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**PROGRAMA DE DOCTORADO EN LENGUAS, TEXTOS Y
CONTEXTOS**

DOCTORAL THESIS

**L1 MORPHOSYNTACTIC ATTRITION AT THE
EARLY STAGES: EVIDENCE FROM PRODUCTION,
INTERPRETATION, AND PROCESSING
OF SUBJECT REFERRING EXPRESSIONS
IN L1 SPANISH-L2 ENGLISH INSTRUCTED AND
IMMERSED BILINGUALS**

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A mis padres, mi hermana, mi familia y mis amigos.

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Abstract

Research on bilingualism and second language acquisition has extensively investigated how a bilingual's first language (L1) influences their second language (L2). While there is ample evidence of L1 influence on the L2, there has been limited research on the opposite direction, specifically L2 to L1 influence within the context of L1 attrition. Most studies on L1 attrition, especially in morphosyntax, have focused on long-term immersed bilinguals who have lived in an L2-dominant naturalistic environment for an extended period of time (Chamorro, Sorace, et al., 2016; Gargiulo, 2020; Gürel, 2004; Kaltsa et al., 2015; Tsimpli et al., 2004). Consequently, a key question that has been largely overlooked is whether intensive instructed exposure to the L2 can also lead to attrition. The potential attrition effects on bilinguals exposed to the L2 in instructed contexts, even though limited research has suggested bidirectional influence in these bilinguals (Cook et al., 2003; Długosz, 2021; Requena & Berry, 2021), remains largely unknown. As a novelty of this dissertation, we will explore L1 attrition in L1 Spanish-L2 English bilinguals who receive frequent L2 exposure and use in formal instructed contexts and who live in an L1-dominant environment, i.e., Spain, and compare them with immersed bilinguals in a naturalistic setting. Additionally, previous research has focused on the later stages of L1 attrition (i.e., after prolonged exposure to the L2), thus leaving a gap on the early stages of L1 attrition, which, as Schmid and Cherciov (2019, p. 273) argue, has been ‘a period more often than not completely neglected by attrition studies’.

In order to fill that gap, special attention will be paid to the production, interpretation, and processing of subject referring expressions REs. In particular, we will pay attention to (null and overt) pronominal subjects and noun phrases (NPs), which are employed as a cohesive mechanism as they (can) corefer with an entity in prior discourse. Thus, reference management proves to be an essential and pervasive aspect of human communication. The importance of investigating subject REs also lies in the fact that they have been identified as a vulnerable domain in bilinguals, both in L2 acquisition and L1 attrition, as hypothesised by theories such as the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012; Sorace & Filiaci, 2006), the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007), and the Pragmatic Principles Violation Hypothesis (Lozano, 2016, 2018). Therefore, to fill gaps in the current literature, the aim of this thesis is to investigate the production, interpretation, and processing of 3rd person singular subject REs in two groups of advanced L1 Spanish-L2 English bilinguals, i.e.,

instructed and immersed bilinguals, who will be compared against Spanish functional monolinguals. Thus, data from the same participants and from different domains will be triangulated.

Data from 207 L1 Spanish-L2 English participants (33 functional monolinguals, 80 advanced instructed bilinguals in Spain, and 94 immersed bilinguals in the UK) were collected. The participants completed three methodologically distinct tasks: two naturalistic production tasks (corpus-based oral video-retelling tasks), an offline experimental task (a picture selection task that measured interpretation preferences), and an online experimental task (a self-paced reading task that measured reaction time in milliseconds). While the two production tasks explored the distribution of 3rd person singular subject REs in topic continuity (TC) contexts as a vulnerable domain in bilinguals (Lozano, 2009; Martín-Villena & Lozano, 2020), the interpretation and processing tasks tested the predictions from the Position of Antecedent Strategy (Carminati, 2002), which claims that null pronouns tend to select subject antecedents and overt pronouns tend to bias towards object antecedents. In addition, a background questionnaire, the *Bilingual Language Profile* (Birdsong et al., 2012) was used to collect data and provided a continuous dominance score for each participant, as well as a working memory task, and a placement test. The production tasks analysed all 3rd person subject REs (N = 9225) in TC and used a fine-grained tagset implemented in the *UAM Corpus Tool* (O'Donnell, 2009) and the results were reported using χ^2 statistics. Both the picture selection and self-paced reading tasks were modelled after Tsimpli et al. (2004) and Kaltsa et al. (2015), respectively, and were analysed using (generalised) linear mixed-effect models in R (Bates et al., 2015). The analysis included all relevant fixed effects as well as their interactions and the random-effect structure that was allowed by the design (Barr et al., 2013).

