most adequate option, or they had to indicate how they perceived a structure. Nonetheless, when they are asked to produce the Spanish Adj in a sentence completion task, HL Spanish bilingual children from Gibraltar show a completely different performance. That is, they produce mostly masculine Adjs, pointing to a preference for the masculine as the default option in guided production (Gómez Carrero, Fernández Fuertes, & Martínez, 2019). Thus, it seems that the modality of the task (i.e., judgment vs. guided production) may play a role in the HL speakers' gender agreement preferences.

Some of the above-mentioned studies have also compared [+AC] Spanish Det + English N switches, as in (57.a), to [+AC] Spanish Adj switches, as in (58.a), in terms of gender agreement mechanisms. Gómez Carrero et al. (2018), Klassen and Liceras (2017) and Valenzuela et al. (2012) find that bilingual speakers, regardless of their linguistic profile, opt for Spanish Adj switches over Spanish Det switches in both judgment and sentence selection data. Liceras and colleagues (Fernández Fuertes & Liceras, 2018a; Klassen & Liceras, 2017; Liceras et al., 2017) associate this preference to how the double-feature valuation mechanism is realized in each structure. That is, the feature valuation in switched DPs is done bidirectionally, as in (60).

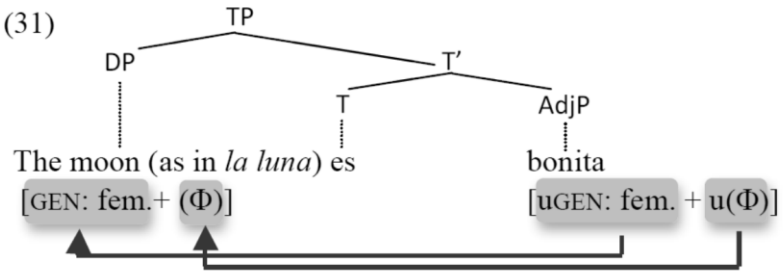
60.



(Klassen & Liceras, 2017, p. 93)

This means that the unvalued gender features on the Spanish Det are valued against the gender features of the translation equivalent of the English N, while the unvalued gender agreement features of the Spanish translation equivalent of the English N are valued against the gender agreement features of the Spanish Det (see chapter 2, section 2.3.1 for a more detailed explanation). However, this operation is done unidirectionally in Adj switches, as in (61).

61.

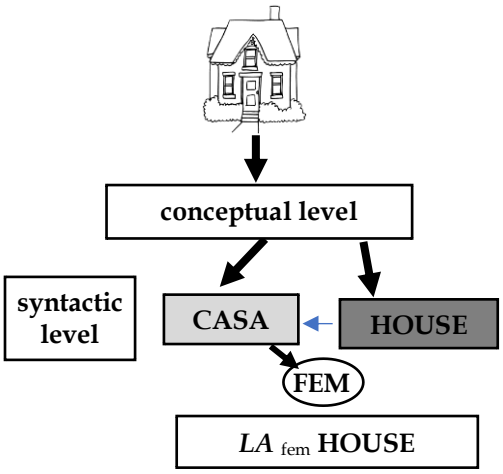


(Klassen & Liceras, 2017, p. 92)

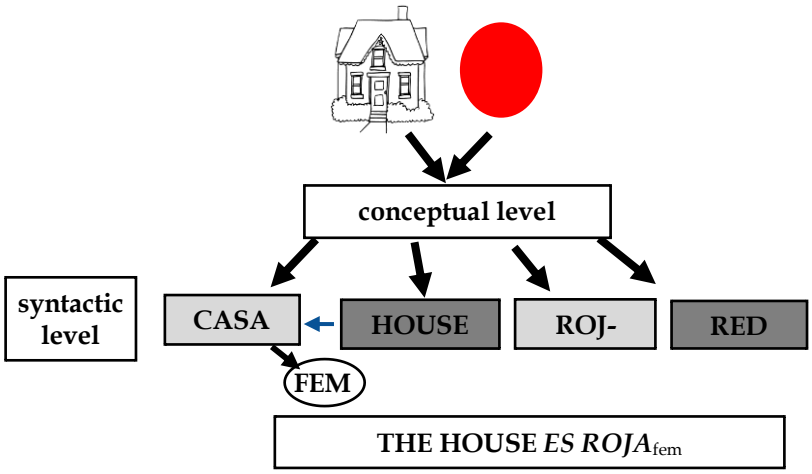
This means that both the unvalued gender feature and the unvalued gender agreement feature on the Spanish Adj are valued to the left (Klassen & Liceras, 2017; Liceras et al., 2017) (see chapter 2, section 2.3.1 for a detailed account). Thus, processing Adj switches becomes easier and, therefore, preferred.

Yet, the pattern found in judgment data is not kept when it comes to guided production data, that is, when bilinguals have to provide the Spanish Det or the Spanish Adj in a sentence completion task. In this case, both HL Spanish bilingual children from Gibraltar and L2 Spanish bilingual adults from Trinidad and Tobago show more adherence to [+AC] in DP switches than to [+AC] in Adj switches (Fernández Fuertes & Liceras, 2018a; Gómez Carrero, Fernández Fuertes, & Martínez, 2019; Liceras et al., 2017). The difficulty in this type of task is explained via the lexical access hypothesis (Liceras et al., 2017): in DP switches the speaker only accesses one lexical category, the N, as represented in (62), while in Adj switches the speaker has to access two lexical categories, namely the N and the Adj, as represented in (63). This is what makes [+AC] Adj switches more complex in experimental production.

62.



63.



(adapted from Liceras et al., 2017)

On the other hand, in the case of codeswitching involving other language pairs, gender agreement mechanisms have only been explored when the Spanish Adj is within the DP and in these cases the focus has mostly been place on word order between the Adj and the N (e.g., Boers et al., 2020; de Nicolás, 2020; Vanden Wyngaerd, 2017). However, data discussing Adj switches are yet to be reported.

In the case of online data, as it occurs with the directionality of the switch, to the best of our knowledge, most of the studies analyzing online data have investigated functional-lexical switches with a Spanish Det, as in (54.a), but no study has yet explored Spanish Adj switches, as in (55.b). Thus, online data investigating Spanish Adj switches are also needed in order to have a better understanding of the diverse cognitive mechanisms underlying the processing of gender agreement mechanisms.

In sum, spontaneous and experimental data have been used by a wide range of studies to investigate the gender agreement mechanisms in both Spanish Det switches and Spanish Adj switches. The differences found could be attributed to the different mechanisms that are at play and which are tackled in the processes bilinguals experience when they are being tested via different offline and online procedures (i.e., AJTs, forced-choice tasks, sentence selection tasks, sentence completion tasks, eyetracking during reading tasks, visual world paradigm tasks, among others). Data collection types also intertwine with the linguistic profile of the participant which points to the different representations formal features have in the mind of different bilinguals (i.e., L2 bilinguals vs. HL bilinguals; habitual codeswitchers vs. non-habitual codeswitchers; English

dominant vs. Spanish dominant bilinguals). A summary of the main findings on gender agreement mechanisms in both structures is presented in Table 2.

Table 2. Summary of the main findings on gender agreement mechanisms on Spanish Det switches and Spanish Adj switches.

			Gender agreement mechanisms	
	Data type	Participant	[+AC]	Masc. Default
DP switches	Spontaneous	children		**HL SP:** Liceras et al. (2008). **HL EN:** Liceras et al. (2008).
		adults	**HL SP:** Moyer (1992).	**HL SP:** Aaron (2015); Balam (2016); Balam et al. (2021); DuBord (2004); Montes-Alcalá & Lapidus Shin (2011); Otheguy & Lapidus Shin (2003); Valdés Kroff (2016).
	Offline	children	**L1 SP:** Fernández Fuertes et al. (2011); Fernández Fuertes et al. (in preparation); Gómez Carrero, Fernández Fuertes & Martínez et al. (2019a,b). **HL SP:** Gómez Carrero, Fernández Fuertes, Martínez et al. (2019). **HL EN:** Fernández Fuertes et al. (2011).	**L1 EN:** Gómez Carrero & Fernández Fuertes (2021d); Gómez Carrero et al. (2018); Gómez Carrero, Fernández Fuertes & Martínez et al. (2019a,b). **HL SP:** Gómez Carrero & Fernández Fuertes (2021d); Gómez Carrero et al. (2018). **HL EN:** Gómez Carrero, Fernández Fuertes & Martínez et al. (2019a,b).
		adults	**L1 SP:** Liceras et al. (2008); Valenzuela et al. (2012). **L1 EN:** Parafita Couto & González Rodríguez (2019). **HL SP:** Delgado (2018).	**L1 EN:** Liceras et al. (2008) **HL SP:** Delgado (2018); Denbaum & de Prada Pérez (2020); Valenzuela et al. (2012).
	Online	children	**L1 SP:** Fernández Fuertes et al. (in preparation); Gómez Carrero & Fernández Fuertes (2020b, 2021c).	
		adults	**L1 SP:** Beatty-Martínez & Dussias (2017); Fernández Fuertes et al. (2019); Gómez Carrero & Fernández Fuertes (2020a); Gómez Carrero & Fernández Fuertes (2021a, b).	**HL SP:** Beatty-Martínez & Dussias (2017); Valdés Kroff et al. (2017).
Adj switches	Spontaneous	children		
		adults		
	Offline	children	**L1 SP:** Fernández Fuertes et al. (2011). **HL EN:** Fernández Fuertes et al. (2011).	**L1 EN:** Gómez Carrero & Fernández Fuertes (2021d). **HL SP:** Gómez Carrero, Fernández Fuertes & Martínez (2019); Gómez Carrero & Fernández Fuertes (2021d).
		adults	**L1 SP:** Klassen & Liceras (2017); Liceras et al. (2017); Valenzuela et al. (2012). **HL SP:** Valenzuela et al. (2012).	**L1 EN:** Klassen & Liceras (2017).
	Online	children		
		adults		

3.4 Summary

This chapter has included an extensive review on the main findings from previous studies using spontaneous and experimental data to analyze the two issues under consideration in this dissertation: the directionality of the switch (section 3.2) and the gender agreement mechanisms (section 3.3) in the two structures of interest which are the switched DP (sections 3.2.1 and 3.3.1) and the Adj switches (sections 3.2.2 and 3.3.2).

In terms of the directionality of the switch within the DP, no differences have been found when comparing offline and online data. In the offline data, in contrast to what previous studies have reported in spontaneous production, a clear-cut preference for the English Det switches, as in (54.b), has been reported to be favored by all types of bilinguals regardless of the type of task used to elicit the data and of their linguistic profile. Studies using online data have emphasized this preference by showing longer processing times in the case of Spanish Det switches. However, results from online experimental data do not show such a clear-cut pattern since processing costs sometimes depend on other factors such as the dominant language or the type of online task. Thus, comparing the three types of codeswitching data (i.e., spontaneous, offline experimental and online experimental), a contrastive pattern can be found based on how the data have been collected, that is, when we compare processing and perception to production.

As for the directionality of the switch in the second structure under consideration, the Adj switches, as in (55), only results from previous studies using offline data have been reviewed, since spontaneous and online data are still to be reported. In this case, the directionality of the switch has been shown to mostly depend on the type of bilingual speaker, yet further research on this topic is still needed.

Regarding gender agreement mechanisms, that is, whether there is a preference for the [+AC] switches ((57.a) and (58.a)), [-AC] switches ((57.b) and (58.b)) or masculine as default switches ((57.c) and (58.c)), both structures have been examined with offline data, but only Spanish Det switches have been analyzed using spontaneous and online data, too. In the case of Spanish Det switches, data from both online and offline experiments have revealed that preference and processing are linked, and that they are dependent on factors such as the type of bilingual (i.e., L1 Spanish vs. HL Spanish and L1 English), or the type of task (e.g., AJT vs. sentence completion task). However, contrastive patterns have been observed when examining spontaneous data from Spanish HL

bilingual adults, that is, the type of bilinguals who have been mostly examined. In this case, different strategies (i.e., [+AC] vs. masculine by default) have been reported to be favored depending on the bilingual community (i.e., Gibraltar vs. USA).

In the case of Spanish Adj switches, only results from offline experiments carried out to date have been reviewed. In this case, the patterns are similar to those found for Spanish Det switches. That is, L1 Spanish bilinguals prefer [+AC] structures, while HL Spanish bilinguals also show this tendency although their performance mostly depends on the type of task (AJT or sentence selection task vs. sentence completion task).

In sum, what all these findings have in common is that the L1 of the bilingual is crucial in how they judge, select or process Spanish grammatical gender, above all when they must enforce gender agreement operations (Spanish Det switches and Spanish Adj switches). This has been seen in how sensitive L1 Spanish bilingual speakers are to gender incongruencies ([-AC]), both in terms of preference (lower rates of [-AC]), or in terms of processing (longer processing costs in the case of [-AC] switches). This has been argued to be so because the strength of Spanish gender features in the mind of the bilingual seems to shape the bilingual's preferences in terms of the directionality of the switch as well as the gender agreement mechanism. This is also perceived in the different degree of sensitivity to Spanish grammatical gender features when comparing not only L1 bilinguals to L2 bilinguals, but also when comparing L1 bilinguals to HL bilinguals and HL bilinguals to L2 bilinguals. That is, there seems to be a gradient (i.e., L1 Spanish > HL Spanish > L2 Spanish) which is also shaped by how we access these speakers' knowledge (that is, by the testing mechanism).

CHAPTER 4. METHODOLOGY

This chapter aims to provide a description of the methodology used for the collection of the data around which this dissertation is framed. In particular, information about the participants, the design of the experiments as well as the procedures followed in the elicitation of the experimental data and in its preparation for the analysis is presented.

Three experiments using online techniques (i.e., eyetracking and reaction times) have been designed to obtain data which will attempt to shed some light on the two issues under consideration in this dissertation: (i) the directionality of the switch within the DP (experiment 1) and in switches involving an Adj[7] (experiment 2); and (ii) the gender agreement mechanisms in both the Spanish DP switches (experiment 1) and the Spanish Adj switches (experiments 2 and 3). In the case of experiments 2 and 3, both behavioral offline data (i.e., judgments and word selection) and online data (i.e., eye movements and reaction times) have been elicited. In the case of experiment 1, an eyetracking during reading task, only online data (i.e., eye movements) have been collected.

Data have been elicited from L1 Spanish – L2 English sequential bilinguals. They have been organized into two groups based on their ages: an L2 English adult group and an L2 English child group[8].

This chapter is divided as follows. Section 4.1 provides a description of the participants which includes the selection criteria applied to each group as well as the questionnaires used to outline the linguistic profile of the participants. Section 4.2 is divided into three sub-sections in which both the design and the description of the

[7] Along this dissertation, and in order to simplify the reference to the two target constructions, these are referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la*$_{\text{the}}$ house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es*$_{\text{is}}$ *roja*$_{\text{red}}$).

[8] The three experiments designed for this study as well as the participants that have participated are part of the research projects *Linguistic competence indicators in heritage and non-native languages: linguistic, psycholinguistic and social aspects of English-Spanish bilingualism* (ref. PGC2018-097693-B-I00; PI: Raquel Fernández Fuertes) funded by the Spanish Ministry of Science, Innovation and Universities and the European Regional Development Fund, and *Aspectos de la dimensión internacional del contacto de lenguas: diagnósticos de la competencia lingüística bilingüe inglés-español* (ref. VA009P17; PI: Raquel Fernández Fuertes) funded by the Regional Government of Castile and León (Spain) and the European Regional Development Fund.

collection and the codification procedures of each experiment are presented. Section 4.3 provides a description of the statistical methods used for the analyses presented in chapter 6. Finally, section 4.3 provides a summary of the chapter.

4.1. Participants

Experimental data have been collected from two groups of participants: an L2 English adult group and an L2 English child group. In the following sub-sections, the selection criteria for each group, as well as the materials used to gather information on the participants' linguistic profile, prior to the completion of the experiments, are presented.

4.1.1. Selection criteria

The two groups of participants from whom data have been elicited for this study had to meet certain criteria regarding their linguistic profile and linguistic experience. These criteria are outlined below:

i. all participants are native speakers of Spanish. This means that they have been born and raised in Spain and that Spanish has been the only language they have spoken at home while growing up;
ii. their L2 is English, and they have acquired it or are acquiring it in an educational context;
iii. participants do not have eye or hearing problems so that it does not interfere with the development of the experiments, and they are not color-blind so they can complete the experiments which require identifying colors;
iv. adult participants are older than 18 years old and their proficiency level of English is higher than an upper intermediate level (i.e., B2 or higher);
v. child participants are at least 9 years old to make sure that they are able to read fluently in Spanish. Their level of English is at least between the Movers and the Flyers level (i.e., upper A1-A2) as per the Cambridge assessment tools. This ensures that they are able to read and understand short sentences in English.

A total of 44 adult and 46 child participants that met all the above criteria have been tested. Not all participants performed all three experiments since other factors such as the availability and the willingness of the participants as well as the approval of the parents and the educational setting where children were tested affected this data collection. If participants completed more than one of the experiments, they did so in different days. A summary of the total number of participants performing each task and their mean ages can be found in Table 3.

Table 3. Summary of number of participants and mean ages per experiment.

	L1 Spanish – L2 English adults				L1 Spanish – L2 English children			
	N	Age			N	Age		
		M	*SD*	Age ranges		*M*	*SD*	Age ranges
Experiment 1: Eyetracking during reading task	31	29.27	9.75	18-52	31	11.16	1.53	10-15
Experiment 2: Reaction task in Gorilla	35	28.37	9.44	18-50	27	10.57	0.64	9-12
Experiment 3: Visual world paradigm task	32	29	9.65	18-50	39	10.64	0.62	9-12

Adult participants carried out the two eyetracking experiments (section 4.2.1 and 4.2.3) at the University of Valladolid and the reaction time task in Gorilla at home (section 4.2.2). On the other hand, children completed the experiments in two different locations: the CEIP Francisco Pino in Valladolid and the International School of Valladolid. Both schools follow the Content and Language Integrated Learning (CLIL) methodology under which subjects other than English as an L2 are taught in English (i.e., music, physical education, natural sciences).

Before carrying out any of the experiments, participants, or their parents if they were underage, signed the consent form which had been previously approved by the Research Ethics Board of the University of Valladolid (protocol approval ref. PI 19-1461). They also completed a language background questionnaire (section 4.1.2). After that, both groups of participants performed a language assessment test (section 4.1.3).

4.1.2. Language background questionnaire

The language background questionnaire used to obtain information about the participants was created by the UVALAL (University of Valladolid Language Acquisition

Lab) in collaboration with the LAR Lab (Language Acquisition Research Lab) from the University of Ottawa (Canada). The questionnaire was in Spanish, the L1 of the participants. Two versions were given to the participants, one per group. On the one hand, the adult group took the adult version in which the questions were about themselves, while the child group were given the child version in which the questions about the child participants were answered by the parents.

The language background questionnaire is divided into three broad sections: (i) personal information; (ii) linguistic information; (iii) physical information. Each section is described below:

i. the *personal information* section includes biodata questions about the participant, that is, the participant's name, age, occupation and sex;
ii. the *linguistic information* section is divided into 4 sub-sections: (a) language history; (b) language use; (c) language proficiency; and (d) language attitude:
    a. in the language history sub-section, participants inform about the language they have acquired at home as well as the other languages they have learned throughout their lives. This way, we are able to discriminate participants who do not meet the selection criteria (i.e., having acquired Spanish at home as the only L1 and having learned English as an L2 in an educational context);
    b. for each language, participants provide information about the contexts and situations in which they use it (i.e., home, school, etc.);
    c. for each language, participants self-assess their knowledge in terms of the different linguistic skills (i.e., reading, writing and listening);
    d. finally, they order each language based on how comfortable they feel with each.
iii. In the *physical information* section participants are asked about any possible vision problems and about whether they are left-handed.

This information helped the researchers determine whether the participants met the criteria to take part in this research project.

4.1.3. Language assessment tests

The experiments used to collect the data require the knowledge of both Spanish and English as these are the two languages involved in the switch. As participants are L2 English speakers, they performed a language assessment test in order to ensure that the English level of both participant groups was adequate to actually perform the tasks. Furthermore, the assessment test also ensured that the participant groups were homogeneous in terms of their level of English. Adult participants completed the Quick Oxford Placement Test while most of the child participants did the Cambridge Young Learners Placement Test (see below for more information).

The Quick Oxford Placement Test (University of Cambridge Local Examination Syndicate, 2001) is a pen-and-paper type of test which assesses the English proficiency of speakers over 16 years old. In this short version of the Oxford Placement Test, 60 questions evaluate vocabulary and grammar in a written form. The test is divided into 2 parts: part 1 involves questions 1 to 40 while part 2 contains questions 41 to 60. Only those participants obtaining more than 36 correct questions in the first part can complete the second part. The test results help classify participants into different proficiency groups which go from A1 to C2 as per the Common European Framework of Reference for Languages.

As for the participants in this dissertation, the adult group completed this test before carrying out the experiments. As described in section 4.1.1, all adult participants obtained between an upper intermediate to an advanced level of English (B2 to C2).

The Cambridge Young Learners Placement Test (University of Cambridge Local Examination Syndicate, 2018) is an online test which measures the level of L2 English in children who are in primary and secondary education. It adapts the questions according to the level of the answers given by the children. In this test, three skills are at stake: listening, reading and writing. And 3 levels are being tested: starters (pre-A1), movers (upper A1) and flyers (A2). The test is organized into 2 sections, each addressing specific skills. The listening section consists of 4 parts of 5 questions each, while the reading and writing section also involves 4 parts with up to 10 questions each. Participants have an example at the beginning of each part.

The Cambridge Young Learners Placement Test (University of Cambridge Local Examination Syndicate, 2018) was administered to the child group tested at the CEIP

Francisco Pino. As described in section 4.1.1, children obtaining a Movers and a Flyers level participated in the experiments since they demonstrated that they were able to read simple sentences in English and understand frequent vocabulary. In the case of the children tested at the International School of Valladolid, participants could not perform this test due to the policy of the institution. However, the teacher in charge of the group provided us with information about their proficiency level which is often assessed at the school as part of its academic activities. In this case, only participants who had around a Flyers level completed the experiments.

4.2. Data collection

In order to investigate the two issues under consideration in this dissertation (i.e., directionality of the switch and gender agreement mechanisms) in switched DPs and in switches involving an Adj, three experiments have been designed. The main purpose of these experiments has been to elicit online data (i.e., eye movements and reaction times). The task design, the data collection procedure and the data codification procedure of each experiment are described in the following sub-sections.

4.2.1. Experiment 1: the eyetracking during reading task

The eyetracking during reading task aims at eliciting online data (i.e., eye movements) in order to determine the directionality of the switch and the gender agreement mechanisms in switched DPs. The task design, the data collection and codification procedures of this experiment are detailed below (sections 4.2.1.1, 4.2.1.2 and 4.2.1.3).

4.2.1.1. Task design

The eyetracking during reading task is a reading experiment which consists of 156 sentences organized into 48 experimental items, 54 distractors and 54 fillers.

As illustrated in Table 4, each experimental item consists of two Spanish Ns, one masculine (e.g., '*libro*'-'book') and one feminine (e.g., '*ventana*'-'window'), and two

English Ns which are the translation equivalents of the Spanish Ns (e.g., 'book' and 'window')[9].

Table 4. Example of an experimental item in eyetracking during reading task.

condition	[AC]	pre-target words	target DP	post-target words
MM	[+AC]	*El niño está leyendo*	*el* book	for the first time
MF	[-AC]	*El señor está arreglando*	*el* window	with a hammer
FF	[+AC]	*El señor está arreglando*	*la* window	with a hammer
FM	[-AC]	*El niño está leyendo*	*la* book	for the first time
DM		The boy is reading	the *libro*	*por primera vez*
DF		The man is fixing	the *ventana*	*con un martillo*

The English Ns are preceded by a Spanish Det, each of them creating two DPs, (i) one in which the analogical criterion is enforced and where the Spanish Det agrees in gender with the translation equivalent of the English N ([+AC]), as in (64.a); and (ii) another one in which there is no such gender agreement between the Spanish Det and the translation equivalent of the English N ([-AC]), as in (64.b).

64.

a) *La* window / *El* book
   the SP fem. Det window = SP fem. N '*ventana*' / the SP masc. Det book = SP masc. N '*libro*'
   "the window" / "the book"

b) *El* window / *La* book
   the SP masc. Det window = SP fem. N '*ventana*' / The SP fem. Det book = SP masc. N '*libro*'
   "the window" / "the book"

This gives rise to a total of 6 experimental sentences, each of them representing one condition, and constituting one experimental item. This results into 6 different lists out of which each participant is presented with only one sentence (and condition) per experimental item. As a result, each participant is presented with 48 experimental sentences (one per experimental item), 54 distractors and 54 fillers.

[9] The Ns used in the eyetracking during reading task as well as in the rest of the tasks designed for this study have been carefully selected so that they would initially refer to the same translation equivalent. This has been attested in the piloting of the task.

Each experimental sentence contains 4 pre-target words, 2 target words and 2 to 4 post-target words. The target words are DPs which consist of a Det and an N which occupy the direct object position. Target Ns are [-animate], [+concrete] and they involve no body parts, no cognates and no Ns beginning with a vowel in either language or with an /l/ in English.

The Spanish target Ns have been selected using the EsPal database (Duchon et al., 2013) and the SUBTLEX-ESP database (Cuetos et al., 2011). The English target Ns have been selected using the SUBTLEX-US database (Brysbaert & New, 2009). Frequency has been controlled for both English and Spanish experimental Ns. An independent two-tailed t-test has been carried out in terms of gender in the case of Spanish Ns (masculine Spanish Ns vs. feminine Spanish Ns), revealing no significant differences ($t(94) = 0.959$, $p = .345$). Another independent two-tailed t-test for frequency between English Ns with masculine translation equivalents (e.g., 'book' – '*libro*' $_{\text{masc.}}$) and English Ns with feminine translation equivalents (e.g., 'window' – '*ventana*' $_{\text{fem.}}$) has rendered no significant differences either ($t(94) = -1.144$, $p = .256$).

As a means of attention deviation from the target constructions, and as it is recommended and often done in the design of experimental tests (e.g., Godfroid, 2020; Mackey & Gass, 2012, 2016; McDaniel et al., 1996), 54 distractors and 54 fillers are included. The fillers are monolingual sentences similar in length to the experimental sentences (i.e., between 8 and 10 words). The fillers contain a noun-noun compound which can appear in initial, mid or final position within the sentence (underlined, as in (65)). Half of the fillers (n=27) are in Spanish, as in (65.a), while the other half (n=27) are in English, as in (65.b).

65.

a) Tu hermano tiene una <u>bicicleta pirata</u> muy bonita
   "Your brother has a very beautiful pirate bike"
b) The little girls have broken the <u>coffee cup</u>

Distractors also have similar length to the experimental sentences (i.e., between 8 and 10 words), but they are bilingual sentences involving a switch happening at a grammatical point different from the ones in the 2 target constructions: between the DP

subject and the rest of the sentence. Half of the distractors (n=27) start in Spanish, as in (66.a), while the other half (n=27) start in English, as in (66.b).

66.

a) *El payaso* has a very big red nose

[The clown] $_{SP\ DP\ Subj}$ [has a very big red nose] $_{EN\ VP}$

"The clown has a very big red nose"

b) The kids *llegan a la escuela en bicicleta*

[The kids] $_{EN\ DP\ Subj}$ [get to school by bike] $_{SP\ VP}$

"The kids get to school by bike"

Neither the distractors nor the fillers contain an N which is a target word within the experimental sentences.

A summary of the distribution of the experimental items, the fillers and the distractors in the eyetracking during reading task can be found in Table 5.

Table 5. Distribution of items in the eyetracking during reading task.

Type of sentence	Condition	Nº of sentences	Sentences per list	Total per list
Experimental	EN Det	96	16	**48**
	[+AC] SP Det	96	16	
	[-AC] SP Det	96	16	
Filler	SP monolingual	27	27	**54**
	EN monolingual	27	27	
Distractor	SP directionality	27	27	**54**
	EN directionality	27	27	
	TOTAL	396	156	**156**

Furthermore, comprehension questions are included after half of the fillers (n=27) and half of the distractors (n=27) to make sure that participants keep their attention on the task. They are yes-no questions whose language matches the language in which the previous sentence ends, as in (67) and (68). Also, the number of positive and negative answers is balanced across the task.

67. Distractors:

a) Sentence: *El payaso* has a very big red nose

"The clown has a very big red nose"

Question: Does the clown have a yellow nose?

Expected answer: No

b) Sentence: The kids *llegan a la escuela en bicicleta*

"The kids get to school by bike"

Question: ¿Llegan los niños a la escuela en bicicleta?

"Do kids get to school by bike?"

Expected answer: Yes

68. Fillers:

a) Sentence: Tu hermano tiene una <u>bicicleta pirata</u> muy bonita

"Your brother has a very beautiful pirate bike"

Question: ¿Tiene tu hermano una bicicleta de juguete?

"Does your brother have a toy bike?"

Expected answer: No

b) Sentence: The little girls have broken the <u>coffee cup</u>

Question: Have the little girls broken the coffee cup?

Expected answer: Yes

At the beginning of the experiment, participants are presented with a set of 9 practice sentences to make sure that they understand the instructions and that they can perform the task as indicated. Practice sentences involve codeswitching at 3 different grammatical points which do not coincide with the ones of the 2 target constructions or with the one that appears in the distractors. Thus, practice sentences involve codeswitching at the following grammatical points: between a V and a prepositional phrase, underlined as in (69.a); between a V and DP functioning as direct object, underlined as in (69.b); and between an auxiliary V and a lexical V, underlined as in (69.c). Three of these sentences also contain a yes-no comprehension question following the same pattern as the ones used for the fillers and distractors.

69. Practice sentences:

a) *La jirafa está* near the trees

The giraffe is $_{V}$ [near the trees] $_{PP}$

"The giraffe is near the trees"

b) The child has *una manzana*

The child has $_{V}$ [an apple] $_{DP}$

"The child has an apple"

c) *El niño está* singing

The kid is $_{AUX\ V}$ singing $_{LEX\ V}$

"The kid is singing"

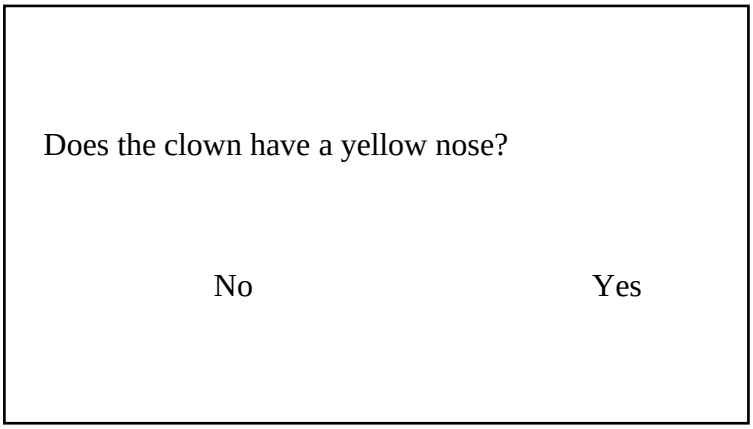
The stimuli are presented on a white background in the middle of the screen, starting on the left part of the screen. The font used in the design is Times New Roman in size 20. Each sentence is presented in isolation, as in (70), while questions are presented with the words '*no*' and 'yes/*sí*' centered at the bottom of the screen, as in (71).

70.

El niño está leyendo the book for the first time

71.

¿Llegan los niños a la escuela en bicicleta? No Sí



The experiment has been built on the SR Experiment Builder, which is a drag-and-drop graphical programming software used for the creation of eyetracking experiments.

4.2.1.2. Data collection procedure

Participants were tested in a quiet room in an institutional setting in Valladolid. Both adult and child participants performed the eyetracking during reading task once they, or their parents, if they were underage, signed the consent form and completed the language background questionnaire and the corresponding language proficiency tests (see section 4.1 for more details).

During the eyetracking during reading task eye movements were recorded with an EyeLink Portable Duo which is a head-free-to-move eyetracker which samples eye movements at 1000 Hz. Thus, setting the eyetracker for the optimal recording of the eye movements and fixations was done before the participant started the experiment, once the instructions were given. First of all, the participant was seated at approximately 60 centimeters from the 17-inch monitor of the Dell Inspiron 17 5000 series HD laptop in which stimuli were presented. The distance from the laptop with the eyetracker and the focus of the camera were adjusted manually by the researcher. As the EyeLink Portable Duo is a remote eyetracker, it requires that the participant wears a target sticker on the forehead so that precise head motions are measured (Godfroid, 2020, p. 320). During this process, the researcher made sure that the pupil's threshold was not too high or too low because this would complicate detecting the corneal reflection, thus, decreasing accuracy.

After this, the participants performed a 3-point calibration. Once the average error was under 0.5º, the participants started the task. First, they were presented the

practice set to make sure that they had understood the instructions, and after this, they began the experimental blocks. The task has been divided into 4 blocks balanced in terms of experimental sentences, fillers and distractors resulting in a total of 39 sentences per block, so participants could take breaks in between. The participant was calibrated at the beginning of each experimental block.

4.2.1.3. Data codification procedure

As described in section 4.2.1.1., the eyetracking during reading task includes 6 experimental conditions, each of them represented by 16 sentences per list. Two of these conditions represent the English Det switches, one in which the English Det is followed by a masculine Spanish N (i.e., DM) and the other one in which it is so by a feminine Spanish N (i.e., DF). The other 4 represent the Spanish Det switches (i.e., MM, MF, FF, FM). The latter are divided into [+AC] switches in which the Spanish Det is masculine or feminine and the Spanish translation equivalent of the English N is masculine or feminine respectively (i.e., MM and FF), and [-AC] switches in which there is no such gender agreement, so the Spanish Det is masculine or feminine and the Spanish translation equivalent of the English N has the opposite gender value (i.e., MF, and FM). A summary of the 6 conditions included in this task is presented in Table 6.

Table 6. Description of the conditions of the DP switches within the eyetracking during reading task.

Condition	Gender of the Det	Gender of Spanish (equivalent) N	Directionality	[AC]
MM	Masc.	Masc.	Spanish-English	[+AC]
MF	Masc.	Fem.	Spanish-English	[-AC]
FF	Fem.	Fem.	Spanish-English	[+AC]
FM	Fem.	Masc.	Spanish-English	[-AC]
DM		Masc.	English-Spanish	
DF		Fem.	English-Spanish	

Each experimental sentence has been divided into 4 interest areas: the pre-target area, 2 target areas and a post-target area, as presented in Table 7.

Table 7. Interest areas for each sentence within the eyetracking during reading task.

	Pre-target	Target: Det	Target: N	Post-target
a)	*El niño está leye*	*ndo el*	book	for the first time
b)	The man is fix	ing the	*ventana*	*con un martillo*

In the design of the experiment, both Det and N interest areas have been considered. In the case of the Det, the three letters and the space previous to the Det have been included within the Det interest area as the Det is a functional category and very short in length, so it tends to be skipped when reading (Conklin et al., 2018; Godfroid, 2020). The reasoning behind this decision is that there is a consensus that short words are identified during the fixation of prior words (Rayner, 2009). However, for the analyses presented in chapter 6, only the fixations on the N interest area have been considered because the focus of this study is the relationship that the N establishes with the Det, and this can only be observed once the Det has been fixated and read[10].