The results from the two corpus-based production tasks showed that advanced L1 Spanish-L2 English bilinguals significantly produced more pragmatically infelicitous overt subject REs (both overt pronouns and NPs) in TC than functional monolinguals overall, with significant differences between the two bilingual groups. These differences were exclusively attested in the most cognitively demanding task, that is, Task 2, as it included several same-gender and different-gender antecedents. Additionally, the results from the picture selection task indicate that 1) the two advanced bilingual groups differed from functional monolinguals only in the overt pronoun condition, and 2) that the more

L2-dominant instructed and immersed participants were as measured by the BLP, the more flexible their interpretation of the overt pronoun was, biasing more towards the subject (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015; Tsimpli et al., 2004). Finally, the results from the self-paced reading task evidence a lack of processing cost when overt pronouns are forced to bias towards subject antecedents in bilinguals, a finding that is not replicated in functional monolinguals. In sum, the findings support the predictions from the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012; Sorace & Filiaci, 2006), the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007), and the Pragmatic Principles Violation Hypothesis (Lozano, 2016, 2018). Notably, bilinguals have been shown to differ from functional monolinguals in the interpretation and processing of overt pronouns, arguably since they have an L2 competing element, in line with the ATH, and the former are comparatively more redundant in production so as to avoid potential ambiguity as predicted by the PPVH. Overall, these results shed new light on L1 attrition by exploring the overlooked initial stages of this phenomenon in immersed bilinguals by triangulating data from different domains (i.e., production, interpretation, and processing). The findings also provide new evidence of variability in the L1 of advanced instructed bilinguals, a population that has been under-researched within L1 attrition studies. Additionally, the results from this dissertation call for the use of continuous measures to investigate gradience in bilingualism to more subtly characterise variability in bilinguals leaving aside dichotomous characterisations which prevent the field from moving forward.

Resumen

La investigación sobre el bilingüismo y la adquisición de segundas lenguas ha estudiado en profundidad cómo la primera lengua (L1) de un bilingüe influye en su segunda lengua (L2). Si bien existe amplia evidencia de la influencia de la L1 en la L2, la investigación en la dirección opuesta ha sido limitada, concretamente la influencia de la L2 en la L1 en el contexto de la atrición de la L1. La mayoría de los estudios sobre la atrición de la L1, especialmente en morfosintaxis, se han centrado en bilingües inmersos que han vivido en un entorno con predominio de la L2 durante un largo periodo de tiempo (Chamorro, Sorace, et al., 2016; Gargiulo, 2020; Gürel, 2004; Kaltsa et al., 2015; Tsimpli et al., 2004). En consecuencia, una pregunta esencial que ha sido poco estudiada ha sido si la exposición intensiva en un contexto formal también puede propiciar efectos de atrición en la L1. Estos posibles efectos de la atrición en bilingües expuestos a la L2 en contextos instruidos, a pesar de que investigaciones limitadas han sugerido una influencia bidireccional en estos bilingües (Cook et al., 2003; Długosz, 2021; Requena & Berry, 2021), siguen siendo en gran medida desconocidos. Como novedad de esta tesis, exploraremos la atrición de la L1 en bilingües L1 español-L2 inglés que reciben una exposición y uso frecuente de la L2 en contextos formales instruidos y que viven en un entorno donde predomina la L1, es decir, España, y los compararemos con bilingües inmersos en un entorno de inmersión. Sin embargo, los estudios anteriores han investigado principalmente a bilingües que han recibido una exposición intensiva y extensiva a la L2 en contextos de inmersión, dejando un vacío en la investigación sobre las primeras etapas de la atrición de la L1, que, como afirman Schmid y Cherciov (2019, p. 273), ha sido "un período la mayoría de las veces completamente descuidado por los estudios de atrición".