The data collected with the eyetracking during reading task have been visualized, processed, and reported through EyeLink Data Viewer, the SR Research software used for data treatment. This software allows researchers to group the data based on different conditions (i.e., type of participant, type of item, etc.) in order to visualize them more easily, to create reports based on diverse issues (i.e., fixations, saccades, interest areas, etc.), to decide on the items to be analyzed (i.e., experimental, filler, distractor, or practice items) and to select the most appropriate eyetracking measures to analyze our data (i.e., total fixation duration, regression path duration, gaze duration, etc.).

In the case of the eyetracking during reading data, only the experimental items have been selected for the creation of the report (see Table 6 for a summary of the conditions). The filler, distractor and practice items have been excluded from this report. In the case of the experimental sentences, an interest area report has been created, so that information about each interest area has been obtained. This means that information about the pre-target area, the Det and N target areas and the post-target area has been captured, although only eye fixations on the N target area have been analyzed in chapter 6.

[10] For a detailed description of the results including the Det as a target region, please refer to Fernández Fuertes et al. (2019, in preparation).

Finally, as the aim of the study is to understand the relationship between the Det and the N in terms of grammatical gender, two eyetracking measures have been used in the analyses of the fixations: (i) the total fixation duration, and (ii) the regression path duration. The total fixation duration measure consists in the sum of all fixations in an interest area, including both forward and regressive movements, as represented in (72) for the N target word "book". The regression path duration measure is the sum of all fixations in an interest area from when first entering it until moving to the right of the interest area, including the fixations made during any regression to earlier parts of the sentence before moving past the right boundary of the area, as represented in (73) (Clifton et al., 2007).

72. El niño está leyendo el book for the first time
73. El niño está leyendo el book for the first time

With all this information, the Data Viewer software creates a report in the Microsoft Excel software which allows the researcher to organize the data into the database of the study. The a posteriori cleaning of the data is detailed in section 4.3.

4.2.2. Experiment 2: the reaction time task in Gorilla

In the same line as the eyetracking during reading task, the reaction time task in Gorilla aims at shedding some light on the directionality of the switch and the gender agreement mechanisms, in this case, in switches involving an Adj. In this task, the online data consist of reaction times which are complemented with offline data (judgments). The task design, the data collection and codification procedure followed in the reaction time task in Gorilla are detailed in the following sub-sections.

4.2.2.1. Task design

The reaction time experiment in Gorilla consists of 112 sentences divided into 48 experimental sentences and 64 fillers and distractors. Out of the 48 experimental sentences, half of them (n=24) are English Adj switches, as in (74), and the other half (n=24) are Spanish Adj switches, as in (75). The latter are divided into (i) 6 masculine and 6 feminine [+AC] switches, that is, the translation equivalent of the English DP subject

agrees in gender with the Spanish Adj, as in (75.a); and into (ii) 6 masculine and 6 feminine [-AC] switches, in which there is no such gender agreement between the Spanish translation equivalent of the English N and the Spanish Adj, as (75.b).

74. *El libro* is funny / *La canción* is slow
the book $_{\text{SP masc. DP}}$ is funny / the song $_{\text{SP fem. DP}}$ is slow
"The book is funny" / "the song is slow"

75.

a) The book *es grueso* / The house *es pequeña*
the book $_{\text{= SP masc. DP 'el libro'}}$ is thick $_{\text{SP masc AdjP}}$ / the house $_{\text{= SP fem. DP 'la casa'}}$ is small $_{\text{SP fem. AdjP}}$
"the book is thick" / "the house is small"

b) The clock *es barata* / The mind *es asombroso*
the clock $_{\text{= SP masc. DP 'el reloj'}}$ is cheap $_{\text{SP fem. AdjP}}$ / the mind $_{\text{=SP fem. DP 'la mente'}}$ is amazing $_{\text{SP masc. AdjP}}$
"the clock is cheap" / "the mind is amazing"

Besides, both the English Adj switches and the Spanish Adj switches are balanced in terms of canonicity: Ns ending in *–o* for masculine and *–a* for feminine are canonical (e.g., 'book' – '*libro'*; 'house' – '*casa'*), while Ns ending in a consonant or in a vowel different from *–o* for masculine and *–a* for feminine are non-canonical (e.g., 'clock' – '*reloj'; '*mind' – '*mente'*). This applies to both the Spanish Ns and the Spanish translation equivalent of the English Ns. An example representing each condition can be found in Table 8.

Table 8. Examples of experimental sentences in the reaction time task in Gorilla.

Condition[11]	Gender of the Spanish (equivalent) N	Gender of the Spanish Adj	[AC]	Canonicity of the Spanish (equivalent) N	Sentence
CEMM	Masc.	Masc.	[+AC]	[+canonical]	The book *es grueso*
CEMF	Masc.	Fem.	[-AC]	[-canonical]	The clock *es barata*
CEFF	Fem.	Fem.	[+AC]	[+canonical]	The house *es pequeña*
CEFM	Fem.	Masc.	[-AC]	[-canonical]	The mind *es asombroso*
CSM	Masc.			[+canonical]	*El libro* is funny
CSF	Fem.			[-canonical]	*La canción* is slow

[11] C= copula (to distinguish the Adj switches conditions from the DP switches conditions, see Table 6).

The experimental stimuli consist of 4-word sentences with a copulative verb ('to be' – '*ser*') in simple present. Ns forming the DP subject are singular, [-animate] and [+concrete], and they are all preceded by a definite article. Orthographic and phonological cognates, compound Ns and Ns beginning with a vowel in English have been avoided. Ns in one language could also be repeated in the other language (e.g., 'the book' and '*el libro*'), yet they have not been paired with the same adjective in the other language (e.g., 'the book *es grueso*', '*el libro* is funny'), so that they are not part of the same sentence with a different language directionality.

Regarding the Adjs, they are singular and mark gender canonically both in the case of Spanish Adjs (e.g., '*rojo'*, '*roja'*) and in the case of the Spanish translation equivalents of the English Adjs (e.g., 'funny' – '*divertido', 'divertida'*). Orthographic and phonological cognates (e.g., 'chocolate' – '*chocolate'*) have also been avoided so that codeswitching between the DP subject and the Adj is maintained and is clear. Experimental Adjs have been repeated but only as translation equivalents (i.e., '*viejo'* and 'old', but 'old' has not been used twice) and always with a different N, as in (76).

76.

a) The building *es viejo*
   the building = SP masc. DP 'el edificio' is old SP masc. AdjP
   "the building is old"
b) *La falda* is old
   the skirt SP fem. DP is old
   "the skirt is old"

Frequency of both Ns and Adjs has been controlled by using the Corpus of Contemporary American English (Davies, 2008-) in the case of English, and *el Corpus del español* NOW (News on the Web) (Davies, 2012-2019) in the case of Spanish. For this experiment, it was necessary to compare frequencies between the two languages but, as each corpus has a different sample size—the Corpus of Contemporary American English is based on 1 billion words while *el Corpus del español* NOW is based on 5.5 billion words—, the frequencies taken from *el Corpus del español* NOW have been adjusted by

dividing them by 5.5 so that all frequencies were based on the same sample size (1 billion).

With respect to frequency, in the case of the Ns used in each target DP, an independent two-tailed t-test has revealed no significant differences between English Ns and Spanish Ns ($t(46)=1.9104$, $p=0.06$). In terms of gender, when comparing only the Spanish Ns, an independent two-tailed t-test has rendered no significant differences between masculine and feminine Ns ($t(22)=0.54127$, $p=0.59$).

In the case of the Adjs used in this experiment, the frequencies from the masculine Spanish Adjs have been added to the ones from the feminine Spanish Adjs, since *el Corpus del español* NOW does not include the frequency of the Adjs regardless of their gender. The total frequency of the different Spanish Adj pairs (e.g., '*nuevo/nueva*' 'new $_{masc.}$ /new $_{fem.}$') has been compared to the frequencies of the English Adjs with an independent two-tailed t-test, rendering no significant differences ($t(46)=1.6646$, $p=0.10$). In the case of the Spanish Adjs, an independent two-tailed t-test has revealed no significant differences between masculine Adjs and feminine Adjs ($t(22)=1.2933$, $p=0.20$).

Together with the experimental sentences, the task includes 32 fillers and 32 distractors. The fillers are 4-to-6-word monolingual sentences. Half of them is in English and the other half is in Spanish, and they all contain a noun-noun compound or a deverbal compound in final position (underlined in the examples below). Furthermore, as judgments are recorded, half of the fillers are grammatical (n=16), as in (77), and the other half are ungrammatical[12] (n=16), as in (78). Both grammatical and ungrammatical noun-noun compounds and deverbal compounds are balanced across the task.

77. Grammatical fillers

a) Ayer compré un <u>abrelatas</u> SP deverbal compound

"Yesterday I bought a tin opener"

[12] In typical acceptability judgment tasks, half of the structures are grammatical while the other half are ungrammatical. However, due to the type of structures included in this task (i.e., switches involving an Adj), this is only possible in the case of the fillers and distractors. In the case of the experimental sentences of this task, as codeswitching is involved, the grammaticality of the structures would depend on the participant's perception.

b) Estamos viendo un pájaro carpintero — SP noun-noun compound
"We are seeing a woodpecker"

c) They bought a hair dryer — EN deverbal compound

d) My father needs his tool box — EN noun-noun compound

78. Ungrammatical fillers

a) *Necesito comprar un uñascorta* — SP deverbal compound
I need to buy a clipper nail
"I need to buy a nail clipper"

b) *Ayer cenamos un espada pez* — SP noun-noun compound
Yesterday we had fish sword for dinner
"Yesterday we had swordfish for dinner"

c) We met a German driver bus — EN deverbal compound
"We met a German bus driver"

d) My sister used my paste tooth — EN noun-noun compound
"My sister used my toothpaste"

The distractors are 32 sentences involving codeswitching between a transitive V and the direct object. Therefore, codeswitching happens at a grammatical point different from the ones of the target constructions. Half of the distractor sentences (n=16) start in Spanish, as in (79.a) and (80.a), while the other half (n=16) start in English, as in (79.b) and (80.b). In both directionalities, the sentences contain between 4 and 6 words, with no definite Dets in neither the DP subject nor the direct object. Moreover, indefinite Dets have been avoided since the English indefinite Det 'a' can be mistaken by the Spanish preposition '*a*' ('to'). Plural and singular Ns and Vs have been used in the construction of the sentences, and Vs can appear in present and past tenses. As in the case of the fillers, half of the distractors are grammatical, as in (79), while the other half are ungrammatical, as in (80). In this case, the grammatical violation affects the word order between the Det and the N in the DP subject (underlined in the examples below).

79. Grammatical distractors

a) *Mi hermano compró* two shirts — SP-EN directionality

My brother bought $_{SP\ V}$ [two shirts] $_{EN\ direct\ object}$

"My brother bought two shirts"

b) These children play *música clásica* — EN-SP directionality

These children play $_{EN\ V}$ [classical music] $_{SP\ direct\ object}$

"These children play classical music"

80. Ungrammatical distractors

a) *Padre tu escribe* romantic poetry — SP-EN directionality

Father your writes $_{SP\ V}$ [romantic poetry] $_{EN\ direct\ object}$

"Your father writes romantic poetry"

b) Lions these hunt *muchas cebras* — EN-SP directionality

Lions these hunt $_{EN}$ [many zebras] $_{SP\ direct\ object}$

"These lions hunt many zebras"

Neither the filler sentences nor the distractor sentences contain copulative verbs, or the Adjs and Ns which have been included in the experimental sentences.

A summary of the distribution of the three sentence types (i.e., experimental, fillers and distractors) can be found in Table 9.

Table 9. Distribution of items in the reaction time task in Gorilla.

Type of sentence		Condition	Nº of sentences	Total
Experimental		EN Adj	24	**48**
		[+AC] SP Adj	12	
		[-AC] SP Adj	12	
Filler	Grammatical	noun-noun compound	8	**32**
		deverbal compound	8	
	Ungrammatical	noun-noun compound	8	
		deverbal compound	8	
Distractor	Grammatical	SP directionality	8	**32**
		EN directionality	8	
	Ungrammatical	SP directionality	8	
		EN directionality	8	
				112

Finally, the reaction time task in Gorilla also includes a practice set which has to be completed by the participants at the beginning of the experiment. The practice set

contains 6 sentences involving codeswitching at grammatical points which do not coincide with those from neither the experimental nor the distractor structures. Thus, the practice sentences include word-internal codeswitching, as in (81.a); a switch between a V and a prepositional phrase, as in (81.b); and a switch between an auxiliary V and a lexical V, as in (81.c).

81.

a) The fish*ito nada en el mar*

the fish $_{\text{EN N}}$ little $_{\text{SP diminutive}}$ swims in the sea

"the little fish swims in the sea"

b) *El bebé llora* in the car

The baby cries $_{\text{SP V}}$ [in the car] $_{\text{EN PP}}$

"the baby cries in the car"

c) *María está* crying

María is $_{\text{SP AUX V}}$ crying $_{\text{EN LEX V}}$

"María is crying"

Given that the practice already involves codeswitching, it also serves to set up a codeswitching mode; that is, participants are exposed to language alternation between English and Spanish from the onset of the experiment.

4.2.2.2. Data collection procedure

Participants completing the reaction time task in Gorilla had already completed at least one of the eyetracking experiments (see sections 4.2.1 and 4.2.3 for more details). Therefore, they, or their parents if they belonged to the child group, had already signed the consent form and filled in the language background questionnaire, and their language competence in English had already been assessed.

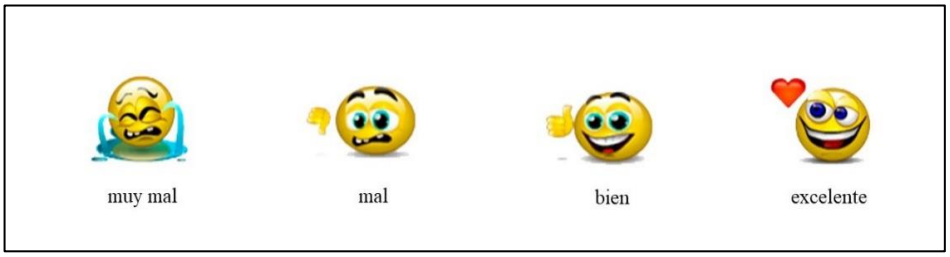
The reaction time task was performed in Gorilla (https://gorilla.sc/), a web-based experiment builder intended for the creation of behavioral experiments and a platform which allows carrying out psycholinguistic experiments online. Due to its web-based nature, participants can complete the task from home. Thus, the adult group did the

experiment at home, since they only needed a computer and internet connection. The child group was tested individually in a quiet room in an institutional setting in Valladolid.

Participants were presented with a sentence centered in the screen, as in (82) and 4 emoticons faces representing 4 values (i.e., '*muy mal', 'mal', 'bien', 'excelente'* – 'very bad', 'bad', 'good', 'excellent') at the bottom of the screen, as in (83).

82.

83.



Participants read each sentence in silence and clicked on one of the emoticons based on the judgment that they considered most appropriate for each sentence. For each sentence, the reaction time as well as the judgment were recorded.

The instructions for the task appeared first and they were presented with examples. Then, the practice set followed with a view to ensuring that the participant had understood the instructions and was familiar with the dynamics of the task. And, finally, the experimental task appeared. Contrary to the other two eyetracking experiments, the reaction time task in Gorilla does not include breaks. Thus, once the participant started the task, they did not stop until it was finished. This is so because eye movements are not

being recorded in this task as they are in the other two. Also, although it is a reading task as the eyetracking during reading task (section 4.2.1), the reaction time task in Gorilla contains fewer and shorter sentences, so that younger participants do not get as tired as they do in the eyetracking during reading task.

4.2.2.3. Data codification procedure

As described in section 4.2.2.1., the reaction time task in Gorilla is organized into 6 experimental conditions. Two of these conditions present the copulative structure with the Spanish DP Subject + English AdjP directionality (i.e., CSM and CSF), while the other 4 conditions have the English DP subject + Spanish AdjP condition (i.e., CEMM, CEMF, CEFF, CEFM). The latter are divided into (i) the [+AC] switches, where both the translation equivalent of the English DP and the Spanish Adj have the same gender value (i.e., CEMM and CEFF), and (ii) the [-AC] switches, where there is no gender agreement between the Spanish translation equivalent of the English DP and the Spanish Adj (i.e., CEMF, CEFM). A summary of the 6 experimental conditions forming the reaction time task in Gorilla can be found in Table 10.

Table 10. Description of the conditions of the Adj switches within the reaction time in Gorilla.

Condition	Gender of the Spanish (equivalent) N	Gender of the SP Adj	[AC]	Directionality
CEMM	Masc.	Masc.	[+AC]	English Subject DP + Spanish AdjP
CEMF	Masc.	Fem.	[-AC]	English Subject DP + Spanish AdjP
CEFF	Fem.	Fem.	[+AC]	English Subject DP + Spanish AdjP
CEFM	Fem.	Masc.	[-AC]	English Subject DP + Spanish AdjP
CSM	Masc.			Spanish Subject DP + English AdjP
CSF	Fem.			Spanish Subject DP + English AdjP

The data elicited with the reaction time task are stored in Gorilla and can be downloaded in an Excel spreadsheet so that the researcher is able to organize them. As the document obtained from Gorilla contains a great deal of information not needed to address the target of the present investigation, so only the necessary columns have been kept to build the database. This database contains the participants' codes and other

biodata such as the proficiency level and age of the participants. Also, it contains information related to the task data: (i) the type of item (i.e., filler, distractor or experimental); (ii) the directionality of the switch; (iii) the canonicity of the Spanish (translation equivalent) N; (iv) the gender of the Spanish (translation equivalent) N; (v) the judgment selected in the scale, codified with numbers (i.e., 1= very bad; 4= excellent); and (vi) the reaction time in milliseconds (i.e., the amount of time the participants need from the moment they start reading the sentence until they press one of the emoticons to judge the sentence). The a posteriori data cleaning is presented in section 4.3.

4.2.3. Experiment 3: the visual world paradigm task

The visual world paradigm is a looking-while-listening type of task (Allopenna et al., 1998; Cooper, 1974). The key idea is that eye movements reflect "the interplay of language, vision, memory and attention" (Huettig et al., 2011, p. 167). The most common type of visual task is the one in which the participant hears an utterance while looking at a scene while their eye movements and fixations are being recorded. Since its introduction, researchers have manipulated the presentation of the visuals or the audio in order to fulfill their research purposes, so that, there have been visual world paradigm tasks in which printed words have been presented instead of images (e.g., Huettig & McQueen, 2007).

In the case of the present investigation, the visual world paradigm task aims at eliciting online data in order to determine the gender agreement mechanisms in switches involving an Adj. It has been created as a complement to the reaction time task in Gorilla (see section 4.2.2), as both tasks target switched structures involving an Adj but, while the first one addresses the two target issues (i.e., the directionality of the switch and the gender agreement mechanisms), the second one focuses on gender agreement mechanisms. This task, therefore, only includes as experimental items switches involving an English DP subject and a Spanish Adj, as in (75), repeated below as (84).

84.

a) The book *es grueso* / The house *es pequeña*

the book = SP masc. DP 'el libro' is thick SP masc. AdjP / the house= SP fem. DP 'la casa' is small SP fem. AdjP

"the book is thick" / "the house is small"

b) The clock *es barata* / The mind *es asombroso*

the clock$_{\text{= SP masc. DP 'el reloj'}}$ is cheap $_{\text{SP fem. AdjP}}$ /the mind$_{\text{=SP fem. DP 'la mente'}}$ is amazing $_{\text{SP masc. AdjP}}$

"the clock is cheap" / "the mind is amazing"

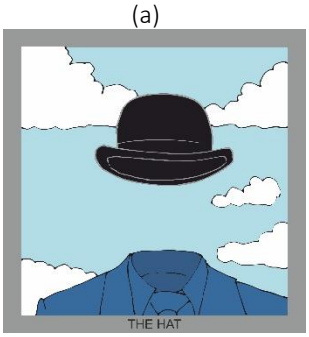
As the focus of this experiment is set on Spanish grammatical gender, the traditional visuals have been replaced by words, as will be described in the following sub-sections (4.2.3.1 and 4.2.3.2).

4.2.3.1. Task design

The visual world paradigm task consists of a total of 72 items organized into 24 experimental items and 48 fillers. As shown in (85), all stimuli consist of (i) an image depicting an English DP, as in (85.a); (ii) a question about the previous English DP and which involves codeswitching, as in (85.b); and (iii) a grid with 4 words in Spanish (i.e., target, competitor, distractor 1 and distractor 2), as in (85.c).

85. Parts of an item in the visual world paradigm task:

(a)



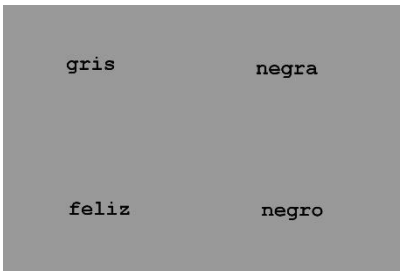
English DP

(b)

¿Cómo es the hat in the previous screen?

Question

(c)



Spanish Adj

Both experimental and filler stimuli consist of the same parts. Yet, the elements which constitute each of them are different. On the one hand, as shown in Table 11, experimental items are organized into 4 conditions based on the gender (M= masculine; F= feminine) and the canonicity (O= canonical; X= non-canonical) of the Spanish translation equivalent of the English N that appears in the English DP subject, as in (84).

Table 11. Example of an experimental item in the visual world paradigm task.

Condition	English DP	Question			Spanish Adj			
					Target	Competitor	Distractor 1	Distractor 2
MO	the hat	*Cómo es*	the hat	in the previous screen?	*gris*	*feliz*	*negro*	*negra*
MX	the glove		the glove		*gris*	*feliz*	*negro*	*negra*
FO	the shirt		the shirt		*gris*	*feliz*	*negra*	*negro*
FX	the cloud		the cloud		*gris*	*feliz*	*negra*	*negro*

Each experimental item contains two English DPs corresponding to Spanish masculine translation equivalents (MO and MX), one with a canonical ending (MO= 'the hat' – '*el sombrero'*) and another one with a non-canonical ending (MX= 'the glove' – '*el guante*'); and two DPs with feminine translation equivalents (FO and FX), one with a canonical ending (FO= 'the shirt' – '*la camisa*'*)* and the other one with a non-canonical ending (FX= 'the cloud' – '*la nube*'). All Ns are singular, [-animate] and [+concrete]. No compounds nor cognates are included in this task, and no English N begins with a vowel.

Frequency has been controlled for English Ns by using the Corpus of Contemporary American English (Davies, 2008-). An independent two-tailed t-test has been performed in terms of gender in the case of the English Ns based on the gender of their Spanish translation equivalents, revealing no significant differences between masculine and feminine translation equivalents ($t(79)= -0.158$, $p = 0.87$). Another independent two-tailed t-test has been carried out to compare the English Ns based on the morphology of their Spanish translation equivalents, rendering no significant differences between canonical and non-canonical Ns ($t(68)= -1.53$, $p= 0.129$).

As shown in (85.c) and illustrated in Table 11, 4 Spanish Adjs are associated to each English DP. Target and competitor Adjs are the same Adj with different gender values depending on the gender agreement established between the Adj and the Spanish translation equivalent of the English N. The target Adj is always [+AC], that is, the Spanish Adj agrees in gender with the Spanish translation equivalent of the English N, as in (86.a) and (87.a); while the competitor is [-AC], where there is no such gender agreement, as in (86.b) and (87.b). In all cases, target and competitor Adjs mark gender canonically (i.e., end in *–a* if feminine and in *–o* if masculine). Target and competitor Adjs have not been repeated along the task so that each of these Adjs has only been used once.

86. The hat = SP masc. *'el sombrero'*

a) *negro* masc. = [+AC]

b) *negra* fem. = [-AC]

"black"

87. The shirt = SP fem. *'la camisa'*

a) *negra* fem. = [+AC]

b) *negro* masc.= [-AC]

"black"

Regarding the other two Adjs forming the grid of an experimental item, the distractor Adjs, there are two types depending on their semantic relationship with the DP subject: distractor 1 is an Adj semantically related to the DP but incorrect given the picture presented in (85.a) (i.e., a hat can be potentially grey color, but not the one in the picture provided); while distractor 2 is an Adj semantically unrelated to the DP (i.e., hats cannot be happy). In either case, they present non-canonical endings (i.e., a consonant or a vowel different from *–o* for masculine and *–a* for feminine) since the focus is not on gender but on semantics. Some distractor Adjs have been repeated twice along the task.

All Adjs are singular and are in Spanish. No orthographic and no phonological cognates have been included (e.g., 'brilliant' – *'brillante'*), especially in the case of target and competitor Adjs so codeswitching between the English N and the Spanish Adj has been maintained and is clear. The 4 Adjs are presented in a grid and their positions vary along the task to make sure that the participant does not know the position of the target word in advance. Also, the length of the Adjs has been controlled for in terms of the number of characters. All Adjs included in the same grid (i.e., target, competitor, distractor 1 and distractor 2) could differ in a maximum of 2 characters.

Finally, frequency of all Spanish Adjs has been taken from *el Corpus del español* NOW (News on the Web) (Davies, 2012-2019). The comparison across the three types of Adjs (target/competitor, distractor 1 and distractor 2) has rendered no significant differences ($F(2,69)= 0.162$, $p=0.851$).

Moreover, as in (85.b), each experimental item includes a question starting with the interrogative *'cómo'* ('how') followed by the Spanish copulative verb '*ser*' ('to be') in third person singular present tense plus the English DP subject. Three different endings

are included in these questions, as those underlined in (88), all of them being prepositional phrases functioning as adjuncts.

88.

a) ¿*Cómo es* the book in the previous screen?

"What is the book in the previous screen like?"

b) *¿Cómo es* the sun in the previous image?

"What is the sun in the previous screen like?"

c) *¿Cómo es* the stain in the previous picture?

"What is the stain in the previous screen like?"

As each experimental item is organized into 4 different conditions, the experiment consists of 4 lists, so that each participant is presented one condition per experimental item to a total of 24 experimental English DPs.

All 4 lists include 48 filler items. The filler items have the same structure as the experimental items, as shown in (85): (i) an image containing an English DP, as in (85.a); (ii) a question about the previous English DP involving codeswitching, as in (85.b); and (iii) a grid with 4 words in Spanish, as in (85.c).

Filler items differ from experimental items in two respects: (i) English DPs involve plural or singular [+animate] Ns; and (ii) the verb in the question alternates between the verb *'hacer'* ('to do'), as in (89.a), and *'tener'* ('to have'), as in (89.b). The Ns used in the English DP appear twice, once with each verb, as in (89). In the same way as the experimental items, the ending of the question present the alternation between three different possibilities (i.e., 'in the previous screen', 'in the previous image', and 'in the previous picture').

89.

a) *¿Qué hace* the dog in the previous screen?

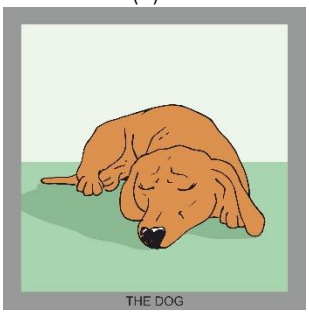
"What is the dog doing in the previous screen?"

b) *¿Qué tiene* the dog in the previous image?

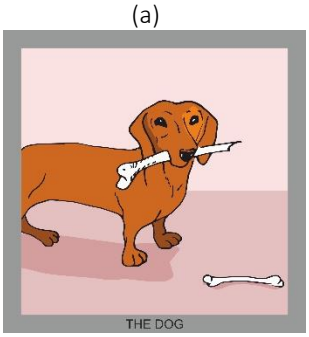
"What does the dog have in the previous screen?"

Regarding the grid, depending on the verb used in the question, the target word associated varies. When the question includes '*hacer*' ('to do'), target and competitor words are Vs in infinitival form in Spanish, as *'dormir'* ('to sleep') (target) and *'pasear'* ('to take a walk') (competitor), as in (90). When the question includes *'tener'* ('to have'), target and competitor words are [-countable] or [+countable, +plural] Ns in Spanish, as *'huesos'* ('bones') (target) and *'tareas'* ('tasks') (competitor) in (91).

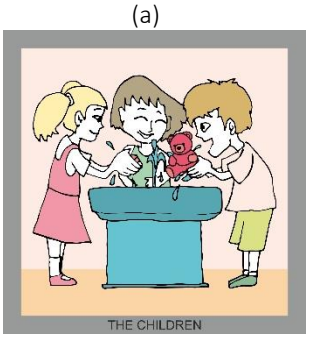
90. Parts of a filler item in the visual world paradigm task: *hacer* condition, V as target:

(a)	(b)	(c)
	*¿Qué hace* the dog in the previous image?	pistolas limones pasear dormir
English DP	Question	Spanish answer

91. Parts of a filler item in the visual world paradigm task: *tener* condition, masc. target N:

(a)	(b)	(c)
	*¿Qué tiene* the dog in the previous image?	tareas cocinar huesos pintar
English DP	Question	Spanish answer

92. Parts of a filler item in the visual world paradigm task: *hacer* condition, V as target:

(a)	(b)	(c)
	*¿Qué hacen* the children in the previous screen?	alegría cantar lavar miedo
English DP	Question	Spanish answer

93. Parts of a filler item in the visual world paradigm task: *tener* condition, fem. target N:

(a)	(b)	(c)
	*¿Qué tienen* the children in the previous screen?	elefantes viajar explicar pinturas
English DP	Question	Spanish answer

In the case of the target and competitor words, Ns have been balanced in terms of gender, that is, half of the target Ns are feminine (e.g., '*pinturas*' – 'crayons'), as in (93), while the other half are masculine (e.g., '*huesos*' – 'bones'), as in (91). Indeed, if the target is a masculine N, the competitor is feminine, as in (91). Regarding the distractor words, when the target and the competitor are Ns, the distractor words are Vs in infinitival form, as in (91) and (93), and when the target and the competitor are Vs in infinitival form, the distractor words are Ns, as in (90) and (92). In the filler items, Ns and Vs have been repeated but never when functioning as targets. Cognate words as well as the Ns used in the experimental items have not been used as part of the filler items (the fillers do not include Adjs).

The length of the filler items has also been controlled for. Each question contains 4-5 words previous to the final adjunct 'in the previous screen/image/picture?'. The number of characters of each item within the grid has not been controlled for but they

have a maximum of 3-character difference. Examples of filler items can be found in Table 12.

Table 12. Example of fillers in the visual world paradigm task.

Question		Gender of the target	Target	Competitor	Distractor 1	Distractor 2
¿Qué tiene the dog	in the previous screen/ image/ picture?	Masc.	*huesos*	*tareas*	*cocinar*	*pintar*
¿Qué hace the dog			*dormir*	*pasear*	*limones*	*pistolas*
¿Qué tienen the children		Fem.	*pinturas*	*elefantes*	*viajar*	*explicar*
¿Qué hacen the children			*lavar*	*cantar*	*miedo*	*alegría*

A summary of the distribution of the fillers and the experimental items forming this task can be found in Table 13.

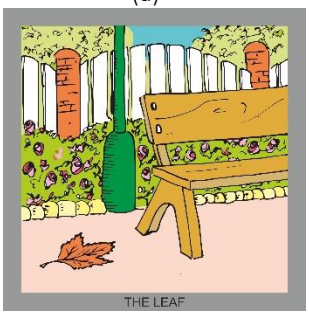
Table 13. Distribution of the stimuli in the visual world paradigm task.

Type of item	Condition	Nº of DPs	DPs per list	Total per list
Experimental	Masc. [+canonical]	24	6	24
	Masc. [-canonical]	24	6	
	Fem. [+canonical]	24	6	
	Fem. [-canonical]	24	6	
Filler	*Tener* ('have')	24	24	48
	Hacer ('do')	24	24	
	TOTAL	144	72	72

The visual world paradigm task includes a practice set at the beginning in order to ensure that participants understand the instructions of the task. The items have the same structure as the experimental and filler stimuli, yet no Adjs nor Ns included in the experimental items as well as no Vs included in the grid of the filler items are part of the practice items. Prepositional phrases in Spanish have been used instead, as in (94.c).

94.

(a)



English DP

(b)

¿Dónde está the leaf in the previous image?

Question

(c)

en la estantería	en el parque
en la rodilla	en la piscina

Spanish answer

All items (experimental and filler) come with an image, as in (85) above and as in (95). Each image represents the English DP with a specific salient trait. This trait is included as one of the items in the grid; that is, in the case of the experimental item in (85), as the target and competitor words are the Spanish Adjs *'negro/a',* the DP 'the hat' is depicted with that trait (i.e., black, as in (95)).

95.

All the images used in this task have been designed by *Soldegato Laboratorio de Ideas* (http://www.soldegato.com). They are 160 x 160 millimeters with a 300-dpi resolution. Each image is located in the middle of the screen on a gray background. Regarding the grid presented after the image, the gray background is maintained and the words in it are in bold Courier New in size 40. The auditory stimuli, i.e., the questions conforming each item, have been recorded by an English-Spanish simultaneous bilingual speaker as all sentences contain codeswitching.

As in the case of the eyetracking during reading task (section 4.2.1), the visual world paradigm task has been built on the SR Experiment Builder.

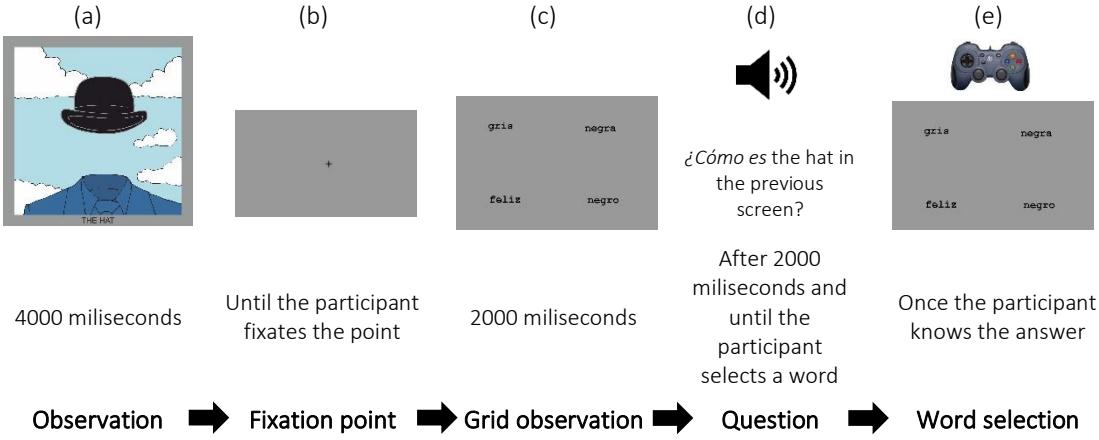
4.2.3.2. Data collection procedure

Participants carrying out the visual world paradigm task had already completed one of the previous tasks (see sections 4.2.1 and 4.2.2 for more details). Thus, they, or their parents if they belonged to the child group, had already signed the consent form and filled in the language background questionnaire, and their language competence in English had been assessed. In the same way as in the eyetracking during reading task, participants were tested individually, in a quiet room in an institutional setting in Valladolid.

The visual world paradigm task follows the same procedure as the eyetracker during reading task. Eye movements have also been recorded using an EyeLink Portable Duo head-free-to-move eyetracker, which samples eye movements at 1000Hz. Thus, for an accurate recording of the eye movements and fixations, the setup of the eyetracker should be optimal before starting the experiment. Therefore, the participant was seated at around 60 millimeters from the 17-inch monitor of the Dell Inspiron 17 5000 series HD laptop. As the eyetracker works on remote mode, the participant wore a target sticker on the forehead to ensure that the distance was correct and that the head motions were captured. Besides, the position of the eyetracker and the focus of the camera were adjusted manually by the researcher to make sure that the pupil's threshold and the corneal reflection were appropriate. During the session, participants wore the AKG K240 MK II headphones which are professional over-ear headphones which reduce external noise.

For this task, both experimental and filler items present the same structure, as shown in (96):

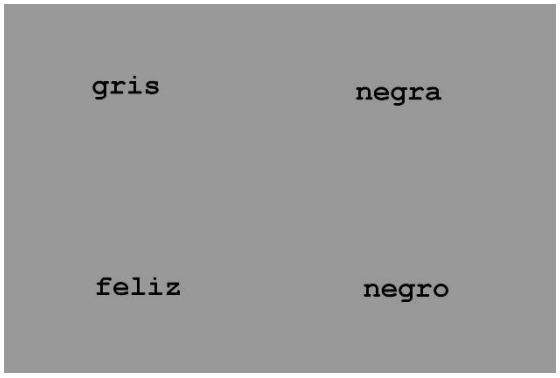
96. Structure of an item in the visual world paradigm task:



First, as in (96.a) and (97), participants observe an image containing an English DP for 4,000 milliseconds. Then, as in (96.b), they fixate a cross which appears in the middle of the screen to ensure that all participants go into the grid looking at the center of the screen. If they fail to look at the cross, the task will ask for recalibration after 4,000 milliseconds. As in (96.c) and (98), if participants look at the cross, 4 words in Spanish will appear on the screen forming a grid. They have 2,000 milliseconds to read the 4 words. Then, as in (96.d), after 2,000 milliseconds, participants hear a question about the image they have observed in (96.a). And finally, as in (96.e), they select one of the words as the answer to the question by pressing one of the buttons of the Logitech F310 gamepad response device. Only 4 buttons are activated in the Logitech F310 gamepad response device, each of them corresponding to one position within the grid. Participants do not need to finish listening to the question to select the word. They can press the corresponding button whenever they are ready to answer.

97.

98.



In the case of the visual world paradigm task, only eye movements from the grid screen are recorded; that is, from the moment the participants fixate the cross and they go into the grid (96.c), until they press one of the buttons of the Logitech F310 gamepad response device (96.e).

Before starting the task, and once the setup of the eyetracker was optimal, participants performed a 9-point calibration. Once the average error was below 0.5º, they were presented with the task starting with a practice set to ensure that they had understood the instructions of the task as well as the correspondence between the Logitech F310 gamepad's buttons and the position of each word in the grid. After that, participants started the task which was divided into 3 experimental blocks so they could take breaks, if they needed to. Each experimental block consisted of 24 items. Participants were not recalibrated unless the task asked for it when they failed to look at the cross during the cross screen that was shown before the grid (96.b).

4.2.3.3. Data codification procedure

As described in section 4.2.3.1., each experimental item forming the visual world paradigm task is organized into 4 conditions based on the gender and canonicity of the Spanish translation equivalent of the English DP forming the question. Thus, there are 2 masculine Spanish translation equivalents, one with a canonical ending (i.e., MO), and another one with a non-canonical ending (i.e., MX), and 2 feminine Spanish translation equivalents, one with a canonical ending (i.e., FO) and the other one with a non-canonical ending (i.e., FX). A summary of the conditions is presented in Table 14.

Table 14. Description of the conditions of the Adj switches within the visual world paradigm task.

Condition	Gender of Spanish translation equivalent DP	Canonicity of the Spanish translation equivalent N
MO	Masc.	[+canonical]
MX	Masc.	[-canonical]
FO	Fem.	[+canonical]
FX	Fem.	[-canonical]

In the case of the visual world paradigm task, only gender agreement mechanisms are under consideration. This is analyzed in the case of the relationship between the English DP forming the question which is presented auditorily to the participant and the Spanish Adjs which are presented in the grid. The target Adj represents [+AC] switches, that is, there is gender agreement between the Spanish translation equivalent of the English DP and the gender of the Spanish Adj of the grid (e.g., the hat = SP masc. DP *'el sombrero'* *es* 'is' *negro* SP masc. AdjP 'black'). The competitor Adj represents [-AC] switches, which means that there is no such gender agreement between them (e.g., the hat = SP masc. DP *'el sombrero'* *es* 'is' *negra* SP fem. AdjP 'black'). The other two Adjs in the grid represent the distractor Adjs (e.g., *gris* 'gray' and *feliz* 'happy', as in (98) above). Thus, each Adj represents one interest area within the grid (i.e., target, competitor, distractor 1 and distractor 2), but the focus of the analyses in chapter 6 is between the target and the competitor area.

As in the eyetracking during reading task, the data elicited with the visual world paradigm task have been visualized, processed, and reported through the EyeLink Data Viewer software, the SR Research software used for data treatment. This software has permitted the creation of a report in which the information for each interest area of each experimental item is included (i.e., target, competitor, distractor 1 and distractor 2). As

two types of data can be elicited from this task, the word selected and the eye movement data, the interest area report includes two pieces of information: (i) the interest area which has been clicked on in each experimental item; and (ii) the amount of time that the 4 interest areas of each experimental item have been fixed for. The latter has been obtained by using the total fixation duration measure (i.e., sum of all fixations in an interest area, including both forward and regressive movements, see example (72)). This information has been transferred to an Excel spreadsheet which is completed with other information about the participants (e.g., group, age, sex). The a posteriori data cleaning is described in section 4.3.

4.3. Statistical methods for data analyses

For each experiment as well as for the different issues under consideration (i.e., directionality of the switch and gender agreement mechanisms) different statistical analyses have been run in R, version 4.1.1 (R Core Team, 2021). Before conducting the statistical tests, the data have been cleaned and treated in two phases: first, in the Excel spreadsheets which are output by the data treatment software (EyeLink Data Viewer or Gorilla), as it has been detailed in the codification section of each experiment; and second, in the R datasets that are manipulated to perform analyses addressing specific issues. More information on these adjustments for the statistical analyses appears in the subsequent paragraphs.

Regarding the eyetracking during reading data, the recommendations for each measure provided by the Data Viewer software instructions have been followed. That is, for the regression path duration measure, only the experimental items where the N target word had been fixated in the first pass have been used in the analysis; while for the total fixation duration measure, all experimental items have been used. For both measures, fixations shorter than 80 milliseconds and longer than 1500 milliseconds have been removed prior to the analysis resulting in the loss of a 2.7% of the total reading data. Moreover, the data have been log transformed (Winter, 2020) and other outliers have been eliminated using the Cook's Distance method.

In the case of the reaction time task in Gorilla, two types of data have been elicited (i.e., reaction times and judgments). Both have been inspected for outliers by using the Cook's Distance method resulting in the loss of a 3.7% of the total reaction time data and

of a 4.1% of the total judgment data. In the case of the reaction times, the remaining data have also been log transformed.

Finally, the visual world paradigm task elicited two types of data: eye fixations on each interest area (i.e., target, competitor, distractor 1 and distractor 2) and the word selected for each experimental item. In order to perform the different analyses, two datasets have been created, one per type of data, as different transformations on the data had to be done. The eye fixations have been measured using the total fixation duration. In this case, the interest areas with no fixations have been eliminated and the data have been log transformed. In the case of the word selected in each experimental item, one column of the dataset has contained the word clicked on by the participant (i.e., target, competitor, distractor 1 or distractor 2), so the number of times clicked on have been counted and percentages for each word have been calculated and arranged in a contingency table.

Once the datasets have been cleaned, a linear mixed effects model for each measure has been fitted in the case of the directionality of the switch as well as in the case of both the [+AC] vs. [-AC] comparison and the [+AC] vs. masculine as default contrast. The linear mixed effects models have been fitted using the lme4 package (Bates et al., 2015) and *p* values have been estimated using the lmerTest package (Kuznetsova et al., 2017). Each model has been re-run adding the factors until obtaining the best-fitting model according to the Akaike Information Criterion (AIC) values. In the case of the directionality of the switch, the four models fitted (two for the eyetracking during reading data and two for the data from the reaction time task in Gorilla) have included (i) DIRECTIONALITY (English Det + Spanish N switches vs. Spanish Det + English N switches, in the case of DP switches; and English DP subject + Spanish Adj vs. Spanish DP subject + English Adj switches, in the case of Adj switches); and (ii) GROUP (children vs. adults) as fixed categorical factors. All four models have been controlled for PARTICIPANT as a random factor. The models fitted in the case of the reaction time data and judgment data have also been controlled for ITEM as a random factor.

In the case of the contrast between [+AC] switches and [-AC] switches, only the data from the Spanish Det and Spanish Adj switches have been used. Five linear mixed effects models have been performed for each measure except for the word selected in the visual world paradigm task. The models have included the ANALOGICAL CRITERION ([+AC]

vs. [-AC]) and GROUP (children vs. adults) as fixed categorical factors, and PARTICIPANT as a random effect. The model fitted for the total fixation duration measure in the case of the visual world paradigm task has also included ITEM specified as random effect.

The contrast between [+AC] vs. masculine as default switches has been performed both with Spanish DP switches and with Spanish Adj switches. In this case, the masculine as default switches include all masculine Det and Adj switches, both [+AC] and [-AC] cases[13]. Thus, some transformations to the data have been done prior to the analyses. Yet, before running the linear mixed effects models fitted for each measure, the online data have been log-transformed and inspected for outliers as in the case of the analyses described above. The models fitted for all measures, except for the ones used in the visual world paradigm task, include CONDITION ([+AC] vs. Masc. Default) and GROUP (children vs. adults) as fixed categorical factors, and PARTICIPANT as a random effect. The online data elicited with the visual world paradigm task have been measured with the total fixation duration measure. In this case, no transformations have been done because the word fixated (i.e., target = [+AC] or competitor = [-AC]) works itself as a condition. This means that the only condition included in the design of the task is whether the translation equivalent of the DP subject is masculine or feminine. Therefore, the analyses have been based on the gender of the translation equivalent of the English DP and on the gender of the word fixated. However, the resulting conditions from these combinations cannot be grouped into [+AC] (i.e., MM and FF) and masculine as default (i.e., MM and FM) as in the previous tasks. Because of this, the linear mixed effects model fitted on this measure includes CONDITION ([+AC] vs. Masc. Default), GENDER (masculine and feminine) and GROUP (children vs. adults) as fixed categorical factors, and PARTICIPANT as a random effect.

When necessary, pairwise comparisons among levels of factors included in the linear mixed effects model have been conducted with the emmeans() function in R with the Bonferroni adjustments (Lenth, 2022).

Finally, in the case of the word selection data elicited with the visual world paradigm task, the proportions of each interest area clicked (i.e., target = [+AC] and

[13] The masculine condition (i.e., MM) is included in both strategies (i.e., [+AC] and masculine as default) because a conservative, more inclusive, analysis of the masculine as default has been conducted. For more details, refer to chapter 2, section 2.3.2.

competitor = [-AC]) have been contrasted by using the chi-square test of equal proportions with the function chisq.test() in R.

4.4. Summary

In this chapter, the methodology followed in the present study has been described. Information about (i) the participants, (ii) the experiments designed for the collection of the experimental data and (iii) the statistical analyses has been outlined.

Regarding the participants, the selection criteria have been detailed in section 4.1.1. L1 Spanish – L2 English bilingual speakers have participated in this codeswitching study. They have been divided according to their age, resulting in two main groups: the L1 Spanish – L2 English adults, who are between 18 and 52 years old and have an upper-intermediate level of English; and the L1 Spanish – L2 English children, who are between 9 and 15 years old and have an upper A1-A2 level of English. Participants from both groups have been born and raised in Spain, have only been exposed to one language at home (i.e., Spanish), Spanish is their only L1, and they have learned English as an L2 in an academic context. A total of 44 L2 English adults and 46 L2 English children have taken part in this study.

Three experiments have been designed to elicit experimental data from these L2 bilingual speakers. The experiments have been designed regarding the two issues under consideration (i.e., directionality of the switch and gender agreement mechanisms), and according to the two structures under study (i.e., DP switches and switches involving an Adj).

The first experiment (section 4.2.1) is an eyetracking during reading task in which eye movements have been recorded while participants were reading simple sentences in English, Spanish or with English-Spanish codeswitching. The focus of this task has been on investigating the directionality of the switch and the gender agreement mechanism in DP switches.

The second experiment (section 4.2.2) consists in a reaction time task in Gorilla. In this case, online (i.e., reaction times) and offline (i.e., judgments) data have been recorded. The purpose of this task has been to examine the directionality of the switch and the gender agreement mechanisms in the case of Adj switches.

The third and last experiment, the visual world paradigm task (section 4.2.3), complements the reaction time task in Gorilla. In this version of the visual world paradigm, visual and auditory stimuli are combined, but the original scene with images has been replaced by 4 words in a grid. Both online data in the form of eye movements as well as offline data in the form of word selection have been elicited. The purpose of this task has been to shed light on the issue of gender agreement mechanisms in Spanish Adj switches.

Not all participants have carried out all three experiments due to availability and opportunity. The total number of experimental items and fillers/distractors seen by each participant group and for each task is presented in Table 15.

Table 15. Total number of items seen by each group per experiment.

Group	Eyetracking during reading		Reaction time task in Gorilla		Visual world paradigm	
	Experimental items	Fillers & distractors	Experimental items	Fillers & distractors	Experimental items	Fillers
L1 Spanish – L2 English adults	1,488	3,348	1,680	2,240	768	1,536
L1 Spanish – L2 English children	1,488	3,348	1,296	1,728	936	1,872
Total nº of structures	21,728					

Table 15 reflects a dissimilarity in terms of the quantity of the data analyzed in the case of the DP switches and in the case of the Adj switches. In spite of this dissimilarity, the way the experiments have been designed allows us to answer the research questions formulated in chapter 5.

In sum, a total of 21,728 structures are being scrutinized by the participants in the present investigation (11,060 by the L2 English adults, and 10,668 by the L2 English children). These data, which constitute the focus of investigation in chapter 6, are integrated in the following datasets that are available via UVaDOC, the University of Valladolid documentary repository: (i) DP switches dataset https://uvadoc.uva.es/handle/10324/54598; and (ii) Adj switches dataset https://uvadoc.uva.es/handle/10324/54597.

CHAPTER 5. RESEARCH QUESTIONS

The aim of this chapter is to formulate the research questions which guide the present study. Taking into account the theoretical and empirical accounts discussed in chapters 2 and 3, the proposed research questions address the two topics under consideration in this dissertation: (i) the directionality of the switch and (ii) the gender agreement mechanisms within DP switches and Adj switches[14]. For each research question, several factors (i.e., type of structure, age of the participants and type of task) are examined in order to determine whether they have an impact on the results. A summary of the three research questions and the factors influencing each of them is presented in Table 16.

Table 16. Summary of the research questions and the factors influencing each of them.

	Focus	Factors		
		Structure type	Participant age	Task type[15]
RQ1: Directionality of the switch	EN Det/Adj vs. SP Det/Adj	DP switches vs. Adj switches	Adults vs. Children	
RQ2: Gender Agreement Mechanisms 1	[+AC] vs. [-AC]			Visual world paradigm task vs. Reaction time task in Gorilla
RQ3: Gender Agreement Mechanisms 2	[+AC] vs. Masc. Default			

The chapter is divided into three sections, one per research question. Section 5.1 deals with the research question that addresses the directionality of the switch as well as the different conditions which may affect this matter. Sections 5.2 and 5.3 involve the research questions related to the gender agreement mechanisms in Spanish Det switches and Spanish Adj switches. In particular, section 5.2 focuses on the comparison between

[14] Along this dissertation, and in order to simplify the reference to the two target constructions, these are referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la* $_{\text{the}}$ house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es* $_{\text{is}}$ *roja* $_{\text{red}}$).

[15] In the case of the task type, only RQ2 and RQ3 examine this factor and only for Adj switches. This is so because only Adj switches have been included within two different tasks (i.e., the visual world paradigm task and the reaction time task in Gorilla) on which the issue of gender agreement mechanisms is focused. For more details, see sections 5.2. and 5.3., and the results in chapter 6.

[+AC] and [-AC] structures, while section 5.3 focuses on the comparison between [+AC] and the masculine as default switches.

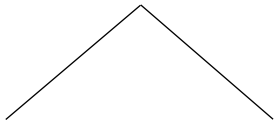
5.1. RQ1: Directionality of the switch

The first research question is related to the directionality of the switch. In other words, the focus is set on the language that provides the functional category in the case of the DP switches (i.e., English Det switches vs. Spanish Det switches) and the language that provides the Adj in the case of the Adj switches (i.e., English Adj switches vs. Spanish Adj switches). Considering this, the following research question has been formulated:

RQ1: *Which codeswitching directionality is easier to process and preferred by L1 Spanish – L2 English bilingual speakers in DP switches and Adj switches?*

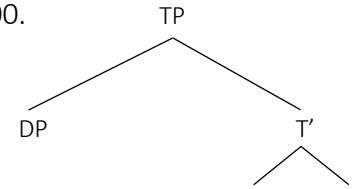
As it has been detailed in chapter 2, the two languages involved in the switched structures under consideration differ in terms of gender: Spanish has a dual gender system while English has no grammatical gender. Thus, when dealing with DP switches and with Adj switches, two scenarios can result, which go hand in hand with the corresponding processing costs.

99.



Det	N
The	*puerta* door
[ ]	[GEN + u(F) = fem.]
The	*libro* book
[ ]	[GEN + u(F) = masc.]

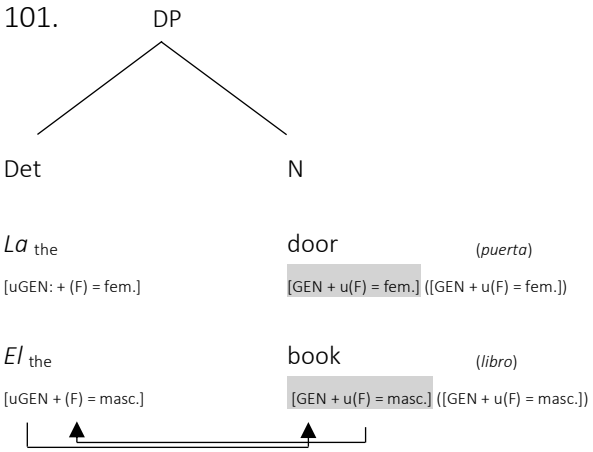
100.

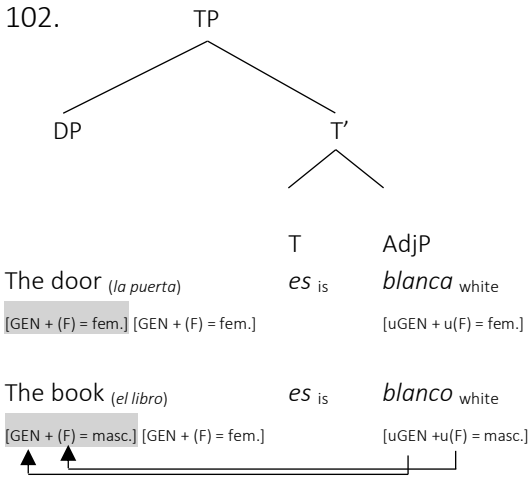


	T	AdjP
La puerta the door	is	white
[GEN + (F) = fem.]		[ ]
El libro the book	is	white
[GEN + (F) = masc.]		[ ]

The first scenario is concerned with the English Det/Adj switches (examples (99) and (100)) and entails no activation of a translation equivalent. This is so since the English Det and the English Adj do not have gender features, even if the N which the English Det

goes with and the DP which the English Adj goes with are in Spanish and, therefore, have grammatical gender. That is, the element that should trigger gender agreement (the functional category Det) is in English and, therefore, no gender agreement takes place in DP switches. In Adj switches, even if the Spanish DP has gender, the English Adj does not and so it cannot agree in gender with the Spanish DP. That is, in this type of switches, the valuation of gender features does not take place because there are no gender features and no gender agreement features to be valued, as the English Det and the English Adj lack these features. Following Fernández Fuertes et al.'s (in preparation) reasoning, this would result into a more economical structure in terms of processing as local inhibition takes place (i.e., the Spanish translation equivalent is not activated) and the grammatical operations of gender agreement are, therefore, not enforced.





The second scenario is concerned with the Spanish Det/Adj switches (examples (101) and (102)) and it may involve the activation of the Spanish translation equivalent of the English N or of the English DP so that the gender feature valuation process can take place. This entails that the unvalued gender feature and the gender agreement feature can be valued, so that the derivation does not crash. The grammatical operations that are triggered are in line with the GFSH (Liceras et al., 2008). This activation of the translation equivalent and the enforcement of gender agreement mechanisms would entail higher processing costs as several steps are involved in the processing of these switches (i.e., the retrieval of the Spanish N or the Spanish DP, depending on the structure, the activation of the subsequent grammatical features and the syntactic mechanisms they trigger).

The different processing costs derived from these codeswitching directionalities may be affected by diverse factors such as the type of structure (i.e., DP switches vs. Adj switches) and the age of the participant (children vs. adults).

First, and regarding the type of structure, the directionality of the switch has been a recurrent topic in the codeswitching literature in the case of the switched DP (see chapter 3 for more details). Yet, very few studies have addressed codeswitching directionality in the case of switches involving an Adj and those studies which have done so have analyzed offline data from bilingual children (Fernández Fuertes et al., 2011; Gómez Carrero & Fernández Fuertes, 2021d). In the present investigation, we are not only dealing with two different types of structures (i.e., DP switches vs. Adj switches) but with a contrast in terms of the linguistic categories which form them: the Det is a functional category while the Adj is a lexical category, thus, in the case of Adj switches, two lexical categories are accessed (i.e., the N – whose features have been already valued within the DP – and the Adj) while in DP switches just one lexical category is accessed (i.e., the N). RQ1 seeks to determine whether the different categories involved in the two structures under consideration and, thus, the number of lexical categories which have to be accessed for each structure play a role in how the directionality of each structure is processed (examples (99) vs. (100) and (101) vs. (102) above).

Second, and regarding the age of the participant, previous studies on codeswitching and specially those on the directionality of the switch using online data have compared speakers with different linguistic profiles (i.e., L2 vs. HL speakers) (e.g., Litcofsky & Van Hell, 2017). However, the comparison in terms of the ages of the participants (i.e., children vs. adults) has remained unattended. Thus, the aim of this study is to investigate whether the age of the participant may be a factor conditioning the processing of one directionality over the other in the two structures under study.

Taking into account the above and considering how gender features may be involved in the processing of each directionality as it has been described in chapter 2, as well as how each directionality has been dealt with by diverse speakers from previous studies, as seen in chapter 3, it can be predicted that, in terms of directionality, English Det/Adj switches will be easier to process. The rationale is that, if both Det and Adj are in English, they do not have to agree in gender with the N in DP switches nor with the DP subject in Adj switches, and no translation equivalent needs to be retrieved because both

the N and the DP are already in Spanish. This will make English Det/Adj switches more economical structures to process when compared to Spanish Det/Adj switches (following Fernández Fuertes et al.'s (in preparation) reasoning).

Besides, in the case of RQ1, it is also predicted that the factors under consideration will not influence the faster processing and preference for English Det/Adj switches. That is, in the case of the type of structure, both DP switches and Adj switches will be processed in the same way regardless of the number of lexical categories that the speaker has to access in each case (i.e., two lexical categories in switches involving an Adj in copulative constructions, and one lexical category in the case of DP switches). Even though two lexical categories are accessed in Adj switches, the DP subject forming the switch is already in Spanish, so no retrieval of a translation equivalent is needed, and the Adj, the other lexical category, is in English and no gender agreement operation needs to be enforced because the English Adj has no gender features which need to be valued. In the same way, the age of the participant is not expected to be an influencing factor either. Both children and adults are expected to have the same performance because both groups are L1 Spanish speakers and, in this case, the child group is past the critical period stage so the representation of Spanish gender is already adult-like and, therefore, the process they will go through should coincide with that of adults.

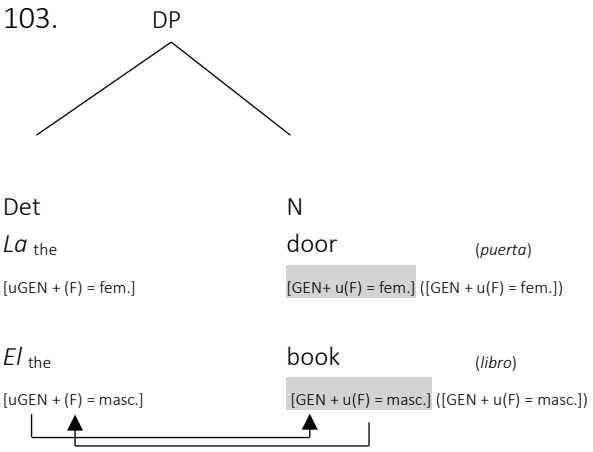
By focusing on how each codeswitching directionality is dealt with and processed as well as the factors which may influence their processing, a more complete picture could be offered of the processing of Spanish grammatical features in switched structures by L1 Spanish – L2 English bilinguals. This will allow us to obtain more information about the different processes these bilinguals activate when they are presented with each directionality in switched structures of these types.

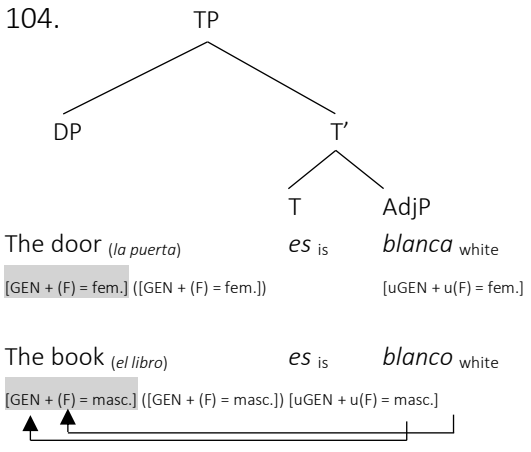
5.2. RQ2: Gender agreement mechanisms: [+AC] vs. [-AC]

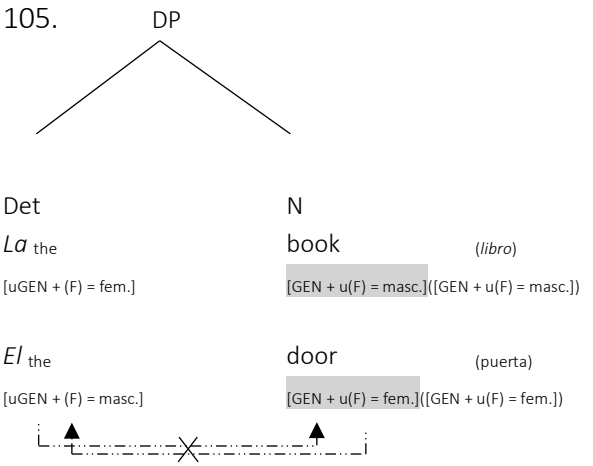
RQ2 addresses the gender agreement mechanisms in Spanish Det switches and in Spanish Adj switches. In particular, RQ2 deals with the scenario in which the English N or the English DP inherits[16] the gender of the Spanish translation equivalent. In this case, two situations can result depending on whether the analogical criterion (AC) holds: (i)

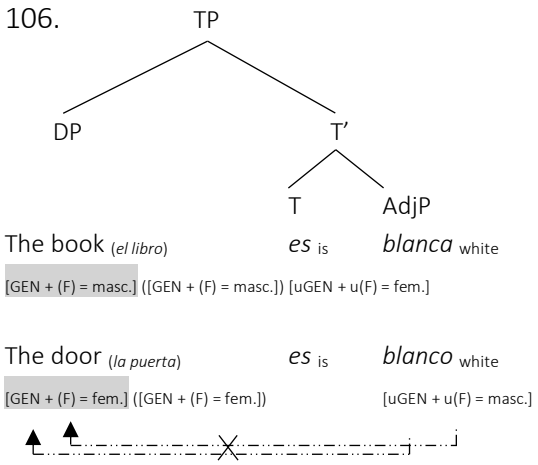
[16] The gender features inherited from the corresponding Spanish translation equivalents of the English Ns/DPs are highlighted in gray in the examples along this dissertation.

[+AC] switches in which there is gender agreement between the Spanish Det or Adj and the translation equivalent of the English N or DP, as in (103) and (104); and (ii) [-AC] switches in which there is no such gender agreement between them, as in (105) and (106).









Taking these two scenarios into account, the following research question has been put forward:

RQ2: *Which gender agreement mechanism (i.e., [+AC] vs. [-AC]) is easier to process and preferred by L1 Spanish – L2 English bilingual speakers in Spanish Det switches and in Spanish Adj switches?*

RQ2 attempts to shed some light on the role played by Spanish gender features and how rooted these features are in the mind of the bilingual speaker, and, in particular,

in the mind of the L1 Spanish bilingual. As indicated in chapter 2, this goes hand in hand with the processing costs which result from facing switched structures in which the gender feature and gender agreement feature need to be valued as part of a three-step process, as shown in (107).

107. The analogical criterion as a three-step process:

a) Retrieval of the Spanish translation equivalent and feature activation:

i. book → *libro* SP masc. / the book → *el* SP masc. *libro* SP masc.

ii. door → *puerta* SP fem. / the door → *la* SP fem. *puerta* SP fem.

b) Assignment of formal features using the Spanish translation equivalent:

i. *el/la* book / the book *es blanco/blanca*

the SP masc./fem. book = SP masc. '*libro*' / the book= SP masc. *'el libro'* is white SP masc./fem.

ii. *la/el* door / the door *es blanca/blanco*

the SP fem./masc. door = SP fem. '*puerta*' / the door= SP fem. *'la puerta'* is white SP fem./masc.

c) Valuation of gender features:

i. [+AC]:

- *el* book / *la* door

the SP **masc**. book = SP **masc**. '*libro*' / the SP **fem**. door = SP **fem**. '*puerta*'

- the book *es blanco* / the door *es blanca*

the book = SP **masc**. 'el libro' is white SP **masc**. / the door = SP **fem**. 'la puerta' is white SP **fem**.

ii. [-AC]:

- *la* book / *el* door

the SP **fem**. book = SP **masc**. '*libro*' / the SP **masc**. door = SP **fem**. '*puerta*'

- the book *es blanca* / the door *es blanco*

the book = SP **masc**. 'el libro' is white SP **fem**. / the door = SP **fem**. 'la puerta' is white SP **masc**.

As represented in (107.a), in both DP and Adj switches, there is a retrieval of the Spanish translation equivalent of the English N (e.g., 'book'/'*libro'*) or of the English DP (e.g., 'the book'/'*el libro'*). Once the Spanish translation equivalent is retrieved and its corresponding features are activated, the latter are transferred to the English N/DP, as in (107.b). This means that, in the case of DP switches, the (un)valued gender feature and gender agreement feature in the Spanish Det can be valued against their inherited ones

in the English N. In the case of Adj switches, the gender features of the Spanish Adj can be valued against the inherited ones in the English DP. Depending on the outcome of the gender feature valuation mechanism, two scenarios can result, as in (107.c): (i) [+AC] switches when the unvalued gender features are successfully valued, similarly to what will happen in a fully Spanish structure, as in (103) and (104) above; and [-AC] switches, when the derivation crashes as gender features do not match, as in (105) and (106) above. The processing costs resulting from each of the scenarios would be related to how rooted Spanish grammatical gender is in the mind of the bilingual speaker; that is, how important it is for bilinguals to comply with Spanish gender agreement mechanisms.

Similar to RQ1, RQ2 deals with the diverse factors which may affect the processing and perception of switched structures, both DP switches and Adj switches, when comparing [+AC] vs. [-AC] switches. The factors addressed in this case are the type of structure (i.e., DP switches vs. Adj switches), the age of the participant (i.e., adults vs. children), and the type of task (i.e., visual world paradigm task vs. reaction time task in Gorilla).

The first factor addressed by the RQ2 concerns the type of structure (i.e., Spanish DP switches vs. Spanish Adj switches). As detailed in chapter 3, the gender agreement mechanisms in Spanish switched DPs have been widely researched in the codeswitching literature, while, to the best of our knowledge, little attention has been placed on the study of gender agreement mechanisms and the derived processing costs in the case of Spanish Adj switches. As we are dealing with two different categories (i.e., a functional category in the case of the Det in DP switches and a lexical category in the case of the Adj in Adj switches), the processing costs resulting from the three steps involved (retrieval and feature activation, feature assignment and feature valuation, as in (107)) may differ in each structure. This may be so because the directionality of feature checking is different in DP switches when compared to Adj switches. That is, in Spanish Adj switches feature checking is unidirectional, as in (104), in which the unvalued gender feature and gender agreement feature of the Spanish Adj are valued against the valued gender feature and gender agreement feature inherited from the Spanish translation equivalent of the English DP subject. In the case of Spanish DP switches, as in (103), gender feature valuation is bidirectional, that is, the unvalued gender feature of the Spanish Det is valued against the valued gender feature of the Spanish translation equivalent of the English N;

and the unvalued gender agreement feature of the Spanish translation equivalent of the English N is valued against the valued one of the Spanish Det. Thus, this can have consequences not only in the case of which gender agreement mechanism is processed faster and preferred (i.e., [+AC] vs. [-AC]), but also in how each mechanism is processed over the other based on the structure under consideration (i.e., DP switches vs. Adj switches).

Secondly, RQ2 seeks to determine the role played by the age of the participants (i.e., children vs. adults). In previous studies, the focus has been set on the linguistic profile of the bilingual speaker (i.e., L1 Spanish, HL Spanish, L2 Spanish), but age has never been treated as a factor which may influence the speaker's preference and processing of [+AC] and [-AC] switches. As it has been described in chapter 3, L1 Spanish bilinguals, both adults and children, have shown lower processing costs in [+AC] switched DPs when dealing with online data (e.g., Beatty-Martínez & Dussias, 2017; Fernández Fuertes et al., 2019, in preparation). In the case of Spanish Adj switches, to the best of our knowledge, no study has yet analyzed the processing of gender agreement mechanisms with online data. Therefore, RQ2 will attempt to determine whether Spanish gender features are rooted in the mind of the bilingual speaker regardless of the age or whether different results are found when processing [+AC] and [-AC] switches based on the age of the L1 Spanish – L2 English bilinguals.

The last issue is how the type of task may have an impact on the processing of Spanish-English switches. Regarding DP switches, only one task has been used in the elicitation of online data (i.e., the eyetracking during reading task), so no comparison can be done in this case. Therefore, only Spanish Adj switches will be taken into consideration, as two tasks have been used to elicit both online and offline data: (i) eye movements and word selection in a visual world paradigm task; and (ii) reaction times and judgments in Gorilla. From each type of task as well as from each type of data (i.e., online and offline), we will be able to obtain different information which will allow us to understand the processes that the speaker activates when performing each action. This way, we will be able to observe if there is a correspondence between eye movements and reaction times and between word selection and judgments. Likewise, we will be able to determine if a slowdown for certain Adj switches in the case of the eye movements and in reaction times

is linked to the selected word or to the judgments, as dealing with different types of data (i.e., online vs. offline) taps on the different processes which are activated in each case.