Para ello, se prestará especial atención a la producción, interpretación y procesamiento de las expresiones referenciales de sujeto (ERs). En particular, nos centraremos en pronombres (nulos y explícitos) de sujeto y sintagmas nominales, que se emplean como mecanismo cohesivo, ya que (pueden) referirse a una entidad en el discurso previo, lo que hace que el mantenimiento de la referencia sea un aspecto esencial y omnipresente de la comunicación humana. La importancia de investigar las ERs de sujeto también radica en que han sido identificados como un dominio vulnerable en la atrición de la L1, según la hipótesis de teorías como la Hipótesis de la Interfaz (Chamorro & Sorace, 2019; Sorace, 2011, 2012; Sorace & Filiaci, 2006), la Hipótesis del Umbral de

Activación (Paradis, 1993, 2004, 2007) y la Hipótesis de la Violación de los Principios Pragmáticos (Lozano, 2016, 2018). Por lo tanto, para llenar vacíos en la literatura actual, el objetivo de esta tesis es investigar la triangulación de la producción, interpretación y procesamiento de ERs de sujeto en 3ª persona singular en dos grupos de bilingües avanzados L1 español-L2 inglés, es decir, bilingües instruidos e inmersos, que serán comparados contra monolingües funcionales españoles.

Se recogieron datos de 207 participantes (33 monolingües funcionales, 80 bilingües avanzados instruidos en España y 94 bilingües inmersos en Reino Unido). Los participantes completaron tres tareas: dos tareas orales de narración basadas en corpus, una tarea offline de selección de imágenes y una tarea online de lectura autodirigida. Mientras que las dos tareas de producción exploraron la distribución de ERs de sujeto singular de 3ª persona en contextos de continuidad de tópico (CT) como dominio vulnerable en bilingües (Lozano, 2009; Martín-Villena & Lozano, 2020), las tareas de interpretación y procesamiento comprobaron las predicciones de la Hipótesis de la Posición del Antecedente (Carminati, 2002), que afirma que los pronombres nulos tienden a seleccionar antecedentes de sujeto y los pronombres manifiestos tienden a sesgar hacia antecedentes de objeto. Además, se utilizó un cuestionario de antecedentes, el *Bilingual Language Profile* (Birdsong et al., 2012) para recopilar datos y proporcionó una puntuación continua de dominancia para cada participante, así como una tarea de memoria de trabajo y una prueba de nivel. En las tareas de producción se analizaron todas las ERs de sujeto en tercera persona (N = 9225) en CT y se utilizó un conjunto de etiquetas de grano fino implementado en la herramienta de corpus *UAM Corpus Tool* (O'Donnell, 2009) y los resultados se obtuvieron utilizando χ^2 . Tanto las tareas de selección de imágenes como las de lectura autodirigida se modelaron según Tsimpli et al. (2004) y Kaltsa et al. (2015), respectivamente, y se analizaron mediante modelos lineales (generalizados) de efectos mixtos en R (Bates et al., 2015). El análisis incluyó todos los efectos fijos pertinentes, así como sus interacciones y la estructura de efectos aleatorios que permitía el diseño (Barr et al., 2013).

Los resultados de las dos tareas de producción basadas en corpus mostraron que los bilingües avanzados L1 español-L2 inglés produjeron significativamente más ERs explícitas (tanto pronombres explícitos como sintagmas nominales) que los monolingües funcionales en CT en general, con diferencias significativas entre los dos grupos bilingües. Estas diferencias se atestiguaron exclusivamente en la tarea más exigente desde

el punto de vista cognitivo, es decir, la Tarea 2, ya que incluía varios antecedentes del mismo género y distinto género. Además, los resultados de la tarea de selección de imágenes indican que 1) los dos grupos bilingües avanzados se diferenciaron de los monolingües funcionales solo en la condición de pronombre explícito, y 2) que cuanto dominantes en la L2 eran los bilingües, medido por el *BLP*, más flexible era su interpretación del pronombre explícito, sesgándose más hacia el sujeto (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015; Tsimpli et al., 2004). Por último, los resultados de la tarea de lectura autodirigida evidencian una falta de coste de procesamiento cuando se fuerza a los pronombres manifiestos a sesgarse hacia los antecedentes del sujeto en los bilingües, un hallazgo que no se replica en los monolingües funcionales. En suma, los hallazgos apoyan las predicciones de la Hipótesis de la Interfaz (Chamorro & Sorace, 2019; Sorace, 2011, 2012; Sorace & Filiaci, 2006), la Hipótesis del Umbral de Activación (Paradis, 1993, 2004, 2007) y la Hipótesis de la Violación de los Principios Pragmáticos (Lozano, 2016, 2018). En particular, se ha demostrado que los bilingües difieren de los monolingües funcionales en la interpretación y el procesamiento de los pronombres explícitos, podría decirse que debido a que tienen un elemento la L2 con el que compiten, en línea con la HUA, y los primeros son más redundantes en producción en un intento de evitar la ambigüedad potencial siguiendo las predicciones de la HVPP. En general, estos resultados arrojan nueva luz sobre la atrición de la L1 al explorar las etapas iniciales de este fenómeno en bilingües inmersos mediante la triangulación de datos de diferentes dominios (es decir, producción, interpretación y procesamiento). Estos resultados también proporcionan nuevas pruebas de la variabilidad en la L1 de bilingües instruidos, una población que ha sido poco investigada dentro de los estudios sobre la atrición de la L1. Además, los resultados de esta tesis hacen un llamamiento al uso de medidas continuas para investigar el bilingüismo y caracterizar de forma más detallada la variabilidad en los bilingües dejando de lado las caracterizaciones dicotómicas que impiden que el campo avance.

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List of abbreviations

AR	Anaphora resolution
ATH	Activation Threshold Hypothesis
BLP	Bilingual language profile
CEDEL2	Corpus Escrito del Español L2
CEFR	Common European Framework of Reference
CLIL	Content and language integrated learning
COREFL	Corpus of English as a Foreign Language
EMI	English as a Medium of Instruction
FSMC	Form-Specific Multiple-Constraints Approach
IH	Interface Hypothesis
L1	First language
L2	Second language
LoR	Length of residence
NP	Noun Phrase
OQPT	Oxford Quick Placement Test
PAS	Position of Antecedent Strategy
PPVH	Pragmatic Principles Violation Hypothesis
PST	Picture selection task
RE	Referring expression
SLA	Second Language Acquisition
SPR	Self-paced reading
TC	Topic continuity
WM	Working memory

CHAPTER 1. Introduction

The coexistence of two languages in the bilingual brain generally leads to bidirectional influence, i.e., from the first language (L1) to the second language (L2) and vice versa. Although most research in bilingualism has focused on L1 to L2 influence, and particularly on L2 outcomes, this thesis explores the opposite direction, i.e., L2 to L1 influence in two types of bilinguals differing in quality and quantity of L2 input, opportunities for output, and dominant environmental language. These outcomes have generally been explored in bilinguals within L1 attrition, understood in line with a wider definition of the concept provided by Schmid and Köpke (2017a), which encompasses both transient and permanent L1 changes along a continuum in bilinguals. Therefore, the present thesis is framed within the study of L1 morphosyntactic attrition in the wider context of bilingualism.

Following previous studies on L1 attrition, this thesis includes a group of L1 Spanish-L2 English immersed bilinguals where increased L1 variability has largely been attested in different domains (e.g., morphosyntax, lexicon, or pronunciation, to name but a few). Bilinguals living in an L2-dominant environment have largely been the focus of research on L1 attrition and particularly those that receive both intensive and extensive exposure to the L2 (Gürel, 2004; Schmid, 2019; Schmid & Köpke, 2017a, 2019; Tsimpli et al., 2004). However, this thesis will also explore a group of L1 Spanish-L2 English instructed bilinguals where the L1 and the L2 also coexist but who mainly receive L2 input through formal instruction in an L1-dominant environment. The comparison of the groups of immersed vs. instructed bilinguals is highlighted as one of the novelties of this dissertation. While previous studies have investigated potential changes in the L1 of instructed bilinguals (Cook et al., 2003; Długosz, 2021; Kecskes & Papp, 2003; Requena & Berry, 2021), these effects have been under-researched and underrepresented in L1 attrition studies. Including such group of bilinguals will make it possible to disentangle which variables can shape and account for L1 attrition.

Effects arising from bidirectional crosslinguistic influence (i.e., from the L1 to the L2 and vice versa) have been attested in different types of bilinguals. For instance, in simultaneous bilinguals, the two languages largely interact from birth and develop in parallel affecting each other. Sequential bilinguals, who learn the L2 roughly after the age of 3-4 (Houwer, 2009; Meisel, 2021), exhibit crosslinguistic influence when the L1 is already in a more developed state than the L2. The aim of this dissertation is to explore

L1 morphosyntactic attrition in two differentiated groups of adult sequential bilinguals who become highly proficient in the L2 when the L1 is generally fully developed. All bilinguals included in this dissertation have received L2 English formal instruction both at primary- and secondary-school levels. Nevertheless, while the immersed group continues to develop the L2 in an L2-dominant environment naturalistically (e.g., in the UK), the instructed group mainly receives L2 formal instruction at university in Spain through a degree taught in L2 English. Additionally, it is important to note that this dissertation pays particular attention to the early stages of L1 morphosyntactic attrition by including bilinguals who have been immersed in the L2 environment from 1 to 5 years, a period which has been widely neglected in morphosyntactic attrition research and hence, ‘to date there is extremely little evidence on how attrition may progress during those first years’ (Schmid, 2019, p. 292).