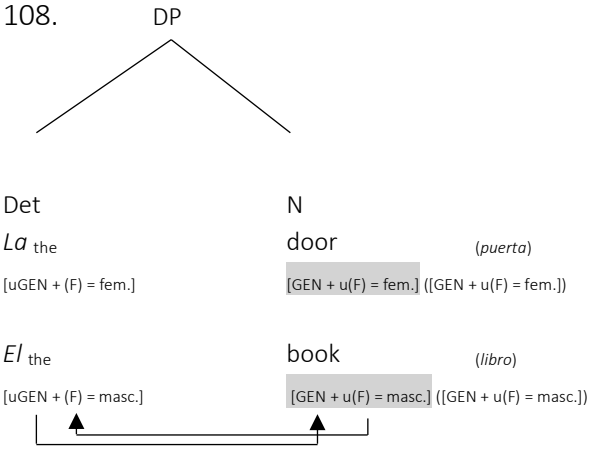
Based on the above as well as on the diverse results observed in previous studies (see chapter 3 for more details) and taking into consideration that our participants are L1 Spanish speakers, the expected outcome is a slowdown for [-AC] switches in general. The reasoning behind this prediction is that the feature mismatch would be perceived as a grammatical violation, and this will have a greater impact on their processing than having to perform the proper valuation of the unvalued gender feature and gender agreement feature. This prediction applies in the case of both child and adult participants as age will not be a factor since the child group is past the critical period stage and Spanish gender is represented in virtually the same way as it is for adults.

Moreover, in the case of the predictions regarding the type of structure, the processing of DP switches is expected to be different to that of the Spanish Adj switches. The rationale is that, if [-AC] switches in general have a higher processing cost for L1 Spanish bilinguals and if the double directionality in the feature valuation process in DP switches slows down processing, then [-AC] DP switches will be the hardest to process, followed by [-AC] Adj switches. Regarding the type of task and only considering Adj switches, eye movements and reaction times are expected to follow the same pattern, that is, longer fixations and longer reaction times are expected on [-AC] Adj switches. At the same time, the longer fixations and reaction times on [-AC] Adj switches will be translated into lower ratings when judging [-AC] Adj switches in the reaction time task as well as into lower selection rates to [-AC] Adj switches in the case of the visual world paradigm task.

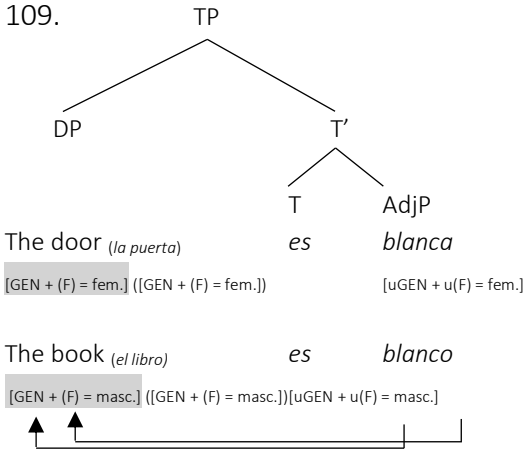
5.3. RQ3: Gender agreement mechanisms: [+AC] vs. Masc. Default

RQ3 deals with the Spanish Det and the Spanish Adj switches in order to determine the gender agreement mechanism which is easier to process. In this case, the contrast is between [+AC] switches and masculine as default switches, that is, whether there is gender agreement between the Spanish Det/Adj and the Spanish translation equivalent of the English N/DP, as in (108) and (109); or, on the contrary, the Spanish Det/Adj is assigned the masculine as default gender regardless of the gender of the Spanish translation equivalent of the English N/DP, as in (110) and (111).

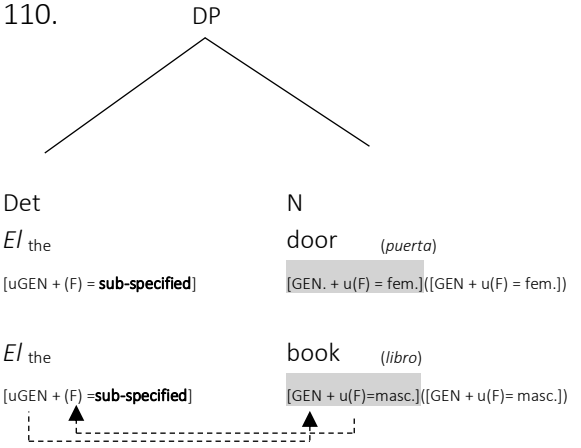
108.



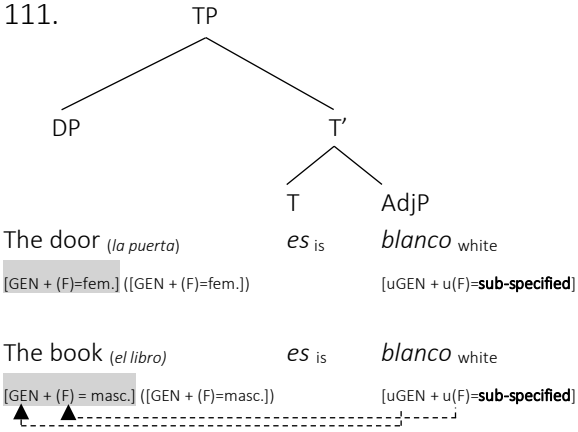
109.



110.



111.



Thus, the following research question has been formulated:

RQ3: *Which gender agreement mechanism (i.e., [+AC] vs. Masc. Default) is easier to process and preferred by L1 Spanish – L2 English bilingual speakers in Spanish Det switches and in Spanish Adj switches?*

In this case, neither of the two gender agreement mechanisms (i.e., [+AC] and masculine as default) involves a crash in the derivation, as in the masculine as default structures the gender feature of the Spanish Det or of the Spanish Adj is sub-specified for gender. Yet, each strategy triggers different internal mechanisms. The [+AC] switches undergo the three-step process discussed above, as in (107), (i.e., retrieval of the

translation equivalent of the English N/DP and feature activation, feature assignment, and valuation of the unvalued gender feature and gender agreement feature). The masculine as default switches also involve the three-step process in (107), yet it differs in the relaxation of the gender agreement requirements in that gender features are not specified as being either feminine or masculine. This ensures that gender valuation, the last step, takes place regardless of the gender of the translation equivalent of the English N/DP. The processing of [+AC] or default masculine switches may lead to higher or lower processing costs of one mechanism over the other. In this respect, Fernández Fuertes et al. (in preparation) propose the scale introduced in chapter 2 and repeated here in (112), that we will adapt for Spanish Adj switches. According to this scale, [+AC] switches (activation proper) would involve higher processing costs because they entail abiding by more grammatical requirements than the masculine as default (activation by default).

112. activation by default	<	activation proper
el door		*la* door
the door *es blanco*		the door *es blanca*
Masc. Default		[+AC]

That is and following the three-step process in (107), activation proper entails (a) retrieval of the Spanish translation equivalent and feature activation, (b) assignment of formal features using the Spanish translation equivalent, and (c) valuation of gender features. However, this three-step process is in a way simplified in the case of activation by default, since (c) will never crash as default forms will always agree with either masculine or feminine structures.

In the same way as the other two research questions, RQ3 also explores whether other factors such as the type of structure (i.e., DP switches vs. Adj switches), the age of the participants (i.e., children vs. adults) or the type of task in the case of Adj switches (i.e., visual world paradigm task vs. reaction time task in Gorilla) have an impact on the results.

Concerning the type of structure, RQ3 attempts to determine whether different results are found in Spanish DP switches and Spanish Adj switches when contrasting [+AC] and masculine as default switches. As in RQ2, different categories form the two structures

under investigation: in the case of DP switches, a functional category (i.e., the Det) and a lexical category (i.e., the N); and two lexical categories in the case of Spanish Adj switches (i.e., the N – whose features are already valued within the DP subject – and the Adj). This may have an impact on how each gender agreement mechanism (i.e., [+AC] vs. Masc. Default switches) is processed in each structure, as the number of lexical categories which are accessed is different in each type of switch. As a result, the directionality in the feature valuation process differs in each structure: the valuation is unidirectional in the case of Spanish Adj switches, as in (109) and (111), while it is bidirectional in the case of Spanish DP switches, as in (108) and (110).

Concerning the type of participant, as Fernández Fuertes et al. (in preparation) argue, the status that the languages involved in the switch have for the bilingual speaker may influence processing, too. In this case, both participant groups involve L1 Spanish bilinguals (children and adults), so the comparison is done in terms of whether age affects the processing of one gender agreement mechanism over the other. Previous studies have mainly focused on how children or adults process gender agreement mechanisms in switched DPs, but none has examined the gender agreement mechanisms within Spanish Adj switches with online data obtained from both children and adults. Besides, to the best of our knowledge, no attention has been paid to comparing participants with the same L1 based on their ages (i.e., children vs. adults) in order to find out whether different processing costs and preferences are found.

Finally, the type of task is another factor under consideration as two experiments (i.e., visual world paradigm task and reaction time task in Gorilla) are used to elicit online (i.e., eye movements and reaction times) and offline data (i.e., word selection and judgments) in the case of Spanish Adj switches. Having two types of tasks and two types of data will allow us to identify if there is a parallelism in the results between the two types of online (i.e., eye movements and reaction times) and offline data (i.e., word selection and judgments) as well as between the two types of tasks in general terms (i.e., visual world paradigm task and reaction time task in Gorilla). This way, we will obtain a more complete picture of the different processes activated in the preference and processing of these gender agreement operations.

Based on the above, and taking into account the conclusions drawn from previous studies in chapter 3, two predictions can be made: (i) if we follow the scale proposed by

Fernández Fuertes et al. (in preparation) and take into account that the masculine as default form involves a relaxation in the gender agreement requirements, lower processing costs are expected for masculine as default switches, as the feature valuation is done regardless of the gender of the N; (ii) if, on the other hand, we consider the L1 of our participants and how integrated gender is in the mind of these bilinguals (see chapter 3 for more details), lower processing costs are expected for [+AC] switches. The rationale for the latter case might be how rooted Spanish gender features are in the mind of these bilinguals, to the point that processing switches which involve proper gender valuation (i.e., [+AC] switches) might be less costly than a default valuation (i.e., masculine default switches). Either prediction would equally work for both groups of participants, as both groups have the same L1 and, given the precociousness of gender in the acquisition of L1 Spanish (e.g., Fernández Fuertes, Álvarez de la Fuente, et al., 2016), the child group should have the same knowledge of gender properties and, therefore, exhibit the same patterns as adults.

Concerning the type of structure, as in RQ2, the directionality of feature valuation in each type of structure is expected to influence how these gender agreement strategies ([+AC] and masculine as default) influence the processing of DP switches and Adj switches. In the scenario in which masculine as default switches are easier to process due to the relaxation of the gender agreement requirements, as proposed by Fernández Fuertes et al. (in preparation), masculine as default Adj switches would be the least costly. The rationale might be that, if Adj switches are processed faster overall due to their unidirectional valuation and thus, less problematic than DP switches (Liceras et al., 2017), the relaxation of the gender agreement requirements of the masculine as default would accelerate their processing. On the other hand, in the scenario in which these L1 speakers are faster when performing proper valuation ([+AC] switches) due to the status that Spanish has for them, the default switches will be identified as a grammatical violation, as it is predicted for [-AC] switches in RQ2. In this case, [+AC] Adj switches will be the least costly because the proper valuation is done, and is so in one direction, as in (108) and (109). In sum, in both scenarios, Adj switches are expected to be processed faster than DP switches as "directionality in the feature valuation process is the dominant factor in determining the level of difficulty in interpreting and processing these structures" (Liceras et al., 2017, p. 28).

Finally, in the case of the type of task, it is expected that both online and offline data follow the same pattern. The rationale for this assumption is that the saliency of Spanish grammatical gender will be the determinant factor for these speakers for whom Spanish is the dominant language. Given this saliency, it would be immaterial how the participant is tested as the information being accessed although in different ways would have the same or similar results: the highly grammaticized nature of Spanish grammatical gender would be kept constant through the different scenarios participants are confronted with (e.g., eye movements, reaction times or judgments). Therefore, longer fixations and longer reaction times are expected for the structure (i) which is less preferred in the case of the judgments in the reaction time task in Gorilla and (ii) which is not selected in the case of the visual world paradigm task. This, again, will depend on how these L1 Spanish bilinguals act: if masculine as default switches are easier to process than [+AC] switches due to the relaxation of the gender agreement requirements, then shorter fixations and shorter reaction times are expected for these default switches, and they are expected to be given higher rates in the judgments and to be selected in the visual world paradigm. If, on the contrary, [+AC] switches are less costly due to how deeply rooted gender features are in the mind of these L1 Spanish bilinguals, then the opposite pattern is expected: shorter fixations and shorter reaction times on [+AC] switches, so that, [+AC] switches would be given higher rates in the reaction time task in Gorilla and they would be selected in the visual world paradigm task.

In order to give an answer to the three research questions formulated above as well as to determine if the predictions made are in the right direction, the experimental study described in chapter 4 has been implemented and the data collected will be presented and discussed in the following chapters.

CHAPTER 6. RESULTS

The aim of this chapter is to account for the various analyses performed to the data elicited with the experiments described in chapter 4 in order to give an answer to the research questions that guide this study (see chapter 5 for more details). These results are described in the present chapter and will be discussed in chapter 7.

This chapter is organized around the three research questions presented in chapter 5. In section 6.1 the results regarding the directionality of the switch are presented both overall as well as considering how the type of structure (i.e., DP switches and Adj switches[17]) and the age of the participants (i.e., children and adults) may influence these results. Sections 6.2 and 6.3 focus on the results regarding the gender agreement mechanisms in Spanish DP switches and Spanish Adj switches. Section 6.2 includes the contrast in terms of the analogical criterion ([+AC] vs. [-AC]), while in section 6.3 the comparison is done between [+AC] switches and masculine as default switches. In these two sections, the type of structure (i.e., DP switches and Adj switches), the age of the participants (i.e., children and adults) and the type of task (i.e., the reaction time task in Gorilla and the visual world paradigm task) are also considered to determine whether, and if so, how they have an impact on the results. Section 6.4 summarizes the main findings.

6.1. RQ1: Directionality of the switch

The directionality of the switch, i.e., which language (English or Spanish) provides the Det in the case of DP switches and the Adj in the case of Adj switches, has been investigated in this study by eliciting data via two tasks, one per structure: the eyetracking during reading task has been used in the case of DP switches, while the reaction time task in Gorilla has been carried out to investigate Adj switches. In the case of the first task, only online data have been recorded, while, in the second task, both reaction times (i.e., online data) and judgments (i.e., offline data) have been elicited.

[17] Along this dissertation, and in order to simplify the reference to the two target constructions, these are referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la* $_{\text{the}}$ house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es* $_{\text{is}}$ *roja* $_{\text{red}}$).

Along this section, the overall results in terms of the directionality of the switch as well as the possible factors which may influence these results (i.e., structure type and age of participants[18]) are discussed.

Overall, in the case of the directionality of the switch, four linear mixed effects models have been fitted, one per measure (i.e., total fixation duration measure and regression path duration measure in the case of the eyetracking during reading task, and reaction times and judgments in the case of the reaction time task in Gorilla)[19]. A summary of the overall results from the four models is presented in Table 17.

Table 17. Summary of the results from the four models fitted for directionality [RQ1].

Task	Measure	Model Parameters			
	Total fixation duration[20]	*b*	*SE*	*t*	*p*
Eyetracking during reading task	Intercept	5.709	0.051	110.183	**<.001**[21]
	Group (children)	0.281	0.073	3.841	**<.001**
	Directionality (Spanish Det)	0.092	0.029	3.114	**.001**
	Group (children) * Directionality (Spanish Det)	-0.011	0.041	-0.280	.779
	Regression path duration				
	Intercept	5.587	0.042	132.618	**<.001**
	Group (children)	0.293	0.060	4.873	**<.001**
	Directionality (Spanish Det)	0.130	0.029	4.380	**<.001**
	Group (children) * Directionality (Spanish Det)	-0.001	0.0431	-0.042	.096
Reaction time task in Gorilla	***Reaction times***				
	Intercept	7.785	0.037	209.733	**<.001**
	Group (children)	0.291	0.055	5.292	**<.001**
	Directionality (Spanish Adj)	0.124	0.022	5.433	**<.001**
	Group (children) * Directionality (Spanish Adj)	-0.098	0.031	-3.118	**.001**
	Judgments				
	Intercept	3.035	0.098	30.923	**<.001**
	Group (children)	0.018	0.125	0.148	.844
	Directionality (Spanish Adj)	-0.616	0.059	-10.313	**<.001**
	Group (children) * Directionality (Spanish Adj)	0.056	0.046	1.206	.434

[18] As indicated in chapter 5, the first research question is not concerned with the task type factor as there is only one type of task per structure (i.e., the eyetracking during reading task in the case of DP switches and the reaction time task in Gorilla in the case of Adj switches).Thus, the task type factor is going to be approached when the same structure is used with two different tasks, that is, with the results concerning research questions 2 and 3, as the visual world paradigm task and the reaction time task in Gorilla have been used to elicit data in the case of the Adj switches.

[19] Detailed information about the linear mixed effects models as well as other statistical analyses performed in this study can be found in chapter 4, section 4.3.

[20] Reference parameters for the total fixation duration measure and the regression path duration measure are adult participants and English Det switches. Reference parameters for the reaction times and judgments are adult participants and English Adj switches. As indicated in chapter 4, data have been log transformed in the case of the online measures (i.e., total fixation duration measure, regression path duration measure and reaction times).

[21] All significant results are in bold.

As detailed in Table 17 as well as in the descriptive data from Table 18 below, there is an overall tendency for longer fixations and longer reaction times towards the structures where Spanish provides the Det in DP switches (e.g., *la/el* SP Det 'the' door EN N) and the Adj in Adj switches (e.g., the door EN DP *es* 'is' *blanca/o* SP AdjP 'white'). This difference is significant as per the results from both the total fixation duration measure (*b*=0.092, *SE*=0.029, *t*=3.114, *p*=.001) and the regression path duration measure (*b*=0.130, *SE*=0.029, *t*=4.380, *p*<.001) in the case of the eyetracking during reading task when investigating DP switches, as well as for the reaction times in the case of Adj switches (*b*=0.124, *SE*=0.022, *t*=5.433, *p*<.001).

On the other hand, in terms of how each directionality is perceived, as per the results obtained from the judgments from the reaction time task in Gorilla, English Adj switches are significantly preferred over Spanish Adj switches (*b*=-0.616, *SE*=0.059, *t*=-10.313, *p*<.001).

Table 18. Summary of the overall means (*M*) and standard deviations (*SD*) of both DP switches and Adj switches in terms of directionality [RQ1].

Task	Measure	English Det + Spanish N		Spanish Det + English N	
		M	*SD*	*M*	*SD*
Eyetracking during reading	*Total fixation duration*	409 (5.85)[22]	244 (0.576)	451 (5.94)	265 (0.584)
	Regression path duration	352 (5.72)	200 (0.53)	407 (5.86)	229 (0.54)
		Spanish DP Subj + English Adj		English DP Subj + Spanish Adj	
Reaction times task in Gorilla		*M*	*SD*	*M*	*SD*
	Reaction times	3,091 (7.91)	1,699 (0.5)	3,254 (7.99)	1,442 (0.4)
	Judgments	3.04	0.76	2.50	0.89

If results are analyzed considering the type of structure, in terms of processing, the same pattern is followed within both structures: Spanish Det and Spanish Adj switches (e.g., *la/el* SP Det 'the' door EN N ; the door EN DP *es* 'is' *blanca/o* SP AdjP 'white') are harder to process than English Det and English Adj switches (the EN Det *puerta* SP N 'door'; *la puerta* SP DP 'the door' is white EN AdjP). This is so as per the results from the total fixation duration measure and the regression path duration measure in the case of DP switches, as in Figure 10 and

[22] The total fixation duration measure, the regression path duration measure and the reaction times are indicated in milliseconds. The log transformed measures are in brackets.

Figure 11, as well as per the results from the reaction times in the case of Adj switches, as in Figure 12.

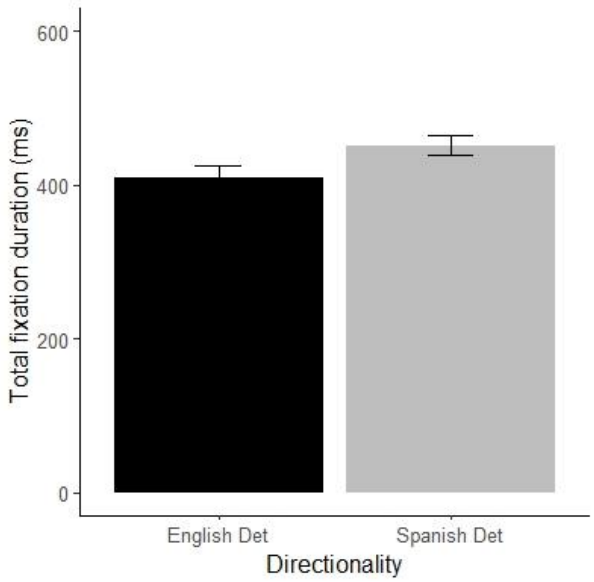


Figure 10. Directionality of the switch in DP switches as per the total fixation duration measure [RQ1].

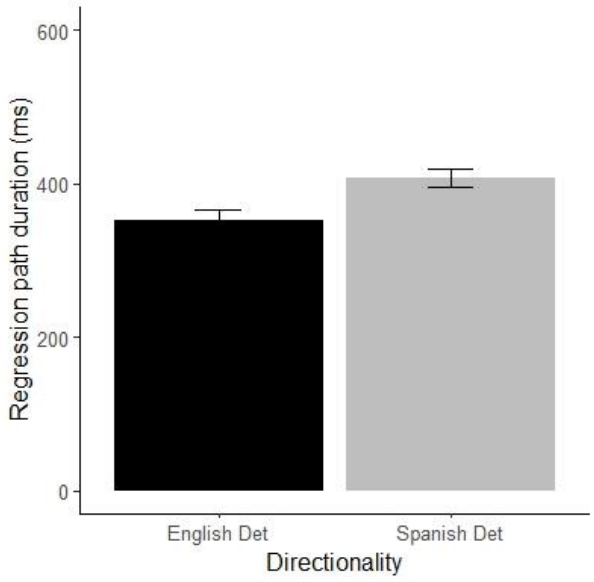


Figure 11. Directionality of the switch in DP switches as per the regression path duration measure [RQ1].

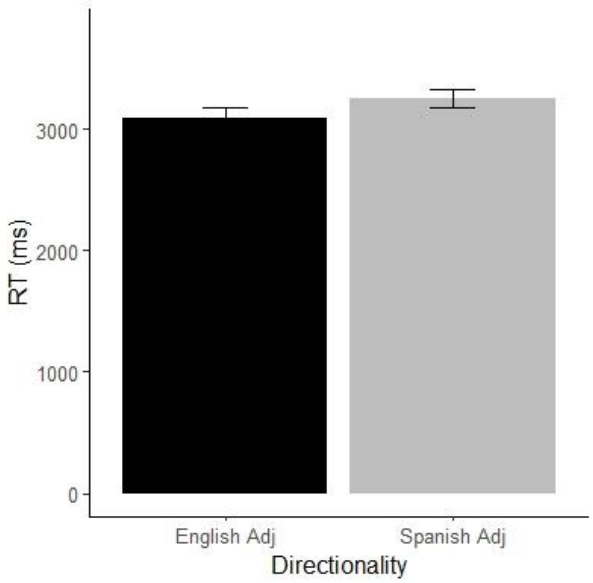


Figure 12. Directionality of the switch in Adj switches as per the reaction times [RQ1].

In the case of Adj switches, that Spanish Adj switches are harder to process is seen both in the reaction times (Figure 12) and in how participants judge these structures. That is, Spanish Adj switches are significantly lower rated than English Adj switches, as shown in Figure 13.

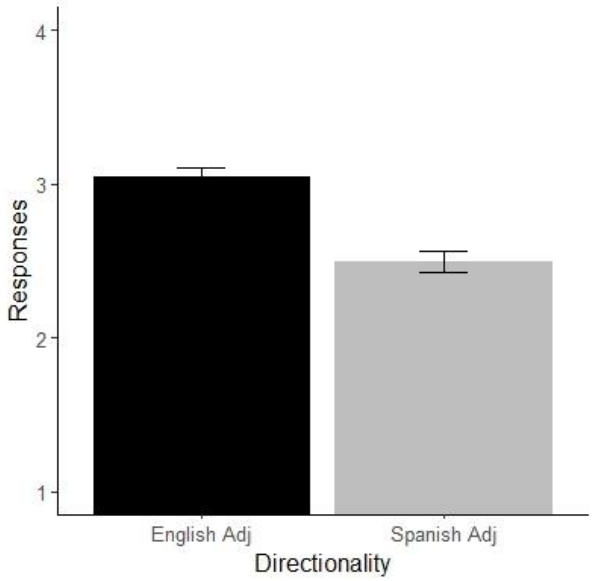


Figure 13. Directionality of the switch in Adj switches as per judgments [RQ1].

Therefore, in the case of how the directionality of the switch is processed and how this may be affected by the type of structure, the results lead to the same conclusions: the structures where Spanish provides the Det in DP switches and the Adj in Adj switches are harder to process.

However, when the group distinction factors in, differences appear. In particular, when the data are analyzed considering how the age of each group impacts on the results, differences are found in how each age group processes or judges Adj switches (i.e., judgments vs. reaction times). A summary of the means (*M*) and standard deviations (*SD*) per group can be found in Table 19.

Table 19. Summary of the means (*M*) and standard deviations (*SD*) of each measure within each group [RQ1].

Task	Measure	Children				Adults			
		English Det + Spanish N		Spanish Det + English N		English Det + Spanish N		Spanish Det + English N	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Eyetracking during reading	*Total fixation duration*	472.[23] (5.99)	275 (0.59)	509 (6.07)	281 (0.58)	347 (5.71)	188 (0.52)	391 (5.81)	234 (0.55)
	Regression path duration	411 (5.86)	229 (0.57)	469 (6.00)	251 (0.56)	299 (5.59)	153 (0.46)	347 (5.73)	186 (0.48)
		Spanish DP Subj + English Adj		English DP Subj + Spanish Adj		Spanish DP Subj + English Adj		English DP Subj + Spanish Adj	
Reaction time task in Gorilla		*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
	Reaction times	3,588 (8.07)	1,767 (0.48)	3,556 (8.10)	1,397 (0.39)	2,705 (7.78)	1,538 (0.48)	3,022 (7.91)	1,433 (0.44)
	Judgments	3.05	0.82	2.61	0.89	3.04	0.72	2.42	0.88

In the case of the eyetracking during reading in which DP switches are under consideration, both total fixation duration and regression path duration measures indicate no interactions between the DIRECTIONALITY of the switch and GROUP (total fixation duration measure: p=.779; regression path duration measure: p=.096). That is, as shown in Figure 14 and Figure 15, both groups show the same performance: longer fixations on the English N when preceded by a Spanish Det. Although there is an effect of GROUP in the models fitted for both eyetracking during reading measures, the Bonferroni post-hoc pairwise comparisons conducted on the DIRECTIONALITY of the switch within each group reveal that the contrast between Spanish Det switches and English Det switches is significant for both groups (children: total fixation duration measure: p=.006; regression

[23] The total fixation duration measure, the regression path duration measure and the reaction times are indicated in milliseconds. The log transformed measures are in brackets.

path duration measure: $p<.001$; adults: total fixation duration measure: $p=.001$; regression path duration measure: $p<.001$). Therefore, the effect of GROUP does point to a difference between children and adults, but this is only observed when comparing the same condition across groups and not the two conditions within each age group. This difference is linked to adult participants reading faster than children, something that could generally be attributed to age and experience.

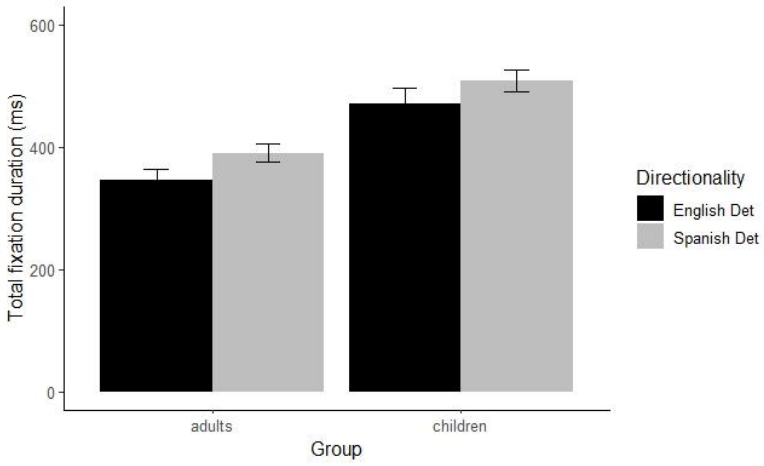


Figure 14. Directionality of the switch in DP switches as per the total fixation duration measure within each group [RQ1].

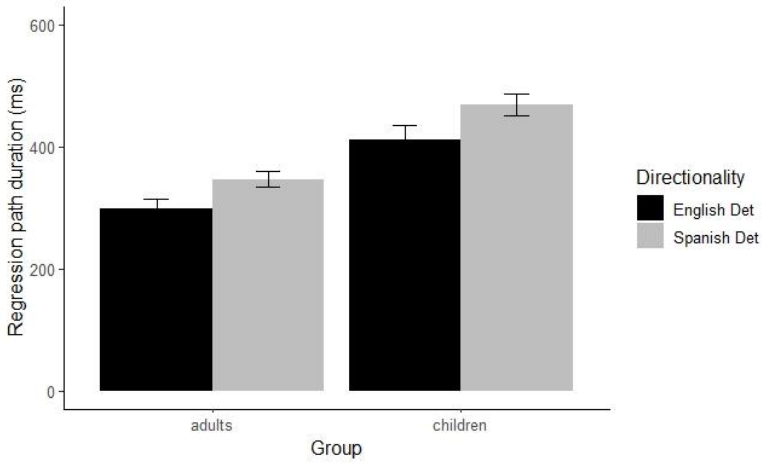


Figure 15. Directionality of the switch in DP switches as per the regression path duration measure within each group [RQ1].

In the case of the reaction time task in Gorilla, the results vary depending on the group and the type of data. The model fitted for the reaction time data indicates an interaction between the DIRECTIONALITY of Adj switches and GROUP (b=-0.098, SE=0.031, t=-3.118, p=.001). Bonferroni post-hoc pairwise comparisons show that adult and child participants do not react in the same way to the directionalities of Adj switches. That is, the adult group shows longer reaction times when they are presented Spanish Adj switches, in line with the results from the Spanish Det switches in the case of the

eyetracking during reading task, and this contrast is significant (p<.001). Yet, the child group shows similar reaction times to both Spanish Adj switches and English Adj switches (p=0.315). This contrast is illustrated in Figure 16.

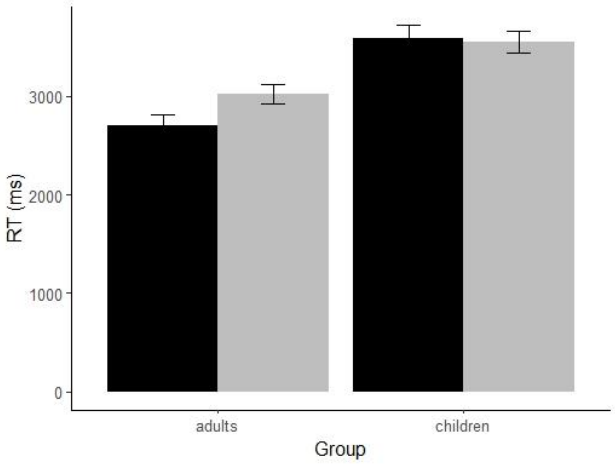


Figure 16. Directionality of the switch in Adj switches as per the reaction times within each group [RQ1].

However, as shown in Figure 17, when participants have to judge Adj switches, the Bonferroni post-hoc pairwise comparisons conclude that both children and adults significantly prefer English Adj switches over Spanish Adj switches (children: p<.001; adults: p<.001).

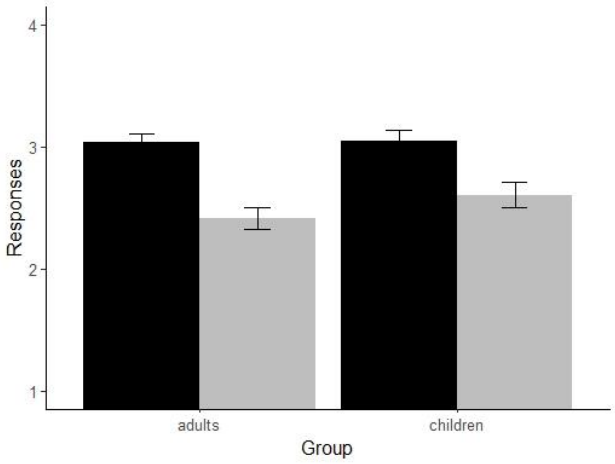


Figure 17. Directionality of the switch in Adj switches as per judgments within groups [RQ1].

In sum, in the case of the RQ1, the pattern detected when analyzing the data overall is disrupted when comparing across the two age groups because, while adults follow the overall preferences (i.e., English Det and Adj switches are easier to process and English Adj switches are preferred), children do not in the case of the Adj switches with online data (i.e., reaction time). This creates a difference in how the two age groups process the two structures at least in the case of online processing: the reaction time

data in Adj switches show that, while adults exhibit longer reaction times in Spanish Adj switches, children present no reaction time difference between Spanish Adj switches and English Adj switches.

6.2. RQ2: Gender agreement mechanisms [+AC] vs. [-AC]

Research questions 2 and 3 revolve around the gender agreement mechanisms in the case of Spanish DP switches (e.g., *la/el* SP Det 'the' door EN N) and Spanish Adj switches (e.g., the door EN DP *es* 'is' *blanca/o* SP AdjP 'white'). The present section focuses on the contrast in terms of the analogical criterion, that is, whether there is gender agreement between the Spanish Det/Adj and the Spanish translation of the English N/DP subject in DP switches and Adj switches, i.e., [+AC] switches (e.g., *la* SP fem. Det 'the' door = SP fem. N '*puerta*'; the door = SP fem. DP *'la puerta'* *es* 'is' *blanca* SP fem. AdjP 'white') in contrast to [-AC] switches (e.g., *el* SP masc. Det 'the' door = SP fem. N '*puerta*'; the book = SP masc. DP *'el libro'* *es* 'is' *blanca* SP fem. AdjP 'white'). In order to investigate this comparison, three tasks have been used to elicit the experimental data: one focuses on this comparison within DP switches (i.e., the eyetracking during reading task), while the other two have been used to study this contrast within Spanish Adj switches (i.e., the reaction time task in Gorilla and the visual world paradigm task). The eyetracking during reading task has only elicited online data, i.e., eye movements, while the other two tasks have elicited online data (i.e., reaction times and eye movements) and offline data (i.e., judgments and word selection).

Along this section, the overall results in terms of the contrast between [+AC] and [-AC] switches, as well as the potential factors which may influence these results (i.e., structure type, age of participants and task type in the case of the Adj switches[24]) are presented.