In line with the previous argument, another point that deserves attention relates to the exploration of the effect of length of residence in modulating L1 attrition effects. Even though length of residence has been claimed to be one of the main variables in L1 attrition research, its role in modulating attrition outcomes is far from clear in morphosyntax (Schmid, 2019; Tsimpli et al., 2004; Wilson, 2009). Thus, one of the aims of this dissertation is to contribute to the understanding of the effect of such variable by exploring the effect of cumulative L2 exposure in an immersion environment (i.e., length of residence in the L2 environment) and in an instructed setting (i.e., length of intensive instructed L2 exposure). As stated above, bilinguals with shorter periods of L2 immersion will be scrutinised to specifically address the early stages of L1 attrition, which have largely been unexplored to date, and which need further attention in L1 morphosyntax.

The linguistic domains under investigation within this dissertation have been selected on the basis of the main claims made by the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016; Sorace & Filiaci, 2006) on the selective vulnerability of interface structures in L1 attrition, as well as those made by the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007) on the selectivity of L1 attrition and the modulating effect of frequency and recency of L1 use. Particularly, this dissertation explores the production, interpretation, and processing of subject referring expressions (REs) in the L1 of the same L1 Spanish-L2 English instructed and immersed bilinguals. Given that each bilingual completed all the tasks included in this dissertation, it will be possible to accurately address the relationship between the three domains (i.e.,

production, interpretation, and processing) avoiding potential differences due to individual variability exhibited when comparing different bilinguals in different tasks.

The production of 3rd person singular null and overt subject REs in topic continuity (TC) was investigated through two (corpus-based) oral retelling tasks, given that these contexts have been shown to be the most problematic for L2 learners (Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021) and are expected to be equally problematic in L1 attrition. The production from the two bilingual groups was compared to that of an L1 Spanish functionally monolingual group. In contexts where the topic is maintained across clauses, which are typically encoded via null pronouns in Spanish functional monolinguals and via overt REs in English (Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021), bilinguals are expected to overproduce both overt pronouns and Noun Phrases (NPs) as a result of L1 attrition (Köpke & Genevska-Hanke, 2018). The multi-factorial analysis carried out in this first corpus-based study will make it possible to further disentangle whether the use of overt forms in TC is additionally motivated by factors such as an increase in the number of potential activated antecedents, a longer distance between a given subject RE and its antecedent, or the context in which the subject RE is embedded (e.g., coordination vs. subordination). The exploration of these variables was also motivated by the predictions made by the Pragmatic Principles Violation Hypothesis (Lozano, 2016, 2018), which argues that bilinguals tend to be more redundant than ambiguous and which also claims that the interaction of multiple factors (e.g., amount of potential activated antecedents or their distance) grades overproduction instances into more or less redundant. These more or less redundant instances represent milder or stronger violations of pragmatic principles such as the Informativeness/Economy Principle.

On another note, both the interpretation and processing tasks, which replicated the original design from Tsimpli et al. (2004) and Kaltsa et al. (2015), tested the biases of null and overt subject pronouns in instructed and immersed bilinguals. The aim of these two tasks was to explore the predictions from the Position of Antecedent Strategy (Carminati, 2002), which claims that null and overt subject pronouns exhibit a complementary distribution in null-subject languages: while null pronouns are generally interpreted as coreferential with the previous subject antecedent, overt pronouns mostly select object antecedents. The results from these studies will shed light on whether the interpretation of null and overt subject pronouns conforms to the PAS (Carminati, 2002),

which was initially proposed for native Italian, considering the contradictory findings that have been attested in native Spanish (Alonso-Ovalle et al., 2002; Bel & García-Alcaraz, 2018; Chamorro, 2018; de Rocafiguera, 2023; de Rocafiguera & Bel, 2022; Jegerski et al., 2011; Keating et al., 2011). Therefore, by including the three aforementioned tasks, it will be possible to explore whether an increase in the use of overt REs in TC is likely to correlate with an increased likelihood of interpreting and processing overt pronouns as coreferential with subject antecedents in bilinguals as a result of L1 attrition in line with previous studies (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015; Tsimpli et al., 2004).

In line with the predictions from the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016; Sorace & Filiaci, 2006) for L1 attrition along with those from the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007), only overt pronouns have been found and are thus expected to exhibit less clear biases towards object antecedents in the null-subject L1 of instructed and immersed bilinguals (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015; Tsimpli et al., 2004). They have additionally been argued to be used as a default to relieve processing demands in bilinguals. By contrast, the interpretation and processing of null pronouns is not hypothesised to be vulnerable in L1 attrition settings in line with previous findings.

Moreover, this dissertation investigates the role played by different variables in modulating the interpretation and processing of subject pronouns in L1 Spanish, which have been either unexplored or inconclusive to date. First, the role played by the subordinating conjunction used to link main and subordinate clauses in PAS-like structures is investigated considering different designs have either controlled this factor (Chamorro, 2018; de la Fuente, 2015; Giannakou, 2018) or manipulated it in an unsystematic way (Jegerski et al., 2011; Keating et al., 2011). Second, the effect of working memory is addressed since successful interpretation and processing of subject REs requires keeping antecedents active in working memory for subsequent retrieval. Such an effect has been poorly understood to date. Finally, language dominance will be included in the analysis as a continuous predictor using the Bilingual Language Profile (BLP) score (Birdsong et al., 2012) so as to better capture variability in bilinguals. The interaction of these factors in differentially modulating pronoun interpretation will also contribute to the claims made by the Form-Specific Multiple Constraints Approach (Kaiser & Trueswell, 2008) in hypothesising that different REs are subject to different

constraints and to different degrees since they cannot be mapped onto a unified salience hierarchy (Kaiser & Trueswell, 2008, p. 710).

In addition, most research in bilingualism to date has made use of groups of so-called monolinguals, who have indeed differed in a number of variables that have been found to modulate L1 performance. In particular, in studies testing the PAS (Carminati, 2002), control groups have included participants who have been either immersed in the L2 environment to different degrees (Chamorro, Sorace, et al., 2016; Jegerski et al., 2011; Keating et al., 2011), are relatively proficient in the L2 (Keating et al., 2011), or speak another language from birth (Bel, Sagarra, et al., 2016; Bel & García-Alcaraz, 2018). Thus, by including such heterogeneous groups as controls, little variability has been arguably assumed based on differences in, for instance, proficiency in the L2 or immersion context of the groups of ‘monolinguals’. In order to address this, the present thesis will include a more controlled design in the group of Spanish functional monolinguals. This will make it possible to explore both the interpretation and processing of null and overt subject pronouns in PAS-like contexts in the absence of some of the aforementioned factors which could likely modulate the phenomenon under investigation by objectively measuring both L2 proficiency, testing participants in an L1 environment, and by including participants who have not been raised bilingually.

The thesis is organised as follows. Chapter 2 introduces the scope of L1 attrition within the wider field of bilingualism as well as the factors that modulate L1 attrition outcomes, particularly those which are essentially explored or controlled in this thesis, i.e., language dominance, length of intensive exposure to the L2, frequency of L1 use, and language (re-)immersion. Chapter 3 deals with the description of the distribution of subject REs in native Spanish and native English, followed by an explanation of how different factors modulate both the production of subject REs and their interpretation and processing in L1 Spanish potential attriters. Within the production of subject REs, the following factors are included: information status, salience, prominence, or accessibility of antecedents, syntactic configuration (i.e., coordination, subordination, or juxtaposition), and the nature of antecedents (their number¹ and gender). The interpretation and processing of subject REs is explored within the structural parsing strategy of the PAS, and multiple factors that modulate its predicted biases are then

¹ Number in this case stands for their amount and not grammatical number.

presented, e.g., clause order, the effect of different subordinating conjunctions, and working memory. Moreover, several accounts that are essential to make predictions for the current research are developed, that is, the Interface Hypothesis, the Pragmatic Principles Violation Hypothesis, the Activation Threshold Hypothesis, and the Form-Specific Multiple-Constraints Approach.

Subsequently, the aim of Chapter 4 is to provide evidence from previous studies on both the production, interpretation, and processing of subject REs in native Spanish along with the results from studies testing L1 morphosyntactic attrition in L1 Spanish and in other mostly null-subject languages (e.g., Greek, Turkish, or Italian). Chapter 4 additionally presents an overall view of research conducted on native English, which will help us establish a baseline for the L2 of our bilingual participants. Chapter 5 presents the main specific research questions and hypotheses by task in addition to several general research questions formulated for the three tasks altogether. Subsequently, Chapter 6 introduces the general methodology from this dissertation, which includes the general procedure followed considering the sequencing of tasks as well as their motivation, a description of the background tasks used (i.e., the Oxford Quick Placement Test, the Bilingual Language Profile, and a working memory task), and concludes with a detailed description of the participants.