When it comes to the contrast in terms of the analogical criterion (i.e., [+AC] vs. [-AC]), five models have been fitted: two for the two measures used in the eyetracking during reading task (i.e., the total fixation duration and the regression path duration measure), two for the two measures used in the reaction time task in Gorilla (i.e., reaction

[24] As indicated in footnote 2, the comparison across tasks is only considered in the case of Spanish Adj switches. This is so because in the case of these structures, two tasks have been used: the reaction time task in Gorilla and the visual world paradigm task. Since data for DP switches have been elicited using only one task type, no such comparison could be carried out.

times and judgments) and one in the case of the visual world paradigm task (i.e., the total fixation duration on each interest area). As for the latter task, the rate of the words selected (i.e., target, competitor, distractor 1 or distractor 2) has been analyzed in terms of percentages. A summary of the main effects and interactions found in each model is presented in Table 20.

Table 20. Summary of the results from the models fitted for the [+AC] vs. [-AC] contrast [RQ2].

Task	Measure	Model Parameters			
	Total fixation duration[25]	*b*	*SE*	*t*	*p*
Eyetracking during reading task	Intercept	5.736	0.051	111.011	**<.001**[26]
	AC ([-AC]	0.126	0.034	3.629	**<.001**
	Group (children)	0.284	0.072	3.902	**<.001**
	Group (children) * AC ([-AC])	-0.026	0.048	-0.534	.593
	Regression path duration				
	Intercept	5.697	0.042	132.526	**<.001**
	AC ([-AC]	0.038	0.035	1.104	.270
	Group (children)	0.291	0.060	4.793	**<.001**
	Group (children) * AC ([-AC])	0.000	0.050	0.001	.999
Reaction time task in Gorilla	*Reaction times*				
	Intercept	7.845	0.035	219.947	**<.001**
	AC ([-AC]	0.132	0.027	4.825	**<.001**
	Group (children)	0.242	0.054	4.479	**<.001**
	Group (children) * AC ([-AC])	-0.106	0.041	-2.553	**.010**
	Judgments				
	Intercept	3.018	0.070	42.589	**<.001**
	AC ([-AC]	-1.220	0.058	-20.858	**<.001**
	Group (children)	0.103	0.108	0.958	.340
	Group (children) * AC ([-AC])	0.163	0.090	1.798	.072
Visual world paradigm task	*Total fixation duration*				
	Intercept	7.117	0.044	158.861	**<.001**
	AC ([-AC]	-0.734	0.031	-23.523	**<.001**
	Group (children)	-0.154	0.058	-2.661	**.009**
	Group (children) * AC ([-AC])	0.289	0.041	6.942	**<.001**

Overall, both the results from the models presented in Table 20, and the descriptive data presented in Table 21 below, indicate that [-AC] are harder to process than [+AC] switches in the case of both DP switches and Adj switches, as longer fixations are shown by the total fixation duration measure in the eyetracking during reading task

[25] Reference parameters are adult participants and [+AC] switches.
[26] All significant results are in bold.

(*b*=0.126, *SE*=0.034, *t*=3.629, *p*<.001) and by the longer reaction times found in the reaction time task in Gorilla (*b*=0.132, *SE*=0.027, *t*=4.825, *p*<.001). As for the latter, judgments point out this cost in terms of preference: [-AC] switches are given significantly lower rates than [+AC] switches (*b*=-1.220, *SE*=0.058, *t*=-20.858, *p*<.001).

In the case of the visual world paradigm, the complementary task to investigate gender agreement preferences and processing in Spanish Adj switches, the patterns are different due to the type of task (refer to chapter 4, section 4.2.3 for more details), but the result points in the same direction. In this case, longer fixations are significantly given to the interest area where the [+AC] Adj is located (*b*=-0.734, *SE*=0.058, *t*=-23.523, *p*<.001), that is, participants seem to indicate with their eyes the word they want to select. Indeed, [+AC] Spanish Adjs, i.e., the target word, are selected significantly more than [-AC] Spanish Adjs, i.e., the competitor word (target: 85.35%, competitor: 9.82%, $X^2(1)=59.943$, *p*<.001).

Table 21. Summary of the overall means (*M*) and standard deviations (*SD*) for each measure in terms of the [+AC] vs. [-AC] contrast [RQ2].

Task	Measure	[+AC]		[-AC]	
		M	*SD*	*M*	*SD*
Eyetracking during reading	*Total fixation duration*	428 (5.89)[27]	257(0.585)	474(6.00)	272 (0.577)
	Regression path duration	400 (5.84)	226 (0.544)	415 (5.88)	231 (0.542)
Reaction times task in Gorilla	*Reaction times*	3,111 (7.95)	1,387 (0.432)	3,396 (8.04)	1,481 (0.434)
	Judgments	3.08	0.674	1.89	0.648
Visual world paradigm task	*Total fixation duration*	1,361 (7.03)	664 (0.612)	765 (6.47)	461 (0.673)

As the results from the models shown in Table 20 and the descriptive data in Table 21 above, the type of structure (i.e., Spanish DP switches and Spanish Adj switches) is not an influencing factor as both types of switches are treated similarly: [+AC] DP switches and [+AC] Adj switches are easier to process and are preferred.

Regarding Spanish DP switches, as in Figure 18 and Figure 19, the total fixation duration measure indicates significant longer fixations on the English N when it is

[27] The total fixation duration measures, the regression path duration measures and the reaction times are indicated in milliseconds. The log transformed measures are in brackets.

preceded by a [-AC] Det (*b*=0.12607, *SE*=0.03474, *t*=3.629, *p*<.001). The regression path duration measure shows the same pattern, yet the contrast is not significant (*p*=.270).

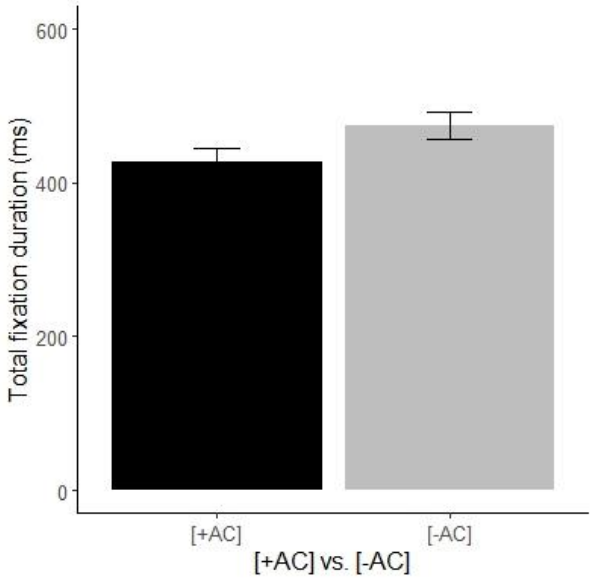


Figure 18. The [+AC] vs. [-AC] contrast within Spanish DP switches as per the total fixation duration measure [RQ2].

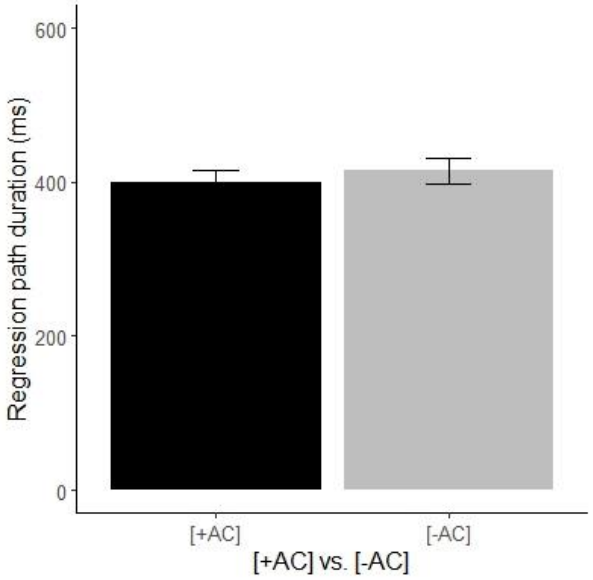


Figure 19. The [+AC] vs. [-AC] contrast within the Spanish Adj switches are per the regression path duration measure [RQ2].

In the case of Spanish Adj switches, the pattern is the same: [+AC] Adj switches are processed faster (*p*<.001) and preferred (*p*<.001), as respectively shown by the online and offline data elicited with the reaction time task in Gorilla, as in Figure 20 and Figure 21 below.

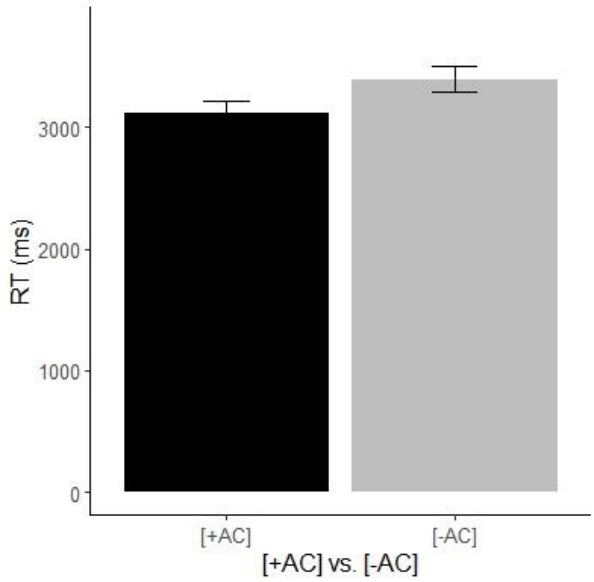


Figure 20. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the reaction times [RQ2].

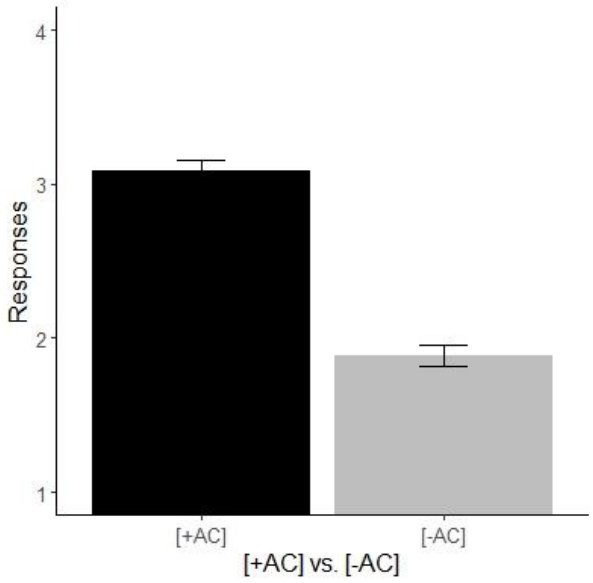


Figure 21. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per judgments [RQ2].

As in Figure 22 and Figure 23 below, the results from the visual world paradigm task also show a preference for [+AC] switches. This is so both in the case of the total fixation duration data, as the target area, where the [+AC] Adj is placed, is significantly longer fixated (p<.001), and indeed in the case of information obtained from the word selection, where the [+AC] Adj is significantly favored (X^2(1)=59.943, p<.001).

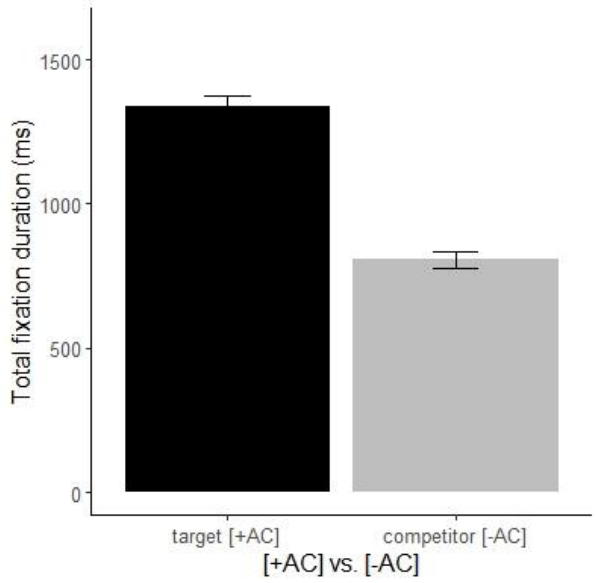


Figure 22. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the total fixation duration measure.

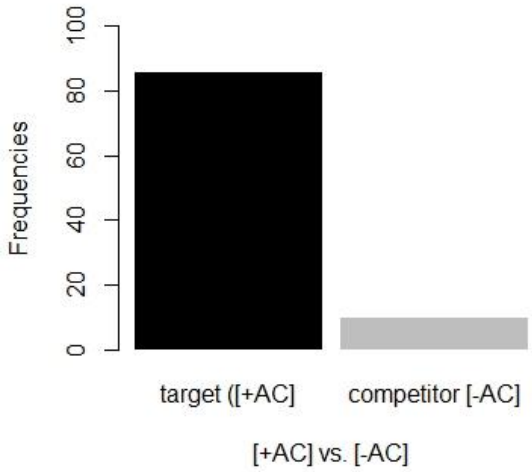


Figure 23. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the word selected.

Regarding how the age of the participants (i.e., adult group vs. child group) influences the processing and perception of the analogical criterion within the two structures under consideration (i.e., Spanish DP switches and Spanish Adj switches), an interaction between the ANALOGICAL CRITERION and GROUP has been found only in the case of Spanish Adj switches in the results from the model fitted. This affects (i) the reaction times in the case of the reaction time task in Gorilla (b=-0.106, SE= 0.041, t=-2.553, p=.010) and (ii) the total fixation duration measure in the case of the visual world paradigm task (b=0.289, SE=0.041, t=6.942, p<.001).

Further analyses have been conducted to find out how each group processes each strategy in the case of Spanish Adj switches. In the case of the reaction times, the

Bonferroni post-hoc pairwise comparison reveals that the difference in processing times between [+AC] Adj switches and [-AC] Adj switches is significant in the case of the adult participants (p<.001), while it is non-significant in the case of the child participants (p=.405). Although non-significant, child participants also spend more time with [-AC] Adj switches than with [+AC] Adj switches. This contrast is illustrated in Figure 24.

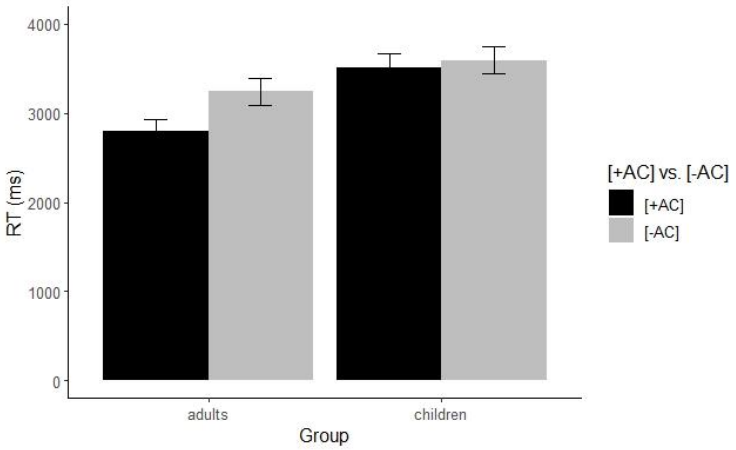


Figure 24. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the reaction times within each group [RQ2].

The results from the total fixation duration measure in the case of the visual world paradigm task also indicate an interaction between the ANALOGICAL CRITERION and GROUP. The Bonferroni post-hoc pairwise comparison reveals that [+AC] Adjs, i.e., the target word, are longer fixated than [-AC] Adjs, i.e., the competitor word, in the case of both groups (adults and children: p<.001). Yet, the interaction comes from the comparison between groups in terms of each strategy. Children and adult participants show no significant differences when fixating the competitor word, i.e., [-AC] Adjs, (p=.15), but they do when it comes to fixating the target word, i.e., [+AC], (p=.05), since, as shown in Figure 25, adults present longer fixations on [+AC] Adjs (M=1426 ms, SD=679) than children do (M=1268 ms, SD=766).

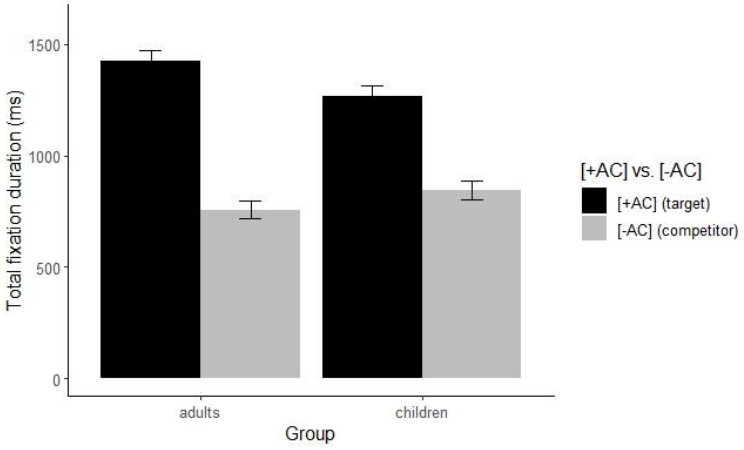


Figure 25. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the total fixation duration measure within each group [RQ2].

When each group has to judge a structure in the case of the reaction time task in Gorilla, no interactions are found between the ANALOGICAL CRITERION and GROUP. Further analyses confirm that [+AC] Adj switches are significantly preferred over [-AC] switches by both groups (children and adults: $p<.001$) as shown in Figure 26.

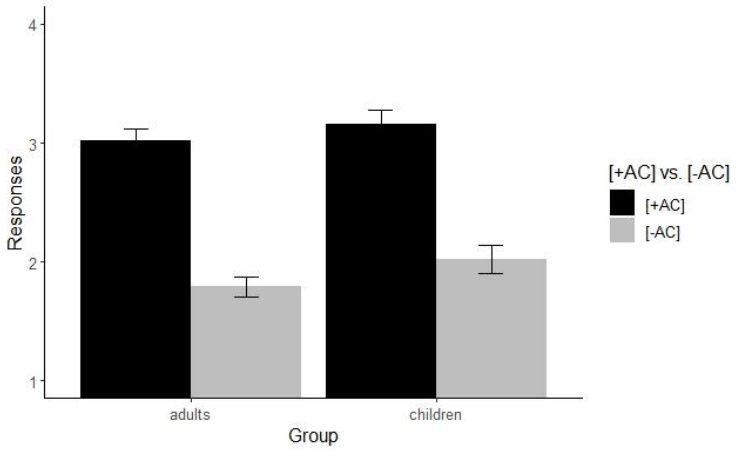


Figure 26. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the judgments within each group [RQ2].

A similar pattern can be found in the case of the word selected in the visual world paradigm task. Adults select the target word, i.e., [+AC] Adj, significantly more than the competitor word, i.e., [-AC] Adj ([+AC]: 90.03%; [-AC]: 5.39%; $X^2(1)=75.074$, $p<.001$). The same goes for children, who select the [+AC] Adj significantly more than the [-AC] Adj ([+AC]: 79.96%; [-AC]: 13.26%; $X^2(1)=47.731$, $p<.001$), yet their percentage rates are lower than those of the adults. This is shown in Figure 27.

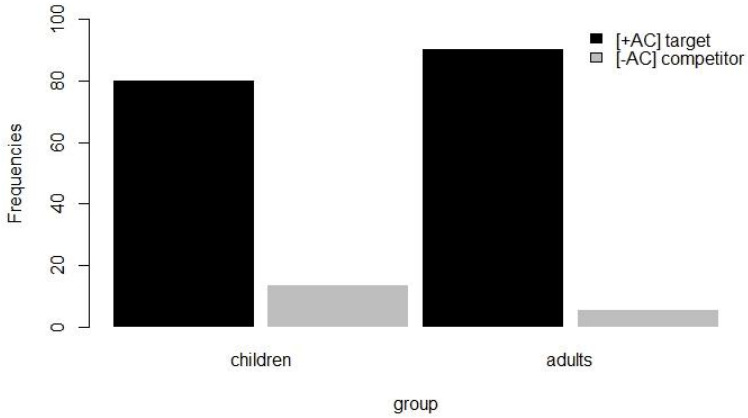


Figure 27. The [+AC] vs. [-AC] contrast within the Spanish Adj switches as per the word selected within each group [RQ2].

Finally, the results from the models fitted in the case of the measures used in the eyetracking during reading task for the Spanish DP switches indicate no interaction although an effect of GROUP appears (total fixation duration measure: *b*=0.284, *SE*=0.072, *t*=3.902, *p*<.001; regression path duration measure: *b*=0.291, *SE*=0.060, *t*=4.793, *p*<.001). This effect is due to longer fixations in the case of both measures, since adults, due to age and experience, read faster than children. Yet, their processing times in the case of the analogical criterion are the same for both groups: as shown in Figure 28, significant differences are found between [+AC] and [-AC] switches for both children and adults as per the total fixation duration measure, while, as shown in Figure 29, the regression path duration indicates no significant difference but longer fixations appear on the N when preceded by a Spanish Det that does not agree in gender, i.e., [-AC] DP switches.

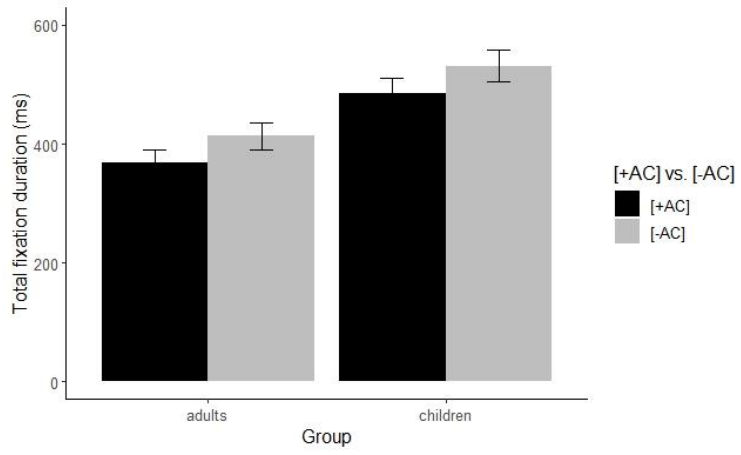


Figure 28. The [+AC] vs. [-AC] contrast within the Spanish DP switches as per the total fixation duration measure within each group [RQ2].

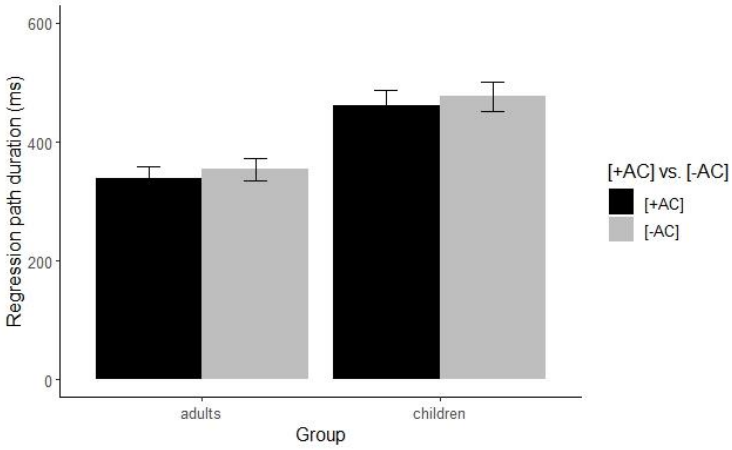


Figure 29. The [+AC] vs. [-AC] contrast within the Spanish DP switches as per the regression path duration measure within each group [RQ2].

A summary of the means (*M*) and standard deviations (*SD*) per group is presented in Table 22.

Table 22. Summary of the means (*M*) and standard deviations (*SD*) of each measure per group [RQ2].

Task	Measure	Children				Adults			
		[+AC]		[-AC]		[+AC]		[-AC]	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Eyetracking during reading	*Total fixation duration*	486.[28] (6.02)	269 (0.590)	532 (6.12)	290 (0.577)	368 (5.75)	228 (0.547)	414 (5.88)	238 (0.550)
	Regression path duration	462 (5.98)	249 (0.573)	476 (6.02)	254 (0.558)	339 (5.71)	183 (0.477)	354 (5.75)	188 (0.491)
Reaction time task in Gorilla	*Reaction times*	3,514 (8.09)	1,400 (0.396)	3,597 (8.11)	1,395 (0.390)	2,799 (7.84)	1,295 (0.429)	3,242 (7.98)	1,527 (0.457)
	Judgments	3.16	0.661	2.02	0.717	3.02	0.678	1.79	0.575
Visual world paradigm task	*Total fixation duration*	1,268 (6.96)	766 (0.633)	845 (6.52)	656 (0.651)	1,426 (7.13)	679 (0.570)	757 (6.39)	550 (0.692)

The last factor, the type of task, is only considered for Spanish Adj switches. In this case, two tasks (i.e., the reaction time task in Gorilla and the visual world paradigm task) have been used to elicit two types of data: online data (i.e., reaction times in the case of the reaction time task in Gorilla, and eye movements in the case of the visual world paradigm) and offline data (i.e., judgments in the case of the reaction time task in Gorilla, and word selection in the visual world paradigm task).

[28] Total fixation duration measures, regression path duration measure and reaction times are indicated in milliseconds. The log transformed measures are within brackets.

Concerning the online data, reaction times indicate that [-AC] switches are harder to process in general as more time is required when participants are presented with a Spanish Adj switch where the Adj does not agree in gender with the Spanish translation equivalent of the English DP subject (e.g., the book = SP masc. DP *'el libro'* *es* 'is' *blanca* SP fem. AdjP 'white'). The online data measured with the total fixation duration on each interest area (target = [+AC], competitor = [-AC]) indicate otherwise: longer fixations are given to the target word, i.e., [+AC] Adj. Yet, this is not understood as the [+AC] Adj switches being harder, but as the target ([+AC] Adj) being the region selected with their eyes. Therefore, it seems that although in both types of online data the results point to [+AC] switches as easier to process, the way this is expressed in the reaction time task in Gorilla is different from the way it is expressed in the visual world paradigm task.

Regarding the offline data, both the judgments given in the reaction time task in Gorilla and the rates of the word selected in the visual world paradigm task follow the same pattern: [+AC] Adj switches are preferred over [-AC] switches.

Therefore, in the case of the [+AC] vs. [-AC] comparison in Adj switches, it is shown that online and offline data go in the same direction, although expressed in a different way depending on the measures used and the type of task.

In sum, as for RQ2, the overall pattern detected is that [+AC] switches are easier to process and are preferred by both children and adults. Yet, this pattern is altered when comparing across groups in the case of Spanish Adj switches. In this case, [-AC] Adj switches are harder to process for the adult group than for the child group as per their reaction times, since the latter do not show any significant difference when presented with either type of Spanish Adj switch. Therefore, children and adults seem to differ in how they process Adj switches, even though both adults and children show very clear preferences for [+AC] switches as per their judgment and word selection data.

6.3. RQ3: Gender agreement mechanisms 2 [+AC] vs. Masc. Default

The last research question also focuses on the gender agreement mechanisms in both DP and Adj switches, yet the contrast is now between [+AC] switches, that is, where there is gender agreement between the Spanish Det/Adj and the Spanish translation equivalent of the English N/DP subject (e.g., *la* SP fem. Det 'the' door = SP fem. N '*puerta*' ; the door = SP fem. DP *'la puerta'* *es* 'is' *blanca* SP fem. AdjP 'white'), and the masculine as default, that is, where

the Spanish Det and the Spanish Adj are masculine regardless of the gender of the translation equivalent of the English N/DP subject (e.g., *el* SP masc. def. Det 'the' door = SP fem. N '*puerta*' ; the door = SP fem. DP '*la puerta*' *es* 'is' *blanco* SP masc. def. AdjP 'white'). As indicated in previous chapters, in the analysis of the data, the most conservative approach to the masculine as default has been followed. This means that all masculine forms are included within the masculine as default, both the cases where there is agreement with the corresponding translation equivalents (e.g., *el* SP masc. Det 'the' book = SP masc. N '*libro*' ; the book = SP masc. DP '*libro*' *es* 'is' *blanco* SP masc. AdjP 'white') and the cases where there is not such agreement with the translation equivalent (e.g., *el* SP masc. def. Det 'the' door = SP fem. N '*puerta*' ; the door = SP fem. DP '*la puerta*' *es* 'is' *blanco* SP masc. def. AdjP 'white').

In the case of the DP switches, the data have been elicited with an eyetracking during reading task, which has only collected online data (i.e., eye movements). In the case of the Adj switches, the data have been elicited with a reaction time task in Gorilla and with a visual world paradigm task which have elicited both online data (i.e., reaction times and eye movements, respectively) and offline data (i.e., judgments and word selection, respectively).

As in the previous sections of this chapter, the results are discussed first overall and then taking into consideration the three factors that may play a role: structure type (i.e., DP switches and Adj switches), age of the participants (i.e., children and adults) and type of task in the case of the Adj switches (i.e., reaction time task in Gorilla and visual world paradigm task).

When it comes to the contrast between [+AC] and masculine as default switches, five linear mixed effects models have been fitted, one per each measure used in each experiment (except for the word selection data). A summary of the results can be found in Table 23.

Table 23. Summary of the results from the models fitted for the [+AC] vs. Masc. Default contrast [RQ3].

Task	Measure	Model Parameters			
	Total fixation duration[29]	*b*	*SE*	*t*	*p*
Eyetracking during reading task	Intercept	6.102	0.054	111.717	**<.001**[30]
	Condition (Masc. Default)	0.045	0.015	3.024	**0.003**
	Group (children)	0.255	0.077	3.305	**0.001**
	Group (children) * condition (Masc. Default)	-0.026	0.021	-1.230	0.223
	Regression path duration				
	Intercept	6.140	0.055	110.359	**<.001**
	Condition (Masc. Default)	-0.012	0.024	-0.495	0.622
	Group (children)	0.271	0.078	3.446	**<.001**
	Group (children) * condition (Masc. Default)	-0.004	0.034	-0.120	0.904
Reaction time task in Gorilla	***Reaction times***				
	Intercept	7.979	0.046	170.767	**<.001**
	Condition (Masc. Default)	0.041	0.022	1.844	0.070
	Group (children)	0.270	0.070	3.818	**<.001**
	Group (children) * condition (Masc. Default)	-0.007	0.033	-0.224	0.823
	Judgments				
	Intercept	2.971	0.096	30.925	**<.001**
	Condition (Masc. Default)	-0.474	0.056	-8.468	**<.001**
	Group (children)	0.053	0.145	0.365	0.716
	Group (children) * condition (Masc. Default)	0.184	0.084	2.170	**0.033**
Visual world paradigm task	***Total fixation duration***				
	Intercept	7.132	0.049	144.640	**<.001**
	Interest area (competitor [-AC])	-0.778	0.044	-17.449	**<.001**
	Group (children)	-0.168	0.065	-2.566	**0.011**
	Gender (Masc.)	-0.019	0.044	-0.437	0.662
	Group (children) * interest area (competitor [-AC])	0.347	0.059	5.828	**<.001**
	Group (children) * gender (Masc.)	0.018	0.059	0.308	0.758
	Interest area (competitor [-AC]) * gender (Masc.)	0.087	0.063	1.389	0.165
	Group (children) * Interest area (competitor [-AC]) * gender (Masc.)	-0.115	0.084	-1.375	0.169

As depicted in the results in Table 23 as well as in the means presented in Table 24 below, overall, [+AC] DP switches are easier to process as per the effect of CONDITION ([+AC] vs. Masc. Default), as shown by the total fixation duration measure in DP switches (*b*=0.045, *SE*=0.015, *t*=3.024, *p*=.003). Likewise, [+AC] Adj switches are preferred as per

[29] Reference parameters are adult participants and [+AC] switches. In the case of the total fixation duration measure from the visual world paradigm task, feminine is included as the gender reference parameter.
[30] All significant results are in bold.

the effect of CONDITION ([+AC] vs. Masc. Default) in the judgment data (*b*=-0.474, *SE*=0.056, *t*=-8.468, *p*<.001). Yet, no effects of CONDITION have been found in the regression path duration measure in DP switches nor in the reaction times in the case of Adj switches.

Table 24. Summary of the overall means (*M*) and standard deviations (*SD*) for each measure in terms of the [+AC] vs. Masc. Default contrast [RQ3].

Task	Measure	[+AC]		Masc. Default	
		M	*SD*	*M*	*SD*
Eyetracking during reading	*Total fixation duration*	534 (6.23)[31]	185 (0.324)	555 (6.26)	199 (0.336)
	Regression path duration	560 (6.28)	185 (0.323)	558 (6.26)	199 (0.357)
Reaction times task in Gorilla	*Reaction times*	3,442 (8.10)	1,084 (0.305)	3,584 (8.14)	1,147 (0.313)
	Judgments	2.99	0.625	2.60	0.530

The results from the linear mixed effects model performed on the total fixation duration measure used in the visual world paradigm task in the case of Adj switches do not show an interaction between the INTEREST AREA (i.e., target = [+AC] and competitor = [-AC]) and the GENDER of the DP subject (i.e., masculine and feminine) (*p*=0.16). Yet, it indicates an effect of the INTEREST AREA as [+AC] Adjs are longer fixated than [-AC] Adjs, as in section 6.2. In the case of the fixations on the interest area where a masculine Adj is preceded by a feminine DP subject (i.e., [-AC] = competitor – F(eminine DP) M(asculine Adj) condition, e.g., the house =SP fem. DP 'la casa' *es* 'is' *blanco* SP masc. AdjP 'white'), the means in Table 25 below reveal that it is not much more fixated than its reversed gender counterpart, the interest area with a feminine Adj preceded by a masculine DP subject (i.e., M(asculine DP) F(eminine Adj) condition, e.g., the book =SP masc. DP 'el libro' *es* 'is' *blanca* SP fem. AdjP 'white'). In fact, this contrast is not significant (*p*=.51), as per the post-hoc pairwise comparison in terms of gender within [-AC] Adj switches. If, on the other hand, the focus is set only on the [+AC] Adj fixated, the comparison in terms of gender of the preceding DP subject (i.e., M(asculine DP) M(asculine Adj) vs. F(eminine DP) F(eminine Adj), e.g., the book =SP masc. DP 'el libro' *es* 'is' *blanco* SP masc. AdjP 'white' vs. the house =SP fem. DP 'la casa' *es* 'is' *blanca* SP fem. AdjP 'white') yields no significant results (*p*=.72). Besides, it is possible to go a step further and compute the averages manually in order to compare the fixations on [+AC]

[31] The total fixation duration measure, the regression path duration measure and the reaction times are indicated in milliseconds. The log transformed measures are in brackets.

Adjs and those on masculine as default Adjs (i.e., masculine Adjs regardless of the gender of the DP subject). By doing so, the mean fixations on [+AC] Adjs (i.e., MM and FF) would be 1,337 milliseconds, while the average fixations on masculine as default Adjs (i.e., MM and FM) would be 1,065 milliseconds. Thus, under this comparison [+AC] Adjs are shown to be longer fixated once more.

Table 25. Summary of the overall means (*M*) and standard deviations (*SD*) for the total fixation duration measure within the Spanish Adj switches in the [+AC] vs. Masc. Default contrast [RQ3].

	[+AC] (target)				[-AC] (competitor)			
Visual world paradigm task	Masc N (MM)		Fem N (FF)		Masc N (MF)		Fem N (FM)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Total fixation duration	1,321.[32] (7.03)	714 (0.596)	1,353 (7.04)	752 (0.627)	802 (6.47)	568 (0.660)	810 (6.46)	655 (0.686)

The preference for [+AC] Adj switches, as shown by the judgment data as well as by the total fixation duration measure of the visual world paradigm task, is corroborated with the word selection data elicited via the visual world paradigm task because [+AC] Adjs (i.e., the target word) are more commonly selected, as shown by the percentages in Table 26.