The following three chapters include the specific methodology employed in each main task, as well as the results, and a discussion. Chapter 7 is devoted to detailing the methodology used for the two corpus-based production tasks, the results from this task, and an interim discussion. Similarly, Chapters 8 and 9 present the main methodological points from the interpretation and processing tasks, respectively, commenting specifically on the divergences from the original tasks used by Tsimpili et al. (2004) and Kaltsa et al. (2015). The presentation of the methodology of each experimental task is also followed by the main results and a specific discussion for each task. Finally, Chapter 10 offers a general discussion of the results from the three main tasks used in this dissertation and Chapter 11 summarises the main conclusions that can be drawn from this thesis, together with the discussion of some of its limitations and important considerations for further research.

Overall, the present thesis will shed light on the variability that is attested in the L1 of instructed vs. immersed bilinguals compared to functional monolinguals. A valuable contribution of this dissertation lies in the triangulation of data from different

methods (production, interpretation, and processing), which will help understand how L1 attrition manifests in the same bilinguals and in different domains to address further claims made by the IH on the vulnerability of interface structures, particularly in online processing. Importantly, the results from this study will also contribute to a better understanding of variability that is to be expected in the L1 of the participants that have largely been used as controls in both L2 and L1 attrition studies by explicitly exploring the role of factors (e.g., L2 exposure, L2 proficiency, and language dominance) that can arguably modulate production, interpretation, and processing of subject REs. Moreover, this thesis provides new findings on changes in the L1 of instructed bilinguals, which have been largely overlooked, as well as the early stages of L1 attrition during the very early years of L2 immersion. On a final note, the present study will also contribute further evidence on the factors that modulate the production, interpretation, and processing of subject REs in instructed vs. immersed bilinguals compared to Spanish functional monolinguals as well as present the findings from novel factors that have not been addressed to date (e.g., the role of different temporal subordinating conjunctions in modulating interpretation biases of null and overt subject pronouns).

CHAPTER 2. Bilingualism and attrition

Learning a second language or becoming bilingual seldom entails an exclusive developmental increase in L2 competence. A growing body of research has shown that changes in the linguistic repertoire of a bilingual (i.e., in either their L1 or L2) typically trigger modifications in the other languages from their linguistic repertoire. Crucially, this has been argued to be the result of the interconnectedness or (co-)activation of the languages in the bilingual brain (Paradis, 1993, 2004, 2007; Schmid & Köpke, 2017a, 2019; van Hell & Dijkstra, 2002). One direct consequence of this co-activation of the languages in the brain of a bilingual is the bidirectional influence that appears to manifest from the L1 to the L2, and conversely.

Nevertheless, most research in SLA to date has focused on the development of different language domains during the process of L2 acquisition and how this is modulated by different intrinsic and extrinsic linguistic and cognitive variables (e.g., age of onset to the L2, length of instruction, motivation, aptitude, executive control, or working memory, to name a few) (Cunnings & Felser, 2013; Kormos & Sáfár, 2008; Leal & Slabakova, 2019; Rivera et al., 2023; Saito, 2019; Wu & Ionin, 2022). Among these variables, crosslinguistic influence from the L1 to the L2 has been one of the most well-studied phenomena in bilingualism (Jarvis & Pavlenko, 2008). When learning a second language, bilinguals tend to rely heavily on their L1 configuration when producing, interpreting, and processing their L2, and particularly at earlier developmental stages. Generally, it is not until later stages of development that L1-to-L2 influence becomes less apparent. Although the effect of L1 influence in the learning of an L2 is argued to decrease in strength as bilinguals become more proficient in the L2, there is evidence that suggests that L1 influence is still a strong and significant factor in L2 acquisition at later stages of development (Lefebvre et al., 2006). Interestingly, even though most research to date has paid attention to the well-attested L1-to-L2 influence (e.g., studies in McManus, 2021), a considerably smaller but still growing body of research (Ortega, 2013; Schmid & Köpke, 2017a, 2019) has also been devoted to investigating whether and which L1 domains are modified following L2 changes in use, exposure, and/or competence.