Table 26. Summary of the overall percentages of the word selected in terms of the gender of the DP subject in the case of the visual world paradigm task [RQ3].

Visual world paradigm task	Target [+AC]		Competitor [-AC]	
	Masc. N (MM)	Fem. N (FF)	Masc. N (MF)	Fem. N (FM)
Word selected	43.00 %	41.35 %	4.52 %	5.29 %

As shown in Table 26, by performing a manual computation of the averages for the [+AC] switches (i.e., MM and FF) (42,17%) and for the masculine as default forms (i.e., MM and FM) (23,76%), it is possible to determine that [+AC] Adjs are more frequently selected than the masculine as default ones.

If we take into account the type of structure, differences are found between DP switches and Adj switches in how they are processed. While significant differences are found in the case of DP switches as per the total fixation duration measure (Figure 30), in the case of the Adj switches the results from the online data elicited with the reaction

[32] The total fixation duration is indicated in milliseconds. The log transformed data is in brackets.

time task in Gorilla (i.e., reaction times) are not significant, although there is a tendency towards shorter reaction times when [+AC] switches are presented, as depicted in Figure 31.

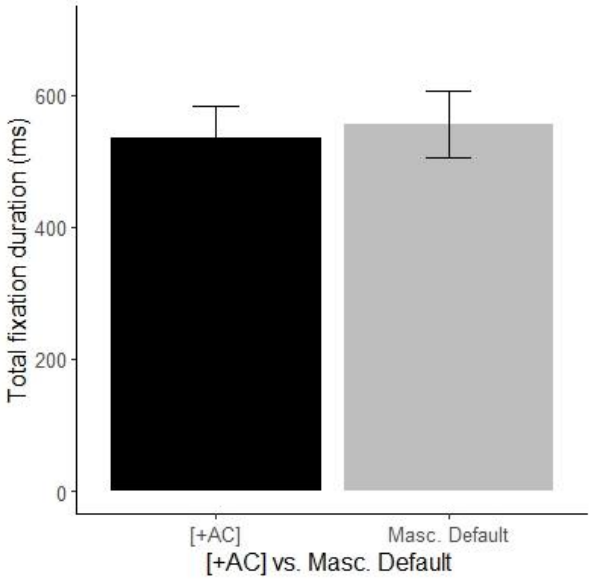


Figure 30. The [+AC] vs. Masc. Default contrast in DP switches as per the total fixation duration measure [RQ3].

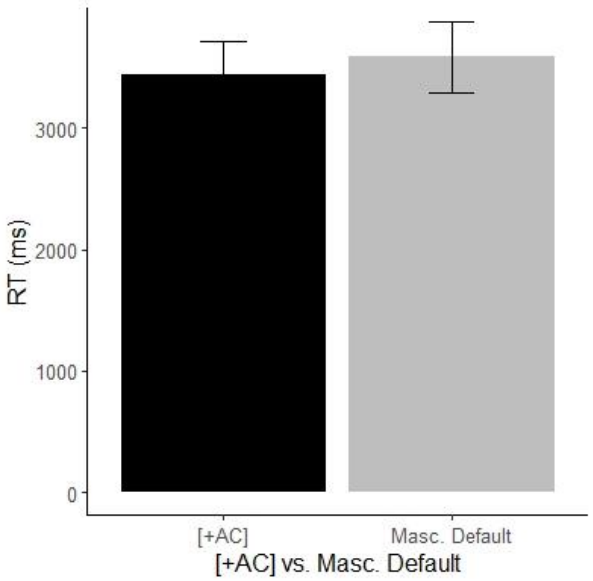


Figure 31. The [+AC] vs. Masc. Default contrast in Adj switches as per the reaction times [RQ3].

When it comes to determining whether the age of the participants influences the processing and perception of [+AC] switches over masculine as default switches, an interaction has been found in the case of Adj switches in the judgment data (*b*=0.184, *SE*=0.084, *t*=2.170, *p*=0.033), yet no effect of GROUP is observed (*p*=.716). Bonferroni post-

hoc pairwise comparisons reveal that both children and adults significantly prefer [+AC] Adj switches over masculine as default Adj switches (children and adults: $p<.001$), as shown in Figure 32.

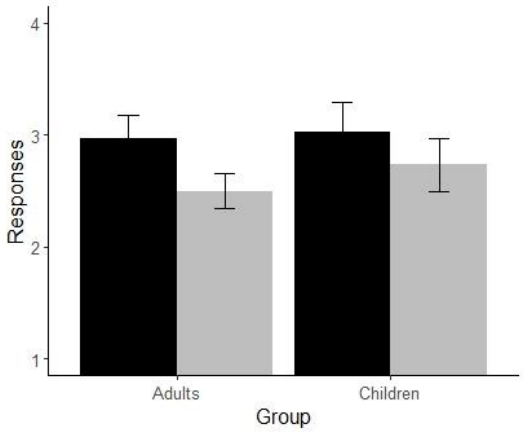


Figure 32. The [+AC] vs. Masc. Default contrast in Adj switches as per judgments within each group [RQ3].

The results from the rest of the models reveal no interactions between the condition at stake ([+AC] vs. Masc. Default) and group, yet an effect of group is found in the total fixation duration measure in DP switches (b=0.255, SE=0.077, t=3.305, p=.001) and in the reaction times in Adj switches (b=0.270, SE=0.070, t=3.818, p<.001). In the case of the DP switches, Bonferroni post-hoc pairwise comparisons on the total fixation duration measure indicate that this group effect is due to how differently children and adults perceive the contrast. That is, children show no significant difference between [+AC] and masculine as default DP switches (p=.210), while adults do (p=.004). In the case of the Adj switches as per the reaction times, the lack of effect of condition already indicates that this contrast is not significant for either group, yet the effect of group in this case is due to how differently each group perceives the same condition (adults [+AC] vs. children [+AC]: p=.002; adults Masc. Default vs. children Masc. Default: p=.003). A summary of the means (M) and standard deviation (SD) for each measure per group can be found in Table 27.

Table 27. Summary of the means (*M*) and standard deviations (*SD*) of each measure per group [RQ3].

Task	Measure	Children				Adults			
		[+AC]		Masc. Default		[+AC]		Masc. Default	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Eyetracking during reading	*Total fixation duration*	608 (6.36)	210 (0.325)	625 (6.38)	230 (0.350)	463 (6.10)	112 (0.272)	486 (6.15)	133 (0.282)
	Regression path duration	640 (6.41)	205 (0.331)	637 (6.39)	235 (0.359)	479 (6.14)	123 (0.255)	478 (6.13)	137 (0.305)
Reaction time task in Gorilla	*Reaction times*	3,936 (8.25)	975 (0.237)	4,100 (8.28)	1,125 (0.267)	3,061 (7.98)	1,019 (0.301)	3,185 (8.02)	1,010 (0.301)
	Judgments	3.02	0.67	2.73	0.59	2.97	0.59	2.50	0.45

As for the visual world paradigm task, no interactions have been found between the INTEREST AREA (i.e., target = [+AC] and competitor = [-AC]), GENDER of the DP subject (i.e., masculine and feminine) and GROUP (i.e., children and adults) (p=.169). As shown in Figure 33, the target area (i.e., [+AC] Adjs) is longer fixated by both child and adult participants.

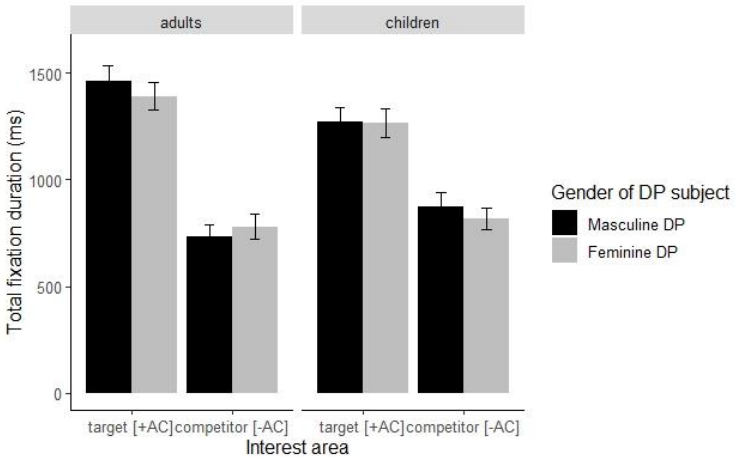


Figure 33. The [+AC] vs. Masc. Default contrast in Adj switches as per the total fixation duration per group [RQ3].

That [+AC] Adj switches are preferred as selected by the eyes of the participants (i.e., the eye fixations from the visual world paradigm task), as depicted in Figure 33, is shown by manually computing the averages of each group for [+AC] switches (i.e., MM and FF) and the masculine as default switches (i.e., MM and FM) from Table 28 below. That is, both children and adults fixate their eyes on [+AC] Adj switches (children: 1,260 milliseconds; adults: 1,426 milliseconds) more than on the masculine as default switches (children: 1,069 milliseconds; adults: 1,062.5 milliseconds).

Table 28. Summary of the total fixation duration measure on [+AC] Adjs, i.e., target, and [-AC] Adjs, i.e., competitor, based on the gender of the preceding DP subject within each group in the visual world paradigm task [RQ3].

Visual world paradigm task	*group*	*[+AC] (target)*				*[-AC] (competitor)*			
		Masc N (MM)		*Fem N (FF)*		*Masc N (MF)*		*Fem N (FM)*	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Total fixation duration	*Children*	1266.[33] (6.96)	762 (0.63)	1270 (6.97)	771 (0.63)	818 (6.50)	580 (0.63)	872 (6.54)	725 (0.67)
	Adults	1392 (7.12)	642 (0.53)	1460 (7.14)	713 (0.60)	780 (6.43)	551 (0.69)	733 (6.36)	548 (0.69)

The longer fixations on [+AC] Adj switches is the participants' way of expressing their preference before selecting one of the words. That is, the word selected in the visual world paradigm goes in line with the region which is longer fixated: the target area (i.e., [+AC] Adj). As shown in Table 29, both groups prefer choosing the [+AC] Adj (i.e., the target word), both masculine and feminine, over the masculine as default switches as per the manual computation of the averages: children: [+AC] Adj=39.97%, Masc. Default Adj=23.9%; adults: [+AC] Adj= 45.01%, Masc. Default Adj=24.45%.

Table 29. Distribution of the Spanish Adj selected per group based on the gender of the Spanish translation equivalent of the preceding DP subject [RQ3].

Visual world paradigm task	*group*	*Target [+AC]*		*Competitor [-AC]*	
		Masc (MM)	*Fem (FF)*	*Masc N (MF)*	*Fem N (FM)*
Word selection	*adults*	45.55 %	44.47 %	2.02%	3.36%
	children	41.02 %	38.93 %	6.47%	6.78%

Finally, regarding the Spanish Adj switches and how differently they are approached depending on the type of task as well as the type of data obtained with each task, significant differences have only been found in the case of the reaction time task in Gorilla (b=0.184, SE=0.084, t=2.170, p=.033). In this case, differences are found when it comes to comparing the type of data within the same task: while offline data (i.e., judgments) indicate a preference for [+AC] Adj switches by both groups of participants, this contrast does not turn out to be significant for either group in the case of the online data (i.e., reaction times). Besides, by comparing across tasks in the case of the Adj switches (i.e., reaction time task in Gorilla vs. visual world paradigm task), it is possible to

[33] The total fixation duration is indicated in milliseconds. The log transformed data is in brackets.

see that the data indicating selection or preference (i.e., judgment, word selection and total fixation duration measure) point to [+AC] switches as being preferred, while the real-time processing data (i.e., reaction times) do not show [+AC] switches as being easier to process than masculine as default switches. Thus, in the [+AC] vs. masculine as default contrast, processing and perception do not seem to go hand in hand.

In sum, in the case of RQ3, the overall pattern is that [+AC] DP switches are easier to process and that [+AC] Adj switches are preferred. Yet, this pattern is disrupted when the age of the participants comes into play in the case of DP switches, with children showing similar processing costs for both strategies. At the same time, divergences are found depending on the type of data in the case of Adj switches: while offline data (i.e., judgments and word selection) as well as online data indicating preference (i.e., total fixation duration in the visual world paradigm task) favor [+AC] Adj switches, real-time processing data (i.e., reaction times) do not show that inclination for [+AC] Adj switches as having less processing costs.

6.4. Summary

In this chapter, the results of each experiment have been described. They have been organized according to the three research questions which guide this research (i.e., directionality of the switch, the [+AC] vs. [-AC] contrast, and the [+AC] vs. Masc. Default contrast) and which are presented in chapter 5. The results regarding the two structures (i.e., DP switches and Adj switches) as well as the other potential factors which may influence the results (i.e., age of the participants and type of task) have been detailed. A summary of the main results can be found in Table 30 and will be discussed in chapter 7.

Table 30. Summary of the main results.

		Overall	Children	Adults
RQ1: Directionality	DP switches	Spanish Det switches are harder to process.		
	Adj switches	Spanish Adj switches are harder to process.	Spanish Adj and English Adj switches are similarly processed.	Spanish Adj switches are harder to process.
		English Adj switches are preferred.		
RQ2: [+AC] vs. [-AC]	DP switches	[+AC] switches are processed faster.		
	Adj switches	[+AC] switches are processed faster.	[+AC] and [-AC] switches are similarly processed.	[+AC] switches are processed faster.
		[+AC] switches are preferred.		
RQ3: [+AC] vs. Masc. Default	DP switches	[+AC] switches are processed faster.	No sig. differences in processing between [+AC] and Masc. Default.	[+AC] switches are processed faster.
	Adj switches	No sig. differences in processing between [+AC] and Masc. Default.		
		[+AC] switches are preferred.		

CHAPTER 7. DISCUSSION & CONCLUSIONS

The present study has examined Spanish grammatical gender in DP switches and Adj switches[34]. In particular, the focus has been set on the directionality of the switch, i.e., which language, Spanish or English, provides the Det or the Adj in DP switches or Adj switches respectively, and on the gender agreement mechanisms involved in Spanish DP switches and Spanish Adj switches. In the latter case, two contrasts have been taken into account: (i) the [+AC] vs. [-AC] comparison, that is, whether the gender of the Spanish Det/Adj matches the gender of the Spanish translation equivalent of the English N/DP subject (i.e., [+AC]) (e.g., *la* SP fem. Det 'the' door = SP fem. N '*puerta*' ; the door = SP fem. DP *'la puerta'* *es* 'is' *blanca* SP fem. AdjP 'white'), or whether no matching takes place (i.e., [-AC]) (e.g., *el* SP masc. Det 'the' door = SP fem. N '*puerta*' ; the book = SP masc. DP *'el libro'* *es* 'is' *blanca* SP fem. AdjP 'white'); and (ii) the [+AC] vs. masculine as default comparison, that is, in the latter case, whether the gender of the Spanish Det/Adj is masculine regardless of the gender of the Spanish translation equivalent of the English N/DP (e.g., *el* SP masc. def. Det 'the' door/book = SP fem./masc. N *'puerta'/'libro'*; the door/book = SP fem./masc. DP *'la puerta'/'el libro'* *es* 'is' *blanco* SP Masc. Def. AdjP 'white').

These two issues have been translated into 3 research questions (refer to chapter 5) and examined through experimental data (both offline and online) elicited via three experiments (see chapter 4 for a description of each experiment).

Taking as a point of departure the formal proposals detailed in chapter 2 as well the previous empirical works on codeswitching and on Spanish grammatical gender in DP switches and in Adj switches, the present chapter aims at discussing the results described in chapter 6 in order to draw the conclusions obtained from the present investigation.

This chapter is organized in two sections. First, the main findings regarding the 3 research questions (i.e., directionality of the switch, the [+AC] vs. [-AC] comparison and the [+AC] vs. Masc. Default contrast) are discussed in section 7.1 and in the corresponding sub-sections. Finally, the main conclusions obtained along the present investigation as well as the limitations and recommendations for further work are presented in section 7.2.

[34] Along this dissertation, and in order to simplify the reference to the two target constructions, these are referred to as follows: DP switches (i.e., switches between a Det and an N; e.g., *la* the house) and Adj switches (i.e., switches in copulative constructions between a DP subject and an AdjP functioning as a subject complement; e.g., the house *es* is *roja* red).

7.1. Discussion

The present investigation has been framed within the Minimalist Program (MacSwan, 1999, 2000), which maintains the minimal theoretical assumptions to account for linguistic data in general and approaches codeswitching data in the same way monolingual data are approached (refer to chapter 2, section 2.2.2.2 for a comprehensive account). In particular, the minimalist framework used in the analysis of the data relies on Liceras et al.'s (2005, 2008, 2016) proposal in which gender features are put at the forefront and the gender valuation mechanisms are used to explain the bilingual speaker's codeswitching preferences and processing. At the same time, language activation and language inhibition (see chapter 2, section 2.3.3 for more details) are considered to explore how they may influence the processing and perception of each directionality and of the gender agreement mechanisms in DP switches and Adj switches.

The following sub-sections present a discussion of the main findings per research question based on the formal and empirical accounts detailed in previous chapters.

7.1.1. Discussing RQ1: the directionality of the switch

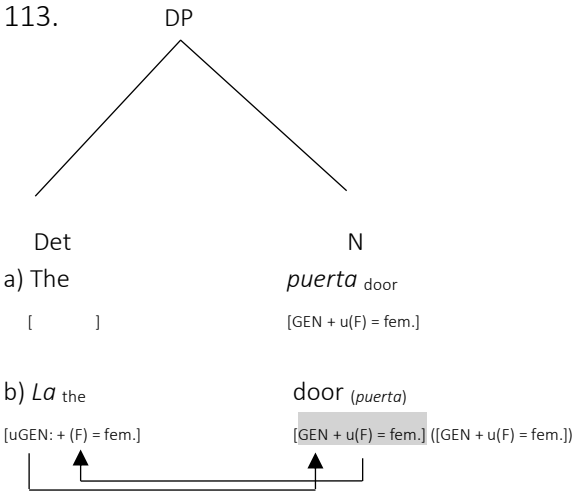
The first research question of the present study concerns the directionality of the switch within both DP switches and Adj switches; that is, which language (i.e., English or Spanish) provides the Det or the Adj in each structure. By using an eyetracking during reading task involving DP switches and a reaction time task in Gorilla including Adj switches (see chapter 4 for detailed descriptions), this study has attempted to shed some light on which directionality implies less processing costs and is preferred by L1 Spanish – L2 English bilingual children and adults. The processing costs and preferences are examined through the lenses of the potential factors influencing them, mainly the type of structure (i.e., DP switches and Adj switches) and the age of the participants (i.e., children and adults), and by discussing how the different types of data (i.e., offline and online) may influence the results. A summary of the type of data elicited with each task and the type of structure involved in each case is presented in Table 31.

Table 31. Summary of the data type elicited with each task for RQ1.

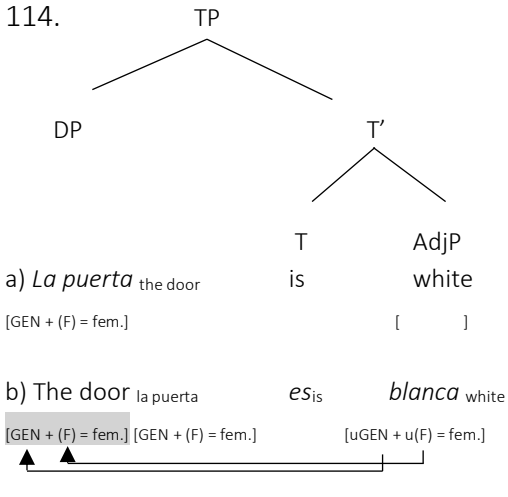
Structure type	Task type	Data type
DP switches	Eyetracking during reading task	Processing (online data – reading measures)
Adj switches	Reaction time task in Gorilla	Preference (offline data – judgments)
		Processing (online data – reaction times)

The results detailed in chapter 6 reveal what has been predicted in RQ1 in chapter 5; that is, English Det switches and English Adj switches (e.g., the EN Det *puerta* SP N 'door' ; *la puerta* SP DP 'the door' is white EN AdjP) involve less processing costs than Spanish Det switches and Spanish Adj switches (e.g., *la/el* SP Det 'the' *door* EN N ; the door EN DP *es* 'is' *blanco/a* SP AdjP 'white'). Indeed, Spanish Adj switches are less preferred than their English counterparts when judged. That is, as it has been hypothesized in chapter 5, the fact that both the Det and the Adj are already in English entails local inhibition, that is, suppressing a specific competing alternative, as in (113a) and (114a). This, as Fernández Fuertes et al. (in preparation) suggest, is different from having the Det and the Adj in Spanish (i.e., Spanish Det switches and Spanish Adj switches, as in (113b) and (114b)) because in this case the translation equivalent of the English N/DP is activated. This could be the reason why English switches are easier to process than Spanish switches: the former involve local inhibition which does not trigger gender agreement operations; and the latter involve lexical activation which implies a three-step process: the retrieval of the Spanish translation equivalent of the English N/DP and its feature activation, the assignment of gender features and the valuation of gender features.

113.



114.



Thus, English Det/Adj switches ((1a) and (2a)) do not imply higher processing costs and they result into more economical switches in terms of processing.

The easiness in the processing of English Det/Adj switches derives into a preference for English Det switches, as has been observed in previous studies with participants from diverse linguistic backgrounds (e.g., Fernández Fuertes et al., 2011, in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Gómez Carrero & Fernández Fuertes, 2021d; Liceras et al., 2008), and for English Adj switches, as it has been shown by the judgment data from this study. These results, therefore, suggest that processing seems to go hand in hand with the bilinguals' preferences in the case of directionality.

What is seen in experimental data, in the case of DP switches, seems to be different from what has been reported in spontaneous data. In this respect, the results of the processing and preferences in experimental conditions seem to move away from the clear-cut preference for Spanish Det switches as per the spontaneous production data examined in previous studies (e.g., Balam et al., 2021; Liceras et al., 2008; Montes-Alcalá & Lapidus Shin, 2011; Moyer, 1992; Otheguy & Lapidus Shin, 2003; Ramírez Urbaneja, 2020; Valdés Kroff, 2016, among many others). As shown in chapter 3, in terms of the directionality of the switch, different results are found based on the type of data collected: spontaneous data differ from experimental data in that, in the former, bilinguals opt for the most 'grammaticized' language (i.e., Spanish) as the provider of the Det in DP switches, as per the GFSH (Liceras et al., 2008, 2016); while in experimental data participants prefer and process more easily the English Det switches and the English Adj switches, that is, the structures where the least 'grammaticized' language provides the Det and the Adj, respectively. This contrast has been attributed to the different mechanisms that are involved when having to build up a structure (i.e., in production) versus the ones involved when having to process an already-built structure (e.g., in judgment). That is, the way bilinguals make use of their grammatical knowledge in order to deal with the two languages simultaneously is connected to, on the one hand, the interplay between local activation and inhibition and, on the other, the different processing constraints that may be involved (e.g., GFSH, lexical access; Fernández Fuertes et al., in preparation; Liceras et al., 2008, 2017).

In the case of Adj switches, the judgment data from this study confirm what previous investigations analyzing L1 Spanish bilinguals have concluded: a preference for English Adj switches where there is no need to enforce any gender agreement operations, (e.g., Fernández Fuertes et al., 2011). In the case of processing, to the best of our knowledge, as indicated in chapter 3, no study has addressed the target structure with online data, thus, this study contributes to the field by putting the Adj switches on the table. The overall pattern obtained from online data (i.e., reaction times) is the same as in DP switches, i.e., English Adj switches are processed faster.

Yet, differences are found when the group distinction factors in: while adults spend more time with Spanish Adj switches, children's difference in reaction times are neutralized when they are presented with both directionalities. This difference has not been predicted in RQ1: as both groups of participants have the same L1, i.e., Spanish, and children are above the critical period stage, the expected outcome was that Spanish would be represented in the same way for the adult group and for the child group. Yet, this has not been the case. Although it can be observed that the children's preferences are clear and similar to those of the adults, the processing of Adj switches may be subject to maturation. That is, children seem to neutralize the differences between directionalities in the case of processing because Adj switches seem to be more complex than DP switches, something that could be attributed to the number of lexical categories that must be accessed (Liceras et al., 2017). In the case of DP switches, only one lexical category (i.e., the N) has to be accessed and, when this one is already in Spanish (i.e., English Det + Spanish N switches), this structure becomes the one with less processing costs for both age groups. However, Adj switches involve accessing two lexical categories (i.e., N and Adj), and the alternation between languages always happens between these two lexical categories; that is, in any directionality, one will be in English and the other one will be in Spanish (e.g., *la puerta* SP DP 'the door' is white EN AdjP ; the door EN DP *es* 'is' *blanco/a* SP AdjP 'white'). Accessing two lexical categories does not mean an extra problem for adults, as per their results from both offline and online data in the case of Adj switches, but it does so for children as per their results from the online data (i.e., reaction times). Indeed, in the case of the child group, the patterns found in the offline data (i.e., judgment) and in the online data (i.e., reaction times) are different. These results seem to imply that when structures are more complex, as it is the case of the Adj switches, and

when participants have not reached certain level of language experience and maturation, processing and preference differ, as in this case. Indeed, the level of complexity of the structure surfaces when the data which provide the most precise information (i.e., real-time processing) are collected.

To sum up, these results point to a contrast between children and adults when two issues are at stake: (i) lexical access and thus, the complexity of the structure, that influences processing patterns in the case of directionality; and (ii) the complexity of the structure, that becomes more evident when processing data are examined because information during real-time processing is collected.

7.1.2. Discussing RQ2: the [+AC] vs. [-AC] contrast

RQ2 deals with the analogical criterion within Spanish Det switches and Spanish Adj switches. In particular, the focus is set on the contrast between the structures where there is gender agreement between the Det and the N in DP switches and the Adj and the DP subject in Adj switches, i.e., [+AC] switches (e.g., *la* SP fem. Det 'the' door = SP fem. N '*puerta*'; the door = SP fem. DP '*la puerta*' *es* 'is' *blanca* SP fem. AdjP 'white'), and the switches where there is no such gender agreement between the Det and the N in DP switches and between the Adj and the DP subject in Adj switches, i.e., [-AC] (e.g., *el* SP masc. Det 'the' door = SP fem. N '*puerta*' ; the book = SP masc. DP '*el libro*' *es* 'is' *blanca* SP fem. AdjP 'white'). The aim of RQ2 is to examine how these structures are processed, and also perceived in the case of Adj switches, by L1 Spanish – L2 English bilingual children and adults, and whether factors such as the type of structure (i.e., DP switches and Adj switches), the age of the participants (i.e., children and adults) and the type of task (i.e., reaction time task in Gorilla and the visual world paradigm task in the case of Adj switches) have an impact on the results. A summary of the different types of data elicited with each task in the case of each structure is presented in Table 32.

Table 32. Summary of the data type elicited with each task for RQ2.

Structure type	Task type	Data type
DP switches	Eyetracking during reading task	Processing (online data – reading measures)
Adj switches	Reaction time task in Gorilla	Preference (offline data – judgments)
		Processing (online data – reaction times)
	Visual world paradigm task	Preference (offline data – word selection)
		Processing (online data – eye fixations).[35]

The results presented in chapter 6 are in line with the predictions put forward in chapter 5: [+AC] switches are processed faster, and, in the case of the Adj switches, [+AC] switches are also preferred. This has been seen in the shorter fixations and shorter reaction times presented in [+AC] switches, as well as confirmed by the selection of [+AC] Adjs both by the participants' eyes and button presses in the visual world paradigm task and by the higher judgments given in the reaction time task in Gorilla.

In the case of DP switches, this pattern has been observed across the two groups of participants, both giving longer fixations to the Ns preceded by a [-AC] Det. That is, it seems that children and adults go through the three-step process (i.e., retrieval of translation equivalent and activation of gender features, assignment of gender features and valuation of gender features). And when it comes to the last step, the valuation of gender features, they consider that [-AC] DP switches involve a grammatical violation that makes the derivation crash. This is translated into a slowdown, which is in line with previous processing studies (e.g., Adler et al., 2020; Beatty-Martínez & Dussias, 2017; Fernández Fuertes et al., 2019, in preparation). Indeed, these online data results are a confirmation of what has been observed in previous studies using offline data from participants with the same linguistic profile (i.e., L1 Spanish bilinguals) and in which a preference for [+AC] DP switches can be observed (e.g., Fernández Fuertes et al., in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Liceras et al., 2008; Valenzuela et al., 2012). These results acknowledge that the linguistic profile of the bilingual plays an important role in their processing and preferences in the case of DP switches. In particular, it leads to how strongly Spanish gender features are rooted in the mind of these bilinguals to the point that they consider [-AC] DP switches as involving

[35] The eye fixation data elicited with the visual world paradigm task mostly provide information about the preference, that is, the word is first selected with the eyes (fixations) and later with the button presses (word selection).

a grammatical violation. This is seen not only in their judgments, as per the results in previous studies, but also in their processing costs, as per the processing data reported in this study. That is, these L1 Spanish bilinguals treat Spanish DP switches as they treat Spanish monolingual DPs, in which the Gender Double-Feature Valuation Mechanism is implemented (Liceras et al., 2016) (refer to chapter 2, section 2.3 for a detailed account; see also example (113b)).

The overall pattern found in Adj switches is the same as the one found in DP switches: [+AC] Adj switches are processed faster and, in the case of the offline data, they are preferred. The latter is in line with the results from previous studies with data elicited from L1 Spanish – L2 English bilinguals (e.g., Fernández Fuertes et al., 2011; Klassen & Liceras, 2017; Liceras et al., 2017; Valenzuela et al., 2012). However, differences are found when the group category factors in. Although both groups show a preference for [+AC] Adj switches when it comes to their judgments and their choices both with their eyes and button presses, children neutralize the differences between [+AC] and [-AC] when processing Adj switches. As it occurred in the case of the directionality of Adj switches, this neutralization only occurs in Adj switches, as it could be considered a more complex structure in terms of lexical access (i.e., it involves two lexical categories – the N and the Adj). Thus, once again, results point to the complexity of the structure and to maturation as potential explanations in the different processing rates of Adj switches when comparing child and adult data (even if processing patterns are the same for both age groups).

When comparing the participants' performance across structures, the expected outcome was that they would show more problems with DP switches than with Adj switches due to the directionality of feature checking. That is, the unvalued gender feature in N and the unvalued gender agreement feature in Det are valued bidirectionally in DP switches, as in (113b), while gender feature checking in the case of Adj switches is unidirectional, as in (114b) (Klassen & Liceras, 2017; Liceras et al., 2017). However, it seems that in this case it is not a question of the directionality of feature checking but a question of lexical access (Liceras et al., 2017). That is, in the case of Adj switches, two lexical categories (i.e., the N and the Adj) must be accessed while in DP switches, only one lexical category (i.e., the N) must be accessed. Thus, the number of lexical categories which must be accessed in each structure seems to affect the processing of the structure

and, hence, the processing of Spanish grammatical gender in this case. Indeed, this has been previously observed with offline experimental data. In particular, Liceras et al. (2017) observe differences between the two structures when they compare data from a judgment task and data from a sentence completion task. In the case of the sentence completion task, which is a guided production task, participants have more problems with the Adj switches than with the DP switches. Thus, it does not seem to be an issue that could only be attributed to age (i.e., children vs. adults) but also to the complexity of the structure at stake, i.e., lexical access in the case of Adj switches.

In sum, in the [+AC] vs. [-AC] contrast, participants show a tendency towards [+AC] switches as having lower processing costs and being preferred. Yet, issues such as the type of structure and the type of participant play an important role and their confluence is pivotal to understanding how the processing of one structure over the other is different. More specifically, lexical access, maturity and the interplay between the two could be potential explanations for the differences found across structures and across age groups.

7.1.3. Discussing RQ3: the [+AC] vs. Masc. Default contrast

The last research question of the present dissertation examines the contrast between the [+AC] and the masculine as default strategies within DP switches and Adj switches. In this comparison, neither of the gender agreement strategies involves a crash in the derivation; that is, both the [+AC] and the masculine as default switches entail a three-step process (i.e., retrieval of the Spanish translation equivalent of the English N/DP and activation of gender features, assignment of gender features and valuation of gender features). However, they differ in the requirements imposed in the last step, the valuation of gender features. While [+AC] switches imply that the unvalued gender feature and the unvalued gender agreement feature must match the gender of the corresponding valued ones (e.g., *la* SP fem. Det 'the' door = SP fem. N '*puerta*' ; the door = SP fem. DP '*la puerta*' *es* 'is' *blanca* SP fem. AdjP 'white'), the masculine as default switches entail a relaxation of these requirements in that gender features are not specified as being either masculine or feminine (e.g., *el* SP masc. def. Det 'the' door = SP fem. N '*puerta*' ; the door = SP fem. DP '*la puerta*' *es* 'is' *blanco* SP masc. def. AdjP 'white').

As in RQ2, this contrast has been examined by eliciting data from L1 Spanish – L2 English bilingual children and adults who have been tested via three experiments (i.e., an eyetracking during reading task, a reaction time task in Gorilla and a visual world paradigm task). Apart from the [+AC] vs. masculine as default contrast, potential factors such as the type of structure (i.e., DP switches and Adj switches), the age of the participants (i.e., children and adults) and the type of task (i.e., reaction time task in Gorilla and visual world paradigm task in the case of Adj switches) have been taken into account. A summary of the type of data elicited with each task in the case of each structure is included in Table 33.

Table 33. Summary of the data type elicited with each task for RQ3.

Structure type	Task type	Data type
DP switches	Eyetracking during reading task	Processing (online data – reading measures)
Adj switches	Reaction time task in Gorilla	Preference (offline data – judgments)
		Processing (online data – reaction times)
	Visual world paradigm task	Preference (offline data – word selection)
		Processing (online data – eye fixations).[36]

The results detailed in chapter 6 reveal that, in DP switches, [+AC] switches are processed faster. These results confirm what has been observed in previous studies using offline experimental data from L1 Spanish bilinguals. That is, L1 Spanish bilinguals prefer [+AC] DP switches (e.g., Fernández Fuertes et al., 2011, in preparation; Gómez Carrero, Fernández Fuertes, Martínez, et al., 2019a, 2019b; Liceras et al., 2008; Valenzuela et al., 2012), which is translated into faster processing in the present study. These results in the case of DP switches are in line with the ones observed in spontaneous production in the case of the bilingual adult data collected in Gibraltar, where [+AC] switches have been shown to be the most prevalent strategy (e.g., Liceras et al., 2008, 2016; Moyer, 1992). Yet, they differ from the patterns observed in the spontaneous production of the English adult bilinguals in the USA, in which the production of masculine as default switches was clearly favored (e.g., Aaron, 2015; Balam, 2016; Balam et al., 2021; DuBord, 2004; Liceras et al., 2008; Montes-Alcalá & Lapidus Shin, 2011; Otheguy & Lapidus Shin, 2003; Valdés Kroff, 2016).

[36] The eye fixation data elicited with the visual world paradigm task mostly provide information about preference, that is, the word is first selected with the eyes (fixations) and later with the button presses (word selection).

Nonetheless, in DP switches, differences are found when each group's data are analyzed. While adult participants follow the overall pattern, child participants do not show significant differences when comparing the processing of [+AC] DP switches over masculine as default DP switches. That is, for these L1 Spanish – L2 English bilingual children, having to comply with either strict or relaxed requirements in terms of gender agreement features, i.e., [+AC] and masculine as default switches respectively, seems to involve the same processing costs. These results are somewhat in between two proposals: on the one hand, Fernández Fuertes et al. (in preparation)'s, according to which masculine as default switches would be easier to process due to the relaxation of the gender agreement requirements; and, on the other, the second prediction put forward in chapter 5, which highlights the profile of these bilinguals as being behind the fact that [+AC] switches seem to be easier to process due to how rooted the Spanish gender features are in the mind of L1 Spanish bilinguals. It is true that the latter seems to be confirmed by the adult data, while children do not opt for either strategy. What is interesting in the case of the L1 Spanish bilingual children is that, even if no significant differences are shown between [+AC] switches and masculine as default switches, both switched DP types implicitly involve lower processing costs than the grammatical violation that [-AC] switches involve.

The Adj switches seem to follow a different pattern where the contrasting results are more related to the type of data than to the type of participants. Overall, in terms of processing, no significant differences have been found between the two strategies at stake (i.e., [+AC] vs. Masc. Default) within either group. However, in terms of preference, [+AC] switches have been shown to be preferred as per the higher judgments and the word selection both with the eyes and with the button presses given by both children and adults. That is, in the case of the Adj switches, no differences are found between child and adult data when contrasting [+AC] switches and masculine as default switches. Yet, the differences come when contrasting the types of data. It seems that the data indicating processing (mainly reaction times) and the one indicating preference (i.e., the offline data and the eye fixations indicating word choice) follow two different paths: [+AC] Adj switches are clearly preferred, as in previous studies with participants with the same linguistic profile (Fernández Fuertes et al., 2011; Klassen & Liceras, 2017; Liceras et al.,

2017; Valenzuela et al., 2012), while in real-time processing, the differences between [+AC] and masculine as default switches are neutralized.

Thus, the [+AC] vs. masculine as default comparison points to an outcome which differs from the one observed between the [+AC] and [-AC] contrast. That is, in the case of RQ3, when participants indicate their preferences (i.e., offline data), their choice is clear: they opt for [+AC] switches. However, when real-time processing is involved, the differences between the two switches tend to be neutralized, and, in this particular contrast, the neutralization does not only occur in the case of the complex structure, i.e., the Adj switches, which is the same for both age groups, but also in the case of DP switches for the child group.

When dealing with Spanish DP switches and Spanish Adj switches and putting all three strategies together (i.e., [+AC], [-AC] and Masc. Default), the results discussed in RQ2 and RQ3 suggest a hierarchy: [+AC] switches are processed faster and preferred, followed by the masculine as default switches, while [-AC] switches are perceived as involving a grammatical violation. On the one hand, this hierarchy seems to be guided by how Spanish gender features are represented in the mind of these bilinguals. That is, in [+AC] and masculine as default switches the valuation of the features (i.e., the last step of the process) successfully takes place, while in [-AC] switches, there is a crash in the derivation regarding the lack of gender agreement which is perceived as a grammatical violation by these L1 Spanish bilinguals. This would explain why the contrast between [+AC] switches and [-AC] switches is more strongly perceived than the one between [+AC] switches and masculine as default switches. Overall, both groups of participants show the same pattern due to how rooted Spanish gender features are in their minds as L1 Spanish speakers. Yet the differences between the two age groups could be attributed and explained in terms of the complexity of the structure, the type of data, the valuation power that features have in the mind of the participants depending on their age, and the interplay between the three. That is, when the contrast is clearly marked by the presence or the lack of gender agreement (i.e., [+AC] vs. [-AC]), the participants that do not follow the overall pattern (i.e., [+AC] as easier to process and preferred) are the children, but only when presented with Adj switches and when the data examined are real-time processing data. When the contrast does not involve a violation of feature matching, as in the case of [+AC] vs. masculine as default switches, differences are blurred when both

groups are presented the most complex structure (i.e., Adj switches), but only in the case of processing data. Yet, this neutralization also occurs in DP switches in the case of children when processing data are involved.

Therefore, overall, when it comes to gender agreement mechanisms, the data from the RQ2 and RQ3 suggest that (i) children and adults processing patterns and preferences are guided by the strength of the Spanish gender features in their mind; and that (ii), in addition to this, these patterns seem to be blurred for children when presented with more complex structures (i.e., Adj switches) and when real-time processing data are examined (i.e., reaction time data). These facts can suggest that children may have not yet arrived at the point of maturation shown by the adult participants, and which is translated into a performance limitation that affects the implementation of the requirements of feature strength, but which does not compromise gender agreement operations.

7.2. Conclusions

Taking Minimalist formal proposals on codeswitching as a point of departure and previous empirical accounts on Spanish grammatical gender in codeswitching as a reference, the present investigation has aimed at examining the directionality of the switch and the gender agreement mechanisms in DP switches and Adj switches by using experimental offline and online data elicited from L1 Spanish – L2 English bilingual participants from two age groups (i.e., children and adults).

The conclusions which can be drawn from the present investigation are the following. Firstly, in the case of the directionality of the switch, the preference for one language over the other providing the Det or the Adj in DP switches and Adj switches respectively mainly depends on the type of data elicited. While Spanish Det/Adj switches are the most common choice in spontaneous production, English Det/Adj switches are the preferred option in experimental data, and this preference is reflected in processing in the sense that the highest processing costs are shown in the structures which are less preferred. Secondly, in the case of the gender agreement mechanisms ([+AC], [-AC] and Masc. Default), a hierarchy can be observed in how each type of strategy is processed and perceived. That is, overall, [+AC] switches are less costly and preferred than [-AC] and

masculine as default switches (i.e., [+AC] < Masc. Default < [-AC]). This hierarchy seems to suggest the strength of the representation of Spanish grammatical gender in the mind of these bilinguals for whom Spanish is their L1. Yet, having the same linguistic profile sometimes does not mean obtaining the same results. Although participants are all L1 Spanish bilinguals and children are above the critical period stage, the children's performance somehow differs from that of the adults when they have to face more complex structures such as Adj switches, where agreement occurs outside the DP domain and involves accessing two lexical categories (i.e., N and Adj) instead of just one as in DP switches (i.e., N), pointing to lexical access as one of the key issues when contrasting DP switches and Adj switches. Finally, the previous contrast becomes clearer when two different types of experimental data are compared (i.e., offline vs. online), as it is the case of the present study. Eliciting two types of data has allowed us to detect patterns in codeswitching in a more precise way and they have informed us about how the representation of Spanish grammatical gender may differ in the minds of these bilinguals based on their age. This indicates that codeswitching in general and the specific issues under investigation in this dissertation, in particular, need to be approached by using an array of methodologies that would allow researchers to better understand the different processes underlying each decision taken by the bilingual speaker.

The present investigation offers a series of contributions. Regarding the type of structure, not only DP switches but also copulative switches with an AdjP as a subject complement, i.e., Adj switches, are included and examined in detail. Although a few studies have taken Adj switches into consideration, above all in terms of gender agreement mechanisms, the present investigation also focuses on the directionality of the switch within this type of structure. This way, issues such as the complexity of the structure (as measured in terms of lexical access) and the directionality of the feature valuation (i.e., unidirectional or bidirectional) can be examined in depth by comparing both Adj switches and DP switches. Indeed, this contrast between structures has allowed us to examine their impact on processing.

What regards to the type of data, the novelty is that two types of experimental data are elicited and compared in order to shed some light on how the type of data and the techniques used in the data collection may affect the patterns observed in codeswitching, and in particular in the directionality of the switch and in the gender

agreement mechanisms in DP switches and Adj switches. Thus, by combining various types of tasks, and obtaining diverse types of data from each, as well as by comparing them to those of previous studies, we are able to observe the outcomes based on the demands of each task (i.e., reading, deciding on judgments, choosing with the eyes, choosing with button presses). In line with this, the present investigation has also offered a broader perspective on the analysis of codeswitching in the sense that spontaneous as well as experimental data have been taken into consideration in the discussion of the results. Including different types of data (i.e., offline and online) has allowed for different analyses and thus, different outcomes, which can contribute to broaden our understanding on codeswitching.

Finally, what regards the type of participant, the present dissertation has provided a comparative account of child and adult data from the same linguistic profile, as L1 Spanish bilinguals. The consideration of both child and adult data has allowed us to detect how, while both age groups abide by the strength of Spanish grammatical gender features, differences do appear. When experimental conditions are more demanding, children may relax, up to a point, the implementation of the requirements imposed by feature strength. This might be behind the differences found between the two age groups, even though their preferences and processing are guided by the same grammatical mechanisms.

Nonetheless, some issues have been left unexplored in the present investigation. For instance, while the focus is placed on L1 Spanish bilinguals, the consideration of L2 Spanish bilinguals or HL Spanish bilinguals, both children and adults, could help complete the picture. That is, by keeping the data elicitation techniques and the issues under consideration constant, the analysis of bilinguals for whom Spanish is not the L1 but rather the HL or the L2 would provide further insight into whether, and if so how, processing costs are affected by the different representation of Spanish grammatical gender in the mind of each bilingual group.

If the strength of formal features in codeswitching contexts is in a way subject to maturation, as the child data analyzed seem to suggest, testing other types of structures may help explore how processing mechanisms are intertwined with representational issues and age. In this respect, testing grammatical person features, for instance, could allow us to explore whether, in the case of subject-verb switches, the directionality of the

switch and the type of person agreement are equally processed by children and adults (e.g., Fernández Fuertes, Álvarez de la Fuente, et al., 2016; González-Vilbazo & Koronkiewicz, 2016; Koronkiewicz, 2014, 2018, 2020; Toribio, 2001).

These and other related issues will certainly guide our future works.

REFERENCES

Aaron, J. E. (2015). Lone English-origin nouns in Spanish: The precedence of community norms. *International Journal of Bilingualism*, *19*(4), 459–480. https://doi.org/10.1177/1367006913516021

Abney, S. P. (1987). *The English noun phrase in its sentential aspects.* [Unpublished dissertation]. Massachusetts Institute of Technology.

Abutalebi, J., Brambati, S. M., Annoni, J.-M., Moro, A., Cappa, S. F., & Perani, D. (2007). The Neural cost of the auditory perception of language switches: An event-related functional magnetic resonance imaging study in bilinguals. *Journal of Neuroscience*, *27*(50), 13762–13769. https://doi.org/10.1523/JNEUROSCI.3294-07.2007

Adger, D. (2003). *Core syntax: A minimalist approach*. Oxford University Press.

Adler, R. M., Valdés Kroff, J. R., & Novick, J. M. (2020). Does integrating a code-switch during comprehension engage cognitive control? *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *46*(4), 741–759. https://doi.org/10.1037/xlm0000755

Åfarli, T. A. (2015). Hybrid verb forms in American Norwegian and the analysis of the syntactic relation between the verb and its tense. In J. B. Johannessen & J. C. Salmons (Eds.), *Studies in Language Variation* (Vol. 18, pp. 161–177). John Benjamins Pub. Co. https://doi.org/10.1075/silv.18.07afa

Åfarli, T. A., & Subbarao, K. V. (2019). Models of grammar and the outcomes of long-term language contact: Language mixing in Dakkhini. In A. Álvarez González, Z. Estrada-Fernández, & C. Chamoreau (Eds.), *Typological Studies in Language* (Vol. 126, pp. 27–52). John Benjamins Pub. Co. https://doi.org/10.1075/tsl.126.02afa

Aguirre, A. (1976). *Acceptability judgements of code-switching phrases by Chicanos: Some preliminary findings*. https://eric.ed.gov/?id=ED129122

Alexiadou, A., & Lohndal, T. (2018). Units of language mixing: A cross-linguistic perspective. *Frontiers in Psychology*, *9*, 1719. https://doi.org/10.3389/fpsyg.2018.01719

Allopenna, P. D., Magnuson, J. S., & Tanenhaus, M. K. (1998). Tracking the time course of spoken word recognition using eye movements: Evidence for continuous

mapping models. *Journal of Memory and Language*, *38*(4), 419–439. https://doi.org/10.1006/jmla.1997.2558

Altarriba, J., Kroll, J. F., Sholl, A., & Rayner, K. (1996). The influence of lexical and conceptual constraints on reading mixed-language sentences: Evidence from eye fixations and naming times. *Memory & Cognition*, *24*(4), 477–492. https://doi.org/10.3758/BF03200936

Ambadiang, T. (1999). La flexión nominal. Género y número. In I. Bosque & V. Demonte (Eds.), *Gramática descriptiva de la lengua española. Volumen 3: Entre la oración y el discurso / morfología.* (Vol. 3, pp. 4843–4913). Espasa.

Arnaus Gil, L., Eichler, N., Jansen, V., Patuto, M., & Müller, N. (2012). The syntax of mixed DPs containing an adjective: Evidence from bilingual German-Romance (French, Italian, Spanish) children. In K. L. Geeslin & M. Díaz-Campos (Eds.), *Selected Proceedings of the 14th Hispanic Linguistics Symposium* (pp. 242–257). Cascadilla Proceedings Project, Somerville, MA.

Arnaus Gil, L., Müller, N., Sette, N., & Hüppop, M. (2021). Active bi- and trilingualism and its influencing factors. *International Multilingual Research Journal*, *15*(1), 1–22. https://doi.org/10.1080/19313152.2020.1753964

Azuma, S. (1993). The frame-content hypothesis in speech production: Evidence from intrasentential code switching. *Linguistics*, *31*(6). https://doi.org/10.1515/ling.1993.31.6.1071

Badiola, L., Delgado, R., Sande, A., & Stefanich, S. (2018). Code-switching attitudes and their effects on acceptability judgment tasks. *Linguistic Approaches to Bilingualism*, *8*(1), 5–24. https://doi.org/10.1075/lab.16006.bad

Badiola, L., & Sande, A. (2018). Gender assignment in Basque/Spanish mixed determiner phrases: A study of simultaneous bilinguals. In L. López (Ed.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 19, pp. 15–38). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.19.02bad

Balam, O. (2016). Semantic categories and gender assignment in contact Spanish: Type of code-switching and its relevance to linguistic outcomes. *Journal of Language Contact*, *9*(3), 405–435. https://doi.org/10.1163/19552629-00903001

Balam, O., Lakshmanan, U., & Parafita Couto, M. del C. (2021). Gender assignment strategies among simultaneous Spanish/English bilingual children from Miami,

Florida. *Studies in Hispanic and Lusophone Linguistics*, *14*(2), 241–280. https://doi.org/10.1515/shll-2021-2045

Balam, O., & Parafita Couto, M. del C. (2019). Adjectives in Spanish/English code-switching: Avoidance of grammatical gender in bi/multilingual speech. *Spanish in Context*, *16*(2), 194–216. https://doi.org/10.1075/sic.00034.bal

Bandi-Rao, S., & den Dikken, M. (2014). Light switches: On v as a pivot in codeswitching, and the nature of the ban on word-internal switches. In J. MacSwan (Ed.), *Grammatical Theory and Bilingual Codeswitching*. The MIT Press.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*, 1–48. https://doi.org/10.18637/jss.v067.i01

Beatty-Martínez, A. L., & Dussias, P. E. (2017). Bilingual experience shapes language processing: Evidence from codeswitching. *Journal of Memory and Language*, *95*, 173–189. https://doi.org/10.1016/j.jml.2017.04.002

Belazi, H. M., Rubin, E. J., & Toribio, A. J. (1994). Code switching and X-Bar Theory: The functional head constraint. *Linguistic Inquiry*, *25*(2), 221–237. http://www.jstor.org/stable/4178859

Bellamy, K., & Parafita Couto, M. C. (2022). Gender assignment in mixed noun phrases: State of the art. In D. Ayoun (Ed.), *The Acquisition of Gender: Crosslinguistic perspectives* (pp. 13–48). John Benjamins Pub. Co.

Bellamy, K., Parafita Couto, M., & Stadthagen-Gonzalez, H. (2018). Investigating gender assignment strategies in mixed Purepecha–Spanish nominal constructions. *Languages*, *3*(3), 28. https://doi.org/10.3390/languages3030028

Bellamy, K., Stadthagen-Gonzalez, H., & Parafita Couto, M. C. (2022). Él code-switches more than tú y yo: New data for the subject pronoun-verb switch constraint. *Languages*, *7*(1), 22. https://doi.org/10.3390/languages7010022

Bessett, R. M. (2017). *The integration of lone English Nouns into bilingual Sonoran Spanish* [Unpublished dissertation]. University of Arizona.

Bialystok, E., Craik, F. I. M., & Luk, G. (2012). Bilingualism: Consequences for mind and brain. *Trends in Cognitive Sciences*, *16*(4), 240–250. https://doi.org/10.1016/j.tics.2012.03.001

Blokzijl, J., Deuchar, M., & Parafita Couto, M. C. (2017). Determiner asymmetry in mixed nominal constructions: The role of grammatical factors in data from Miami and Nicaragua. *Languages*, *2*(4), 20. https://doi.org/10.3390/languages2040020

Blom, J.-P., & Gumperz, J. J. (1972). Social meaning in linguistic structure: Code-switching in Norway. In J. J. Gumperz & D. H. Hymes (Eds.), *Directions in sociolinguistics: The ethnography of communication* (pp. 407–434). Holt, Rinehart and Winston.

Boers, I., Sterken, B., van Osch, B., Parafita Couto, M. C., Grijzenhout, J., & Tat, D. (2020). Gender in unilingual and mixed speech of Spanish heritage speakers in the Netherlands. *Languages*, *5*(4), 68. https://doi.org/10.3390/languages5040068

Bosma, E., & Pablos, L. (2020). Switching direction modulates the engagement of cognitive control in bilingual reading comprehension: An ERP study. *Journal of Neurolinguistics*, *55*, 100894. https://doi.org/10.1016/j.jneuroling.2020.100894

Brysbaert, M., & New, B. (2009). Moving beyond Kucera and Francis: A critical evaluation of current word frequency norms and the introduction of a new and improved word frequency measure for American English. *Behavior Research Methods*, *41*(4), 977–990.

Bullock, B. E., & Toribio, A. J. (2009). Themes in the study of code-switching. In A. J. Toribio & B. E. Bullock (Eds.), *The Cambridge Handbook of Linguistic Code-switching* (pp. 1–18). Cambridge University Press. https://doi.org/10.1017/CBO9780511576331.002

Bultena, S., Dijkstra, T., & van Hell, J. G. (2015a). Switch cost modulations in bilingual sentence processing: Evidence from shadowing. *Language, Cognition and Neuroscience*, *30*(5), 586–605. https://doi.org/10.1080/23273798.2014.964268

Bultena, S., Dijkstra, T., & van Hell, J. G. (2015b). Language switch costs in sentence comprehension depend on language dominance: Evidence from self-paced reading. *Bilingualism: Language and Cognition*, *18*(3), 453–469. https://doi.org/10.1017/S1366728914000145

Burkholder, M. (2018). Language mixing in the nominal phrase: Implications of a Distributed Morphology perspective. *Languages*, *3*(2), 10. https://doi.org/10.3390/languages3020010

Byers-Heinlein, K., Morin-Lessard, E., & Lew-Williams, C. (2017). Bilingual infants control their languages as they listen. *Proceedings of the National Academy of Sciences*, *114*(34), 9032–9037. https://doi.org/10.1073/pnas.1703220114

Cantone, K. F., & MacSwan, J. (2009). Adjectives and word order: A focus on Italian-German code-switching. In L. Isurin, D. Winford, & K. deBot (Eds.), *Studies in Bilingualism* (Vol. 41, pp. 243–277). John Benjamins Pub. Co. https://doi.org/10.1075/sibil.41.14can

Cantone, K. F., & Müller, N. (2008). Un nase or una nase? What gender marking within switched DPs reveals about the architecture of the bilingual language faculty. *Lingua*, *118*(6), 810–826. https://doi.org/10.1016/j.lingua.2007.05.007

Carstens, V. (2010). Implications of grammatical gender for the theory of uninterpretable features. In M. T. Putnam (Ed.), *Language Faculty and Beyond* (Vol. 3, pp. 31–58). John Benjamins Publishing Company. https://doi.org/10.1075/lfab.3.03car

Carter, D., Davies, P., Deuchar, M., & Couto, M. del C. P. (2011). A systematic comparison of factors affecting the choice of matrix language in three bilingual communities. *Journal of Language Contact*, *4*(2), 153–183. https://doi.org/10.1163/187740911X592808

Carvalho, A. M. (2012). Corpus del Español en el Sur de Arizona (CESA). *University of Arizona*. https://cesa.arizona.edu/

Chomsky, N. (1965). *Aspects of the theory of syntax*. The MITPress.

Chomsky, N. (1993). A Minimalist Program for linguistic theory. In K. Hale & S. J. Keyser (Eds.), *The view from building 20: Essays in linguistics in Honor of Sylvain Bromberger*. MIT Press.

Chomsky, N. (1995). *The Minimalist Program*. The MIT Press.

Chomsky, N. (2001). Derivation by phase. In M. Kenstowicz (Ed.), *Ken Hale: A life in language* (pp. 1–52). The MIT Press.

Chomsky, N. (2013). Derivation by phase. In R. S. Kayne, T. Leu, & R. Zanuttini (Eds.), *An annotated syntax reader: Lasting insights and questions* (pp. 482–496). Wiley Blackwell, A John Wiley & Sons, Ltd., Publication.

Chomsky, N. (2015). *The Minimalist Program* (20th Anniversary Edition). The MIT Press.

Clegg, J. (2010). Native Spanish speaker intuition in noun gender assignment. *Language Design*, *12*, 5–18. https://www.semanticscholar.org/paper/Native-Spanish-

Speaker-Intuition-in-Noun-Gender-Clegg/25a45979a55fdb496a0e0d0a460f9c788f1ed6d2

Clegg, J. H., & Waltermire, M. (2009). Gender assignment to English-origin nouns in the Spanish of the Southwestern United States. *International Journal of the Linguistic Association of the Southwest*, *28*(1), 1–18.

Clifton, C., Staub, A., & Rayner, K. (2007). Eye movements in reading words and sentences. In *Eye Movements* (pp. 341–371). Elsevier. https://doi.org/10.1016/B978-008044980-7/50017-3

Conklin, K., Pellicer-Sánchez, A., & Carrol, G. (2018). *Eye-tracking: A guide for applied linguistics research*. Cambridge University Press. https://doi.org/10.1017/9781108233279

Cooper, R. M. (1974). The control of eye fixation by the meaning of spoken language: A new methodology for the real-time investigation of speech perception, memory, and language processing. *Cognitive Psychology*, *6*, 84–107.

Corbett, G. G. (1991). *Gender* (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9781139166119

Cruz, A. (2021). A syntactic approach to gender assignment in Spanish–English bilingual speech. *Glossa: A Journal of General Linguistics*, *6*(1). https://doi.org/10.16995/glossa.5878

Cuetos, F., Glez-Nosti, M., Barbón, A., & Brysbaert, M. (2011). SUBTLEX-ESP: Spanish word frequencies based on film subtitles. *Psicológica*, *32*, 133–143.

Davies, M. (2008). *The Corpus of Contemporary American English (COCA).* https://www.english-corpora.org/coca/.

Davies, M. (2012, 2019). *Corpus del Español NOW (News on the Web).* https://www.corpusdelespanol.org/now/

de Groot, A. M. B., & Christoffels, I. K. (2006). Language control in bilinguals: Monolingual tasks and simultaneous interpreting. *Bilingualism: Language and Cognition*, *9*(2), 189–201. https://doi.org/10.1017/S1366728906002537

de Nicolás, I. (2020). *Adjective placement in code-switched determiner phrases* [Unpublished dissertation]. University of Illinois at Chicago.

de Nicolás, I., & Robledo, J. (2018). Adjective placement in Spanish and Basque mixed DPs. In L. López (Ed.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 19, pp.

63–100). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.19.04nic

Delgado, R. (2018). The familiar and the strange: Gender assignment in Spanish/English mixed DPs. In L. López (Ed.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 19, pp. 39–62). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.19.03del

Denbaum, N., & de Prada Pérez, A. (2021). How do Spanish heritage speakers in the US assign gender to English nouns in Spanish-English code-switching?: The effect of noun canonicity and codeswitcher type. *Linguistic Approaches to Bilingualism*, *11*(6), 846–872. https://doi.org/10.1075/lab.19029.den

Deuchar, M. (2006). Welsh-English code-switching and the Matrix Language Frame model. *Lingua*, *116*(11), 1986–2011. https://doi.org/10.1016/j.lingua.2004.10.001

Deuchar, M. (2012). Code switching. In C. A. Chapelle (Ed.), *The Encyclopedia of Applied Linguistics*. John Wiley & Sons, Inc. https://doi.org/10.1002/9781405198431.wbeal0142

Deuchar, M., Davies, P., Herring, J. R., Couto, M. C. P., & Carter, D. (2014). Building bilingual corpora. In E. M. Thomas & I. Mennen (Eds.), *Advances in the Study of Bilingualism* (pp. 93–110). Multilingual Matters. https://doi.org/10.21832/9781783091713-008

Deuchar, M., & Quay, S. (2001). *Bilingual acquisition: Theoretical implications of a case study*. Oxford University Press.

Di Sciullo, A.-M., Muysken, P., & Singh, R. (1986). Government and code-mixing. *Journal of Linguistics*, *22*(1), 1–24. https://doi.org/10.1017/S0022226700010537

DuBord, E. M. (2004). Gender Assignment to English Words in the Spanish of Southern Arizona. *Divergencias: Revista de Estudios Lingüísticos y Literarios*, *2*(2), 27–39.

Duchon, A., Perea, M., Sebastián-Gallés, N., Martí, A., & Carreiras, M. (2013). EsPal: One-stop shopping for Spanish word properties. *Behavior Research Methods*, *45*(4), 1246–1258. https://doi.org/10.3758/s13428-013-0326-1

Duran Eppler, E., Luescher, A., & Deuchar, M. (2017). Evaluating the predictions of three syntactic frameworks for mixed determiner–noun constructions. *Corpus Linguistics and Linguistic Theory*, *13*(1). https://doi.org/10.1515/cllt-2015-0006

Dussias, P. E. (2003). Spanish-English code mixing at the auxiliary phrase: Evidence from eye-movement data. *Revista Internacional de Lingüística Iberoamericana*, *1*(2), 7–34.

Dussias, P. E., Valdés Kroff, J. R., Beatty-Martínez, A. L., & Johns, M. A. (2019). What language experience tells us about cognition: Variable input and interactional contexts affect bilingual sentence processing. In J. W. Schwieter & M. Paradis (Eds.), *The Handbook of the Neuroscience of Multilingualism* (1st ed., pp. 467–484). Wiley. https://doi.org/10.1002/9781119387725.ch23

Dussias, P. E., Valdés Kroff, J. R., Guzzardo Tamargo, R. E., & Gerfen, C. (2013). When gender and looking go hand in hand: Grammatical gender processing in L2 Spanish. *Studies in Second Language Acquisition*, *35*(2), 353–387. https://doi.org/10.1017/S0272263112000915

Eichler, N., Hager, M., & Müller, N. (2012). Code-switching within determiner phrases in bilingual children: French, Italian, Spanish and German. *Zeitschrift Für Französische Sprache Und Literatur*, *122*(3), 227–258. http://www.jstor.org/stable/24548797

Eichler, N., & Müller, N. (2012). The derivation of mixed DPs: Mixing of functional categories in bilingual children and in second language learners. In M. Watorek, S. Benazzo, & M. Hickmann (Eds.), *Comparative Perspectives on Language Acquisition* (pp. 263–281). Multilingual Matters. https://doi.org/10.21832/9781847696045-016

Eleta, I., & Golbeck, J. (2014). Multilingual use of Twitter: Social networks at the language frontier. *Computers in Human Behavior*, *41*, 424–432. https://doi.org/10.1016/j.chb.2014.05.005

Espinosa, A. M. (1917). Speech mixture in New Mexico: The influence of the English language on New Mexican Spanish. In H. M. Stephens & H. E. Bolton (Eds.), *The Pacific Ocean in History.* (pp. 408–428). Macmillan Co.

Ezeizabarrena, M.-J. (2009). Development in early Basque-Spanish language mixing. In J. Grinstead (Ed.), *Language Acquisition and Language Disorders* (Vol. 50, pp. 57–90). John Benjamins Pub. Co. https://doi.org/10.1075/lald.50.04eze

Fairchild, S., & Van Hell, J. G. (2017). Determiner-noun code-switching in Spanish heritage speakers. *Bilingualism: Language and Cognition*, *20*(1), 150–161. https://doi.org/10.1017/S1366728915000619

Fernández, E. M., & Souza, R. A. (2016). Walking bilinguals across language boundaries: On-line and off-line techniques. In R. R. Heredia, J. Altarriba, & A. B. Cieślicka (Eds.), *Methods in Bilingual Reading Comprehension Research* (pp. 33–60). Springer. https://doi.org/10.1007/978-1-4939-2993-1_3

Fernández Fuertes, R., Álvarez de la Fuente, E., & Mujcinovic, S. (2016). The acquisition of grammatical gender in L1 bilingual Spanish. In A. Alba de la Fuente, E. Valenzuela, & C. Martínez Sanz (Eds.), *Studies in Bilingualism* (Vol. 51, pp. 237–279). John Benjamins Publishing Company. https://doi.org/10.1075/sibil.51.10fue

Fernández Fuertes, R., Gómez Carrero, T., & Liceras, J. M. (in preparation). *Activation and local inhibition in the bilingual child's processing of codeswitching*.

Fernández Fuertes, R., Gómez Carrero, T., & Martínez, A. (2019). Where the eye takes you: The processing of gender in codeswitching. *Revista Electrónica de Lingüística Aplicada*, *18*, 1–17.

Fernández Fuertes, R., & Liceras, J. M. (2018a, January 16). *Divergent and convergent code-switching behavior in adult production versus interpretation data: The concord-agreement divide* [Presentation]. Key Debates in Code-Switching Research: Methodological and Theoretical Considerations, Lorentz Center, Universiteit Leiden, The Netherlands.

Fernández Fuertes, R., & Liceras, J. M. (2018b). Bilingualism as a first language: Language dominance and crosslinguistic influence. In A. Cuza & P. Guijarro-Fuentes (Eds.), *Language Acquisition and Contact in the Iberian Peninsula* (pp. 159–186). De Gruyter. https://doi.org/10.1515/9781501509988-007

Fernández Fuertes, R., Liceras, J. M., & Alba de la Fuente, A. (2016). Beyond the subject DP versus the subject pronoun divide in agreement switches. In C. Tortora, M. den Dikken, I. L. Montoya, & T. O'Neill (Eds.), *Romance Languages and Linguistic Theory* (Vol. 9, pp. 79–98). John Benjamins Publishing Company. https://doi.org/10.1075/rllt.9.05fue

Fernández Fuertes, R., Liceras, J. M., & Bel, A. (2011, June 15). *Functional-lexical code-switching in simultaneous and sequential child bilingualism* [Presentation]. 8th International Symposium of Bilingualism, University of Oslo, Norway.

Franceschina, F. (2001). Morphological or syntactic deficits in near-native speakers? An assessment of some current proposals. *Second Language Research*, *17*(3), 213–247. https://doi.org/10.1177/026765830101700301

Fricke, M., Kroll, J. F., & Dussias, P. E. (2016). Phonetic variation in bilingual speech: A lens for studying the production-comprehension link. *Journal of Memory and Language*, *89*, 110–137. https://doi.org/10.1016/j.jml.2015.10.001

Garrod, S. (2006). Psycholinguistic research methods. In *Encyclopedia of Language & Linguistics* (pp. 251–257). Elsevier. https://doi.org/10.1016/B0-08-044854-2/04155-9

Gaskins, D., Bailleul, O., Werner, A., & Endesfelder Quick, A. (2021). A crosslinguistic study of child code-switching within the noun phrase: A usage-based perspective. *Languages*, *6*(1), 29. https://doi.org/10.3390/languages6010029

Giancaspro, D. (2013). L2 learners' and heritage speakers' judgments of code-switching at the auxiliary-VP boundary. In J. Cabrelli Amaro, G. Lord, A. de Prada Pérez, & J. E. Aaron (Eds.), *Selected Proceedings of the 16th Hispanic Linguistics Symposium* (pp. 56–69). Cascadilla Proceedings Project.

Giancaspro, D. (2015). Code-switching at the auxiliary-VP boundary: A comparison of heritage speakers and L2 learners. *Linguistic Approaches to Bilingualism*, *5*, 379–407. http://www.jbe-platform.com/content/journals/10.1075/lab.5.3.04gia

Godfroid, A. (2020). *Eye tracking in second language acquisition and bilingualism: A research synthesis and methodological guide*. Routledge, Taylor & Francis.

Godfroid, A., Loewen, S., Jung, S., Park, J.-H., Gass, S., & Ellis, R. (2015). Timed and untimed grammaticality judgments measure distinct types of knowledge: Evidence from eye-movement patterns. *Studies in Second Language Acquisition*, *37*(2), 269–297. https://doi.org/10.1017/S0272263114000850

Gómez Carrero, T. (2015). *Un pencil or una pencil? The importance of Spanish gender in switched DPs* [Unpublished master thesis].

Gómez Carrero, T., & Fernández Fuertes, R. (2017, April 20). *Spanish Determiner-English Noun switches and grammatical gender: The case of English heritage speakers*

[Presentation]. KFLC: The Language, Literatures and Cultures Conference, University of Kentucky.

Gómez Carrero, T., & Fernández Fuertes, R. (2020a, July 1). *Spanish grammatical gender in code-switching: Evidence from eye-movements* [Presentation]. 50th Linguistic Symposium on Romance Languages, University of Texas at Austin.

Gómez Carrero, T., & Fernández Fuertes, R. (2020b, December 17). *An eye tracking study with children: Gender in code-switching* [Presentation]. International Online Conference of Psycholinguistic and Neurolinguistic Research: Methods, Materials, and Approaches, University of Salamanca, Spain; Center for Linguistic Justice and Endangered Languages, National Law University, New Delhi.

Gómez Carrero, T., & Fernández Fuertes, R. (2021a, April 16). *Using eye-tracking data to test how L1 SP-L2 EN bilinguals process Spanish grammatical gender in switched DPs* [Presentation]. 38 Congreso Internacional de la Asociación Española de Lingüística Aplicada, University of A Coruña.

Gómez Carrero, T., & Fernández Fuertes, R. (2021b, June 3). *Testing English Spanish switched Determiner Phrases: Evidence from eye tracking during reading.* [Poster]. 3rd International Symposium on Bilingual and L2 Processing in Adults and Children, Center for Language Studies, Radboud University (Nijmegen).

Gómez Carrero, T., & Fernández Fuertes, R. (2021c, June 22). *Spanish grammatical gender through the eyes of the L1 Spanish-L2 English bilingual child.* [Presentation]. XV International Symposium of Psycholinguistics 2021, Nebrija University.

Gómez Carrero, T., & Fernández Fuertes, R. (2021d, July 10). *How children in Gibraltar process Spanish grammatical gender: A new look at an old problem* [Presentation]. 13th International Symposium on Bilingualism, University of Warsaw, Poland.

Gómez Carrero, T., Fernández Fuertes, R., & Martínez, A. (2018, August 30). *English-Spanish early bilingualism in a language contact context: The view from code-switching* [Presentation]. Multilingual Education in Linguistically Diverse Contexts (MELDC18) Conference, University of Malta.

Gómez Carrero, T., Fernández Fuertes, R., & Martínez, A. (2019, January 9). *English-Spanish code-switching in Gibraltar: Testing formal proposals via production data.*

[Poster]. Bilingualism in the Hispanic and Lusophone World (BHL), University of Leiden, The Netherlands.

Gómez Carrero, T., Fernández Fuertes, R., Martínez, A., & Liceras, J. M. (2019a, April 4). *Gender patterns in 2L1 and L2 English-Spanish bilingual grammars: The Spain-Gibraltar connection* [Presentation]. Uniting Gender Research Workshop, The Arctic University of Norway (Tromso, Norway).

Gómez Carrero, T., Fernández Fuertes, R., Martínez, A., & Liceras, J. M. (2019b, August 27). *Codeswitching in Spain and Gibraltar: Gender in the spotlight.* [Poster]. International Symposium on Monolingual and Bilingual Speech, Great Arsenali Conference Center, Chania (Greece).

González-Vilbazo, K. (2005). *Die Syntax des Code-Switching* [Unpublished dissertation]. University of Cologne.

González-Vilbazo, K., Bartlett, L., Downey, S., Ebert, S., Heil, J., Hoot, B., Koronkiewicz, B., & Ramos, S. (2013). Methodological considerations in code-switching research. *Studies in Hispanic and Lusophone Linguistics*, *6*(1), 119–138. https://doi.org/10.1515/shll-2013-1143

González-Vilbazo, K., & Koronkiewicz, B. (2016). Tú y yo can codeswitch, nosotros cannot: Pronouns in Spanish-English codeswitching. In R. E. Guzzardo Tamargo, C. M. Mazak, & M. C. Parafita Couto (Eds.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 11, pp. 237–260). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.11.10gon

González-Vilbazo, K., & López, L. (2011). Some properties of light verbs in code-switching. *Lingua*, *121*(5), 832–850. https://doi.org/10.1016/j.lingua.2010.11.011

Grimstad, M. B., Lohndal, T., & Åfarli, T. A. (2015). Language mixing and exoskeletal theory: A case study of word-internal mixing in American Norwegian. *Nordlyd*, *41*(2), 213. https://doi.org/10.7557/12.3413

Grimstad, M. B., Riksem, B. R., Lohndal, T., & Åfarli, T. A. (2018). Lexicalist vs. Exoskeletal approaches to language mixing. *The Linguistic Review*, *0*(0). https://doi.org/10.1515/tlr-2017-0022

Grosjean, F. (1982). *Life with two languages: An introduction to bilingualism* (11. print). Harvard Univ. Press.

Grosjean, F. (1989). Neurolinguists, beware! The bilingual is not two monolinguals in one person. *Brain and Language*, *36*(1), 3–15. https://doi.org/10.1016/0093-934X(89)90048-5

Gullberg, M., Indefrey, P., & Muysken, P. (2009). Research techniques for the study of code-switching. In B. E. Bullock & A. J. Toribio (Eds.), *The Cambridge Handbook of Linguistic Code-switching* (pp. 21–39). Cambridge University Press. https://doi.org/10.1017/CBO9780511576331.003

Gullifer, J., Kroll, J. F., & Dussias, P. E. (2013). When language switching has no apparent cost: Lexical access in sentence context. *Frontiers in Psychology*, *4*(278). https://doi.org/10.3389/fpsyg.2013.00278

Gumperz, J. J. (1982). *Discourse strategies*. Cambridge University Press.

Gumperz, J. J., & Hernández-Chávez, E. (1971). Cognitive aspects of bilingual communication. In W. H. Whitely (Ed.), *Language and social change: Problems of multilingualism with special reference to Eastern Africa.* (pp. 111–125). Oxford University Press.

Guzzardo Tamargo, R. E., Valdés Kroff, J. R., & Dussias, P. E. (2016). Examining the relationship between comprehension and production processes in code-switched language. *Journal of Memory and Language*, *89*, 138–161. https://doi.org/10.1016/j.jml.2015.12.002

Halle, M. (1997). Distributed Morphology: Impoverishment and fission. *MIT Working Papers in Linguistics*, *30*, 425–449.

Halle, M., & Marantz, A. (1993). Distributed Morphology and the pieces of inflection. In K. Hale & J. Keyser (Eds.), *The view from building 20* (pp. 111–176). The MIT Press.

Harris, J. W. (1991). The exponence of gender in Spanish. *Linguistic Inquiry*, *22*(1), 37.

Haugen, E. (1953). *The Norwegian language in America: A study in bilingual behavior.: Vol. I: The bilingual community; Vol. II:The American dialects of Norwegian*. Indiana University Press.

Herring, J. R., Deuchar, M., Couto, M. C. P., & Quintanilla, M. M. (2010). 'I saw the *madre* ': Evaluating predictions about codeswitched determiner-noun sequences using Spanish–English and Welsh–English data. *International Journal of Bilingual Education and Bilingualism*, *13*(5), 553–573. https://doi.org/10.1080/13670050.2010.488286

Hok-Shing Chan, B. (2003). *Aspects of the syntax, the pragmatics, and the production of code-switching*. Peter Lang.

Huettig, F., & McQueen, J. M. (2007). The tug of war between phonological, semantic and shape information in language-mediated visual search. *Journal of Memory and Language*, *57*(4), 460–482. https://doi.org/10.1016/j.jml.2007.02.001

Huettig, F., Rommers, J., & Meyer, A. S. (2011). Using the visual world paradigm to study language processing: A review and critical evaluation. *Acta Psychologica*, *137*(2), 151–171. https://doi.org/10.1016/j.actpsy.2010.11.003

Iriondo, A. (2017). *Kode-alternantzia elebidun gazteetan: DS nahasiak*. https://doi.org/10.1387/gogoa.18646

Jake, J. L., Myers-Scotton, C., & Gross, S. (2002). Making a minimalist approach to codeswitching work: Adding the Matrix Language. *Bilingualism: Language and Cognition*, *5*(01). https://doi.org/10.1017/S1366728902000147

Jansen, V., Müller, J., & Müller, N. (2012). Code-switching between an OV and a VO language: Evidence from German-Italian, German-French and German-Spanish children. *Linguistic Approaches to Bilingualism*, *2*(4), 337–378. https://doi.org/10.1075/lab.2.4.01jan

Jorschick, L., Endesfelder Quick, A., Glässer, D., Lieven, E., & Tomasello, M. (2011). German–English-speaking children's mixed NPs with 'correct' agreement. *Bilingualism: Language and Cognition*, *14*(2), 173–183. https://doi.org/10.1017/S1366728910000131

Joshi, A. (1985). Processing of sentences with intrasentential code switching. In D. R. Dowty, L. Karttunen, & A. M. Zwicky (Eds.), *Natural language parsing: Psychological, computational and theoretical perspectives* (pp. 190–205). Cambridge University Press.

Kihm, A. (2005). Noun class, gender and the lexicon–syntax interface: A comparative study of Niger-Congo and Romance languages. In G. Cinque & R. S. Kayne (Eds.), *The Oxford Handbook of Comparative Syntax*. Blackwell.

Klassen, R., & Liceras, J. M. (2017). The representation of gender in the mind of Spanish-English bilinguals: Insights from code-switched Adjectival Predicates. *Borealis – An International Journal of Hispanic Linguistics*, *6*(1), 77. https://doi.org/10.7557/1.6.1.4100

Kootstra, G. J. (2015). A psycholinguistic perspective on code-switching: Lexical, structural, and socio-interactive processes. In G. Stell & K. Yakpo (Eds.), *Code-switching Between Structural and Sociolinguistic Perspectives*. DE GRUYTER. https://doi.org/10.1515/9783110346879.39

Kootstra, G. J., Hell, J. G. V., & Dijkstra, T. (2012). Priming of code-switches in sentences: The role of lexical repetition, cognates, and language proficiency*. *Bilingualism: Language and Cognition*, *15*(4), 797–819. https://doi.org/10.1017/S136672891100068X

Koronkiewicz, B. (2014). *Pronoun categorization: Evidence from Spanish/English code-switching* [Unpublished dissertation]. University of Illinois at Chicago.

Koronkiewicz, B. (2018). Acquiring L1-english L2-spanish code-switching: The role of exposure to language mixing. *Languages*, *3*(3), 26. https://doi.org/10.3390/languages3030026

Koronkiewicz, B. (2020). Subject-predicate code-switching: Testing the need of a matrix language through embedding. In A. Morales-Front, M. J. Ferreira, R. P. Leow, & C. Sanz (Eds.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 26, pp. 250–264). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.26.12kor

Kramer, R. (2015). *The morphosyntax of gender* (1st ed). Oxford University Press.

Królikowska, M., Bierings, E., Beatty-Martínez, A., Navarro-Torres, C. A., Dussias, P., & Parafita Couto, M. del C. (2019). *Gender-assignment strategies within the bilingual determiner phrase: Four Spanish-English communities examined* [Poster]. 3rd Conference on Bilingualism in the Hispanic and Lusophone World (BHL), Leiden, NL.

Kroll, J. F., & Bialystok, E. (2013). Understanding the consequences of bilingualism for language processing and cognition. *Journal of Cognitive Psychology*, *25*(5), 497–514. https://doi.org/10.1080/20445911.2013.799170

Kroll, J. F., Bobb, S. C., & Wodniecka, Z. (2006). Language selectivity is the exception, not the rule: Arguments against a fixed locus of language selection in bilingual speech. *Bilingualism: Language and Cognition*, *9*, 119–135. https://doi.org/10.1017/S1366728906002483

Kroll, J. F., Dussias, P. E., Bice, K., & Perrotti, L. (2015). Bilingualism, mind, and brain. *Annual Review of Linguistics*, *1*(1), 377–394. https://doi.org/10.1146/annurev-linguist-030514-124937

Kroll, J. F., Dussias, P. E., Bogulski, C. A., & Valdés Kroff, J. R. (2012). Juggling two languages in one mind. In *Psychology of Learning and Motivation* (Vol. 56, pp. 229–262). Elsevier. https://doi.org/10.1016/B978-0-12-394393-4.00007-8

Kroll, J. F., & Gollan, T. H. (2014). Speech planning in two languages: What bilinguals tell us about language production. In *The Oxford Handbook of Language Production* (pp. 165–181). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199735471.001.0001

Kroll, J. F., Gullifer, J., & Zirnstein, M. (2016). Literacy in adulthood: Reading in two languages. In E. Nicoladis & S. Montanari (Eds.), *Bilingualism across the lifespan: Factors moderating language proficiency.* (pp. 225–245). American Psychological Association. https://doi.org/10.1037/14939-013

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, *82*, 1–26. https://doi.org/10.18637/jss.v082.i13

Lenth, R. V. (2022). *emmeans: Estimated marginal means, aka least-squares means* (1.8.4-1). https://CRAN.R-project.org/package=emmeans

Leung, J. H. C., & Williams, J. N. (2011). The implicit learning of mappings between forms and contextually derived meanings. *Studies in Second Language Acquisition*, *33*(1), 33–55. https://doi.org/10.1017/S0272263110000525

Liceras, J. M., & Fernández Fuertes, R. (2018, January 15). *Formal constraints on code-switching: GFSH and gender valuation in spontaneous and experimental child data* [Presentation]. Key Debates in Code-Switching Research: Methodological and Theoretical Considerations, Lorentz Center, Universiteit Leiden, The Netherlands.

Liceras, J. M., Fernández Fuertes, R., & Klassen, R. (2016). Language dominance and language nativeness: The view from English-Spanish codeswitching. In R. E. Guzzardo Tamargo, C. M. Mazak, & M. C. Parafita Couto (Eds.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 11, pp. 107–138). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.11.05lic

Liceras, J. M., Fernández Fuertes, R., & Klassen, R. (2017). *Linguistic theory and code-switching data: Feature matching restrictions…and beyond.'* [Presentation]. Bilingualism in the Hispanic and Lusophone World, Florida State University.

Liceras, J. M., Fernández Fuertes, R., Perales, S., Pérez-Tattam, R., & Spradlin, K. T. (2008). Gender and gender agreement in bilingual native and non-native grammars: A view from child and adult functional–lexical mixings. *Lingua*, *118*(6), 827–851. https://doi.org/10.1016/j.lingua.2007.05.006

Liceras, J. M., & García-Alcaraz, E. (2019). Grammatical gender in atypical language development: A case study on the interpretation and production of sentence internal codeswitching by an English–Spanish bilingual with Prader–Willi Syndrome. *Journal of Monolingual and Bilingual Speech*, *1*(2). https://doi.org/10.1558/jmbs.v1i2.11878

Liceras, J. M., Spradlin, K. T., & Fernández Fuertes, R. (2005). Bilingual early functional-lexical mixing and the activation of formal features. *International Journal of Bilingualism*, *9*(2), 227–252. https://doi.org/10.1177/13670069050090020601

Lindholm, K. J., & Padilla, A. M. (1978). Language mixing in bilingual children. *Journal of Child Language*, *5*(2), 327–335. https://doi.org/10.1017/S0305000900007509

Lipski, J. M. (1978). Code-switching and the problem of bilingual competence. In M. Paradis (Ed.), *Aspects of bilingualism* (pp. 250–264). Hornbeam Press.

Lipski, J. M. (1985). *Linguistic aspects of Spanish–English language switching*. Center of Latin American Studies, Arizona State University.

Litcofsky, K. A., & Van Hell, J. G. (2017). Switching direction affects switching costs: Behavioral, ERP and time-frequency analyses of intra-sentential codeswitching. *Neuropsychologia*, *97*, 112–139. https://doi.org/10.1016/j.neuropsychologia.2017.02.002

López, L. (2018). Introduction: Theory and methodology in code-switching research. In L. López (Ed.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 19, pp. 1–14). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.19.01lop

López, L. (2020). *Bilingual grammar: Toward an integrated model* (1st ed.). Cambridge University Press. https://doi.org/10.1017/9781108756181

Mackey, A., & Gass, S. M. (Eds.). (2012). *Research methods in second language acquisition: A practical guide* (1st ed). Wiley-Blackwell.

Mackey, A., & Gass, S. M. (2016). *Second language research: Methodology and design* (2nd ed.). Routledge.

MacSwan, J. (1999). *A minimalist approach to intrasentential codeswitching*. Garland Publishing, Inc.

MacSwan, J. (2000). The architecture of the bilingual language faculty: Evidence from intrasentential code switching. *Bilingualism: Language and Cognition*, *3*(1), 37–54. https://doi.org/10.1017/S1366728900000122

MacSwan, J. (2005). Codeswitching and generative grammar: A critique of the MLF model and some remarks on "modified minimalism." *Bilingualism: Language and Cognition*, *8*(1), 1–22. https://doi.org/10.1017/S1366728904002068

MacSwan, J. (2009). Generative approaches to code-switching. In B. Bullock & A. J. Toribio (Eds.), *The Cambridge Handbook of Linguistic Code-Switching* (pp. 309–335). 10.1017/CBO9780511576331.019

MacSwan, J. (2013). Code-switching and grammatical theory. In T. K. Bhatia & W. C. Ritchie (Eds.), *The Handbook of Bilingualism and Multilingualism* (2nd edition, pp. 321–350). Wiley. https://doi.org/10.1002/9781118332382.ch13

MacSwan, J. (2014). Programs and proposals in codeswitching research: Unconstraining theories of bilingual language mixing. In J. MacSwan (Ed.), *Grammatical Theory and Bilingual Codeswitching* (pp. 1–34). The MIT Press.

MacSwan, J., & McAlister, K. T. (2010). Naturalistic and elicited data in grammatical studies of codeswitching. *Studies in Hispanic and Lusophone Linguistics*, *3*(2), 521–532. https://doi.org/10.1515/shll-2010-1085

MacWhinney, B. (2005). A unified model of language acquisition. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of Bilingualism: Psycholinguistic Approaches* (pp. 49–67). Oxford University Press.

Mahootian, S. (1993). *A null theory of codeswitching* [Unpublished dissertation]. Northwestern University.

Marian, V., & Spivey, M. (2003). Bilingual and monolingual processing of competing lexical items. *Applied Psycholinguistics*, *24*(2), 173–193. https://doi.org/10.1017/S0142716403000092

Marinis, T. (2010). Using on-line processing methods in language acquisition research. In E. Blom & S. Unsworth (Eds.), *Language Learning & Language Teaching* (Vol. 27, pp. 139–162). John Benjamins Pub. Co. https://doi.org/10.1075/lllt.27.09mar

McDaniel, D., McKee, C., & Cairns, H. S. (1996). *Methods for assessing children's syntax*. MIT Press.

McKinstry, H. E. (1930). The American language in Mexico. *American Mercury*, *19*, 336–338.

Meuter, R. F. I., & Allport, A. (1999). Bilingual language switching in naming: Asymmetrical costs of language selection. *Journal of Memory and Language*, *40*(1), 25–40. https://doi.org/10.1006/jmla.1998.2602

Miccio, A. W., Hammer, C. S., & Rodríguez, B. (2009). Code-switching and language disorders in bilingual children. In *The Cambridge Handbook of Linguistic Code-switching* (pp. 241–252). Cambridge University Press. https://doi.org/10.1017/CBO9780511576331.015

Milroy, L., & Muysken, P. (Eds.). (1995). *One speaker, two languages: Cross-disciplinary perspectives on code-switching* (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511620867

Montes-Alcalá, C. (2001). Written codeswitching: Powerful bilingual images. In R. Jacobson (Ed.), *Codeswitching Worldwide, II* (pp. 193–220). De Gruyter Mouton. https://doi.org/10.1515/9783110808742.193

Montes-Alcalá, C. (2007). Blogging in two languages: Code-switching in bilingual blogs. In J. Holmquist, A. Lorenzino, & L. Sayahi (Eds.), *Selected Proceedings of the Third Workshop on Spanish Sociolinguistics* (pp. 162–170). Cascadilla Proceedings Project.

Montes-Alcalá, C., & Lapidus Shin, N. (2011). *Las keys* versus *el key*: Feminine gender assignment in mixed-language texts. *Spanish in Context*, *8*(1), 119–143. https://doi.org/10.1075/sic.8.1.06mon

Moreno, E. M., Federmeier, K. D., & Kutas, M. (2002). Switching languages, switching palabras (words): An electrophysiological study of code switching. *Brain and Language*, *80*(2), 188–207. https://doi.org/10.1006/brln.2001.2588

Morgan-Short, K., Sanz, C., Steinhauer, K., & Ullman, M. T. (2010). Second language acquisition of gender agreement in explicit and implicit training conditions: An

event-related potential study. *Language Learning*, *60*(1), 154–193. https://doi.org/10.1111/j.1467-9922.2009.00554.x

Moro Quintanilla, M. (2014). The semantic interpretation and syntactic distribution of determiner phrases in Spanish-English codeswitching. In J. MacSwan (Ed.), *Grammatical Theory and Bilingual Codeswitching* (pp. 213–226). The MIT Press.

Moro Quintanilla, M. (2016). El programa minimalista y los adjetivos modificadores del nombre en la alternancia lingüística español-inglés. *Revista Electrónica de Lingüística Aplicada*, *15*(1), 21–35. https://rael.aesla.org.es/index.php/RAEL/article/view/46

Moyer, M. G. (1992). *Analysis of code-switching in Gibraltar* [Unpublished dissertation]. Universidad Autónoma de Barcelona.

Munarriz-Ibarrola, A., Ezeizabarrena, M.-J., Arrazola, V. D., & Parafita Couto, M. C. (2021). Gender assignment strategies and L1 effects in the elicited production of mixed Spanish-Basque DPs. *Linguistic Approaches to Bilingualism*. https://doi.org/10.1075/lab.20016.mun

Muysken, P. (2000). *Bilingual speech: A typology of code-mixing*. Cambridge University Press.

Myers-Scotton, C. (1993). *Duelling languages: Grammatical structure in codeswitching* (1st edition). Oxford University Press.

Myers-Scotton, C. (1995). A lexically based model of code-switching. In L. Milroy & P. Muysken (Eds.), *One Speaker, Two Languages* (1st ed., pp. 233–256). Cambridge University Press. https://doi.org/10.1017/CBO9780511620867.011

Myers-Scotton, C. (1997). *Duelling languages: Grammatical structure in codeswitching* (2nd edition). Oxford University Press.

Myers-Scotton, C. (2002). *Contact linguistics: Bilingual encounters and grammatical outcomes*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198299530.001.0001

Myers-Scotton, C. (2006). *Multiple voices: An introduction to bilingualism*. Blackwell Pub.

Myers-Scotton, C., & Jake, J. L. (2000a). Four types of morpheme: Evidence from aphasia, code switching, and second-language acquisition. *Linguistics*, *38*(6). https://doi.org/10.1515/ling.2000.021

Myers-Scotton, C., & Jake, J. L. (2000b). Testing the 4-M model: An introduction. *International Journal of Bilingualism*, *4*(1), 1–8. https://doi.org/10.1177/13670069000040010101

Myers-Scotton, C., & Jake, J. L. (2001). Explaining aspects of codeswitching and their implications. In J. Nicol (Ed.), *One mind, two languages: Bilingual language processing* (pp. 84–116). Blackwell Publishers, Inc.

Myers-Scotton, C., & Jake, J. L. (2009). A universal model of code-switching and bilingual language processing and production. In B. E. Bullock & A. J. Toribio (Eds.), *The Cambridge Handbook of Linguistic Code-switching* (pp. 336–357). Cambridge University Press. https://doi.org/10.1017/CBO9780511576331.020

Myers-Scotton, C., & Jake, J. L. (2017). Revisiting the 4-M model: Codeswitching and morpheme election at the abstract level. *International Journal of Bilingualism*, *21*(3), 340–366. https://doi.org/10.1177/1367006915626588

Olson, D. J. (2016). The impact of code-switching, language context, and language dominance on suprasegmental phonetics: Evidence for the role of predictability. *International Journal of Bilingualism*, *20*(4), 453–472. https://doi.org/10.1177/1367006914566204

Otheguy, R. (2011). Functional adaptation and conceptual convergence in the analysis of language contact in the Spanish of bilingual communities in New York. In *The Handbook of Hispanic Sociolinguistics* (pp. 504–529). Blackwell Publishing Ltd. https://doi.org/10.1002/9781444393446.ch24

Otheguy, R., & Lapidus Shin, N. (2003). An adaptive approach to noun gender in New York contact Spanish. In R. Núñez-Cedeño, L. López, & R. Cameron (Eds.), *Current Issues in Linguistic Theory* (Vol. 238, p. 209). John Benjamins Publishing Company. https://doi.org/10.1075/cilt.238.17oth

Pablos, L., Parafita Couto, M. C., Boutonnet, B., de Jong, A., Perquin, M., de Haan, A., & Schiller, N. O. (2019). Adjective-noun order in Papiamento-Dutch code-switching. *Linguistic Approaches to Bilingualism*, *9*(4–5), 710–735. https://doi.org/10.1075/lab.17036.pab

Parafita Couto, M. C., & Gullberg, M. (2019). Code-switching within the noun phrase: Evidence from three corpora. *International Journal of Bilingualism*, *23*(2), 695–714. https://doi.org/10.1177/1367006917729543

Parafita Couto, M. C., Munarriz, A., Epelde, I., Deuchar, M., & Oyharçabal, B. (2015). Gender conflict resolution in Spanish–Basque mixed DPs. *Bilingualism: Language and Cognition*, *18*(2), 304–323. https://doi.org/10.1017/S136672891400011X

Parafita Couto, M. C., & Rodríguez-González, E. (2019). Do all bilinguals switch the same way? Testing patterns of non-habitual Spanish-English code-switchers. In E. Pandis Pavlakis, H. Symeonidis, P. Chandler, M. Tsokou, & K. Viktoria (Eds.), *Espacios en evolución: Confluencias lingüísticas y culturales* (p. 23). Ediciones del Orto.

Parafita Couto, M. C., & Stadthagen-Gonzalez, H. (2019). *El book* or *the libro*? Insights from acceptability judgments into determiner/noun code-switches. *International Journal of Bilingualism*, *23*(1), 349–360. https://doi.org/10.1177/1367006917728392

Pesetsky, D., & Torrego, E. (2001). T-to-C Movement: Causes and consequences. In M. Kenstowicz (Ed.), *Ken Hale: A life in language* (pp. 355–426). The MIT Press. https://doi.org/10.7551/mitpress/4056.001.0001

Pesetsky, D., & Torrego, E. (2007). The syntax of valuation and the interpretability of features. In S. Karimi, V. Samiian, & W. K. Wilkins (Eds.), *Phrasal and Clausal Architecture* (pp. 262-294). Amsterdam: John Benjamins

Pfaff, C. W. (1979). Constraints on language mixing: Intrasentential code-switching and borrowing in Spanish/English. *Language*, *55*(2), 291. https://doi.org/10.2307/412586

Poeste, M., Müller, N., & Arnaus Gil, L. (2019). Code-mixing and language dominance: Bilingual, trilingual and multilingual children compared. *International Journal of Multilingualism*, *16*(4), 459–491. https://doi.org/10.1080/14790718.2019.1569017

Poplack, S. (1980). Sometimes I'll start a sentence in Spanish y termino en español: Toward a typology of code-switching. *Linguistics*, *18*(7–8), 581–618. https://doi.org/10.1515/ling.1980.18.7-8.581

Poplack, S. (1981). The syntactic structure and social function of code-switching. In R. P. Durán (Ed.), *Latino language and communicative behavior* (pp. 169–184). Ablex.

Poplack, S. (1988). Contrasting patterns of codeswitching in two communities. In M. Heller (Ed.), *Codeswitching: Anthropological and sociolinguistic perspectives* (Vol.

48, pp. 215–244). De Gruyter Mouton. https://doi.org/10.1515/9783110849615.215

Quick, A. E., Lieven, E., & Tomasello, M. (2016). Mixed NPs in German-English and German-Russian bilingual children. In M. Reif & J. A. Robinson (Eds.), *Cognitive Perspectives on Bilingualism* (pp. 127–146). De Gruyter Mouton. https://doi.org/10.1515/9781614514190-008

R Core Team. (2021). *R: A language and environment for statistical computing.* R Foundation for Statistical Computing. https://www.R-project.org/

Radford, A., Kupisch, T., Köppe, R., & Azzaro, G. (2007). Concord, convergence and accommodation in bilingual children. *Bilingualism: Language and Cognition*, *10*(3), 239–256. https://doi.org/10.1017/S1366728907003057

Ramírez Urbaneja, D. (2020). "¿*Tú tienes una* little pumpkin?" Mixed noun phrases in Spanish-English bilingual children and adults. *International Journal of Bilingualism*, *24*(4), 824–839. https://doi.org/10.1177/1367006919888580

Rayner, K. (1993). Eye movements in reading: Recent developments. *Current Directions in Psychological Science*, *2*(3), 81–86. https://doi.org/10.1111/1467-8721.ep10770940

Rayner, K. (2009). Eye movements and attention in reading, scene perception, and visual search. *Quarterly Journal of Experimental Psychology (2006)*, *62*(8), 1457–1506. https://doi.org/10.1080/17470210902816461

Riksem, B. R. (2018). Language mixing in American Norwegian noun phrases. *Journal of Language Contact*, *11*(3), 481–524. https://doi.org/10.1163/19552629-01103005

Roca, I. M. (1989). The organisation of grammatical gender. *Transactions of the Philological Society*, *87*(1), 1–32. https://doi.org/10.1111/j.1467-968X.1989.tb00617.x

Roca, I. M. (2005a). La gramática y la biología en el género del español (1ª parte). *Revista Española de Lingüística*, *35*(1), 17–44.

Roca, I. M. (2005b). La gramática y la biología en el género del español (2ª parte). *Revista Española de Lingüística*, *35*(2), 397–432. https://doi.org/10.31810/RSEL.35.2

Sankoff, D., & Poplack, S. (1981). A formal grammar for code-switching. *Paper in Linguistics*, *14*(1), 3–45. https://doi.org/10.1080/08351818109370523

Schmitt, C., & Miller, K. (2010). Using comprehension methods in language acquisition research. In E. Blom & S. Unsworth (Eds.), *Language Learning & Language Teaching* (Vol. 27, pp. 35–56). John Benjamins Publishing Company. https://doi.org/10.1075/lllt.27.04sch

Spradlin, K. T., Liceras, J. M., & Fuertes, R. F. (2003). Functional-lexical code-mixing patterns as evidence for language dominance in young bilingual children. In J. M. Liceras (Ed.), *Proceedings of the 6th Generative Approaches to Second Language Acquisition Conference (GASLA 2002)* (pp. 298–307). Cascadilla Proceedings Project.

Stadthagen-González, H., López, L., Parafita Couto, M. C., & Párraga, C. A. (2018). Using two-alternative forced choice tasks and Thurstone's law of comparative judgments for code-switching research. *Linguistic Approaches to Bilingualism*, *8*(1), 67–97. https://doi.org/10.1075/lab.16030.sta

Stadthagen-González, H., Parafita Couto, M. C., Párraga, C. A., & Damian, M. F. (2019). Testing alternative theoretical accounts of code-switching: Insights from comparative judgments of adjective–noun order. *International Journal of Bilingualism*, *23*(1), 200–220. https://doi.org/10.1177/1367006917728390

Staub, A., & Rayner, K. (2007). Eye movements and on-line comprehension processes. In M. G. Gaskell (Ed.), *The Oxford Handbook of Psycholinguistics* (pp. 326–342). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198568971.013.0019

Swain, M. (1972). *Bilingualism as a first language* [Unpublished dissertation]. University of California.

Tanenhaus, M. K., Spivey-Knowlton, M. J., Eberhard, K. M., & Sedivy, J. C. (1995). Integration of visual and linguistic information in spoken language comprehension. *Science*, *268*(5217), 1632–1634. https://doi.org/10.1126/science.7777863

Timm, L. A. (1975). Spanish-English code-switching: El porqué y how-not-to. *Romance Philology*, *28*(4), 473–482.

Timm, L. A. (1978). Code switching in War and Peace. In M. Paradis (Ed.), *The Fourth LACUS Forum 1977* (Vol. 28, pp. 236–249). Hornbeam Press.

Tokowicz, N., & Perfetti, C. A. (2005). Introduction to part II: Comprehension. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of Bilingualism: Psycholinguistic Approaches* (pp. 173–177). Oxford University Press.

Toribio, A. J. (2001). On the emergence of bilingual code-switching competence. *Bilingualism: Language and Cognition*, *4*(3), 203–231. https://doi.org/10.1017/S1366728901000414

Toribio, A. J. (2011). Code-switching among US latinos. In *The Handbook of Hispanic Sociolinguistics* (pp. 530–552). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781444393446.ch25

Torres Cacoullos, R., & Travis, C. E. (2015). New Mexico Spanish–English bilingual (NMSEB) Corpus. *National Science Foundation 1019112/1019122*. http://nmcode-switching.la.psu.edu/

Torres Cacoullos, R., & Travis, C. E. (2016). Two languages, one effect: Structural priming in spontaneous code-switching. *Bilingualism: Language and Cognition*, *19*(4), 733–753. https://doi.org/10.1017/S1366728914000406

Treffers-Daller, J. (1994). *Mixing two languages: French-Dutch contact in a comparative perspective*. De Gruyter Mouton. https://doi.org/10.1515/9783110882230

Treffers-Daller, J., Ruigendijk, E., & Hofweber, J. (2021). Behavioral and neurophysiological approaches to code-Switching and language switching. *Frontiers in Psychology*, *12*, 660695. https://doi.org/10.3389/fpsyg.2021.660695

University of Cambridge Local Examination Syndicate. (2001). *Quick Placement Test*. Oxford University Press.

University of Cambridge Local Examination Syndicate. (2018). *Cambridge Young Learners Placement Test*.

Valdés Fallis, G. (1976). Social interaction and code-switching patterns: A case study of Spanish/English alternatives. *Bilingualism in the Bicentennial and Beyond*, 53–85.

Valdés Kroff, J. R. (2016). Mixed NPs in Spanish-English bilingual speech: Using a corpus-based approach to inform models of sentence processing. In R. E. Guzzardo Tamargo, C. M. Mazak, & M. C. Parafita Couto (Eds.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 11, pp. 281–300). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.11.12val

Valdés Kroff, J. R., Dussias, P. E., Gerfen, C., Perrotti, L., & Bajo, M. T. (2017). Experience with code-switching modulates the use of grammatical gender during sentence processing. *Linguistic Approaches to Bilingualism*, *7*(2), 163–198. https://doi.org/10.1075/lab.15010.val

Valdés Kroff, J. R., & Fernández-Duque, M. (2017). Experimentally inducing Spanish-English code-switching: A new conversation paradigm. In K. Bellamy, M. W. Child, P. González, A. Muntendam, & M. C. Parafita Couto (Eds.), *Issues in Hispanic and Lusophone Linguistics* (Vol. 13, pp. 211–231). John Benjamins Publishing Company. https://doi.org/10.1075/ihll.13.09val

Valdés Kroff, J. R., Román, P., & Dussias, P. E. (2020). Are all code-switches processed alike? Examining semantic v. language unexpectancy. *Frontiers in Psychology*, *11*, 2138. https://doi.org/10.3389/fpsyg.2020.02138

Valenzuela, E., Faure, A., Ramírez-Trujillo, A. P., Barski, E., Pangtay, Y., & Diez, A. (2012). Gender and heritage Spanish bilingual grammars: A Study of code-mixed determiner phrases and copula constructions. *Hispania*, *95*(3), 481–494.

Van Hell, J. G., & Dijkstra, T. (2002). Foreign language knowledge can influence native language performance in exclusively native contexts. *Psychonomic Bulletin & Review*, *4*(9), 780–789. https://doi.org/10.3758/BF03196335

van Hell, J. G., Fernandez, C. B., Kootstra, G. J., Litcofsky, K. A., & Ting, C. Y. (2018). Electrophysiological and experimental-behavioral approaches to the study of intra-sentential code-switching. *Linguistic Approaches to Bilingualism*, *8*(1), 134–161. https://doi.org/10.1075/lab.16010.van

Vanden Wyngaerd, E. (2017). The adjective in Dutch-French codeswitching: Word order and agreement. *International Journal of Bilingualism*, *21*(4), 454–473. https://doi.org/10.1177/1367006916632302

Vaughan-Evans, A., Parafita Couto, M. C., Boutonnet, B., Hoshino, N., Webb-Davies, P., Deuchar, M., & Thierry, G. (2020). Switchmate! An electrophysiological attempt to adjudicate between competing accounts of adjective-noun code-switching. *Frontiers in Psychology*, *11*, 549762. https://doi.org/10.3389/fpsyg.2020.549762

Vogt, H. (1954). Language contacts. *WORD*, *10*(2–3), 365–374. https://doi.org/10.1080/00437956.1954.11659533

Weinreich, U. (1953). *Languages in contact, findings and problems*. Linguistic Circle of New York.

Winter, B. (2020). *Statistics for Linguists: An Introduction Using R* (1st ed.). Routledge. https://doi.org/10.4324/9781315165547

Woolford, E. (1983). Bilingual code-switching and syntactic theory. *Journal of Linguistic Anthropology*, *8*(1), 3–29.

Zentella, A. C. (1981). *"Hablamos los dos. We speak both": Growing up bilingual in El Barrio* [Unpublished dissertation]. University of Pennsylvania.

Zentella, A. C. (1997). *Growing up bilingual: Puerto Rican children in New York*. Blackwell Publishers.