Arguably as a consequence of the co-activation and competition of languages in the bilingual brain (Schmid & Köpke, 2017a, 2019), acquiring a second language has been claimed to additionally trigger changes in the L1, which have already been extensively documented (see studies in Schmid, 2016; Schmid & Köpke, 2019). These

changes in the L1, which have been largely coined under the umbrella term of L1 attrition (Schmid & Köpke, 2017a), become evident at multiple language levels: e.g., lexicon, phonology, morphology, morphosyntax, or pragmatics, among others (Schmid & Köpke, 2017a; Yilmaz & Schmid, 2018). The following section will narrow down the concept of L1 attrition due to its central role played in this dissertation. Additionally, a problematisation of the concept of monolingual control will be introduced as a direct consequence of the outcomes of research in L1 attrition.

2.1 The scope of L1 attrition

The aim of this section is to first introduce the definition of attrition that will be addressed in this dissertation and second to discuss the implications of using monolinguals as control groups.

2.1.1 Defining L1 attrition

Early research on L1 attrition was originally motivated by Einar Haugen's (1938) seminal work on 'Language and immigration'. One of the main goals of his work was to challenge the evidence-based incorrect assumption that once a native speaker reaches maturity, their L1 becomes rather stable and is thus not susceptible to change. The main claims made by Haugen were related to changes in the lexicon of Norwegian native speakers in the United States. Following his work, multiple authors emphasised the non-unidirectionality of crosslinguistic influence in bilingualism (Cook, 2003, 2020; Grosjean, 1985; Grosjean & Py, 1991; Jarvis & Pavlenko, 2008; van Hell & Dijkstra, 2002; Weinreich, 1953), highlighting the possibility of the L1 being influenced in the process of becoming bi/multilingual. Therefore, research on the (in)stability of the L1 in bilinguals rapidly proliferated.

Notably, most of the research concentrated on the changes experienced in the L1 of bilinguals who migrated to and were hence immersed in an environment where the L2 was the dominant language. Moreover, these early studies largely investigated bilinguals with (relatively) long periods of length of residence (i.e., immersion) in the L2 environment (de Bot et al., 1991; de Bot & Clyne, 1994; Gürel, 2004; Schmid, 2002; Schmid et al., 2004; Seliger & Vago, 1991; Weltens et al., 1987). Although this tendency

to include long-immersed bilinguals has been maintained to a large extent when investigating L1 morphosyntactic attrition (Chamorro, Sorace, et al., 2016; Gargiulo & van de Weijer, 2020; Kaltsa et al., 2015; Köpke & Genevska-Hanke, 2018; Tsimplici et al., 2004), which is the focus of this dissertation, shorter periods of length of L2 residence have been included in studies testing other language domains such as phonetics, phonology, or the lexicon (Celata, 2019; de Leeuw, 2019; Jarvis, 2019).

It is important to note that the selection of long-immersed bilinguals has been connected to the original conception of L1 attrition as mainly leading to changes at the level of representation and almost equating it to L1 deterioration, erosion, or ultimately loss (Gürel, 2004; Schmid, 2013; Seliger & Vago, 1991)². L1 attrition effects were thought to surface when length of residence in the L2 environment was considerable together with reduced L1 use and exposure, both of which would arguably be needed for the loss or erosion of certain L1 features to become apparent. Interestingly, Schmid (2011) and Schmid and Köpke (2013, p. 19) actually suggested that one of the selection criteria to include bilinguals in L1 attrition studies should be length of residence and that it should not be shorter than 7 or 15 years. According to Schmid (2019, p. 292), '[t]his well-meaning but misguided piece of advice has had the regrettable effect that to date there is extremely little evidence on how attrition may progress during those first years', which is one of the research gaps that this thesis will address. In fact, this contention is in line with a relatively recent proposal from Schmid and Köpke (2017a, 2019) to widen the initially restricted scope of L1 attrition research. This proposal will serve as the basis for the working definition of L1 attrition used to frame this research. From their revisited perspective, L1 attrition includes 'any of the phenomena that arise in the native language of a sequential bilingual as the consequence of the co-activation of languages, crosslinguistic transfer or disuse, at any stage of second language development and use' (Schmid & Köpke, 2017a, pp. 637–638). Hence, L1 attrition is thought to entail

'the process by which (a) pre-existing linguistic knowledge becomes less accessible or is modified to some extent as a result of the acquisition of a new

² It is considering this meaning of L1 attrition as being equal to loss or deterioration what has led some authors to suggest that a change of the term would be more appropriate (e.g., Allen, 2017; Gyllstad & Suhonen, 2017). However, as Schmid and Köpke (2017b) argue, for lack of a better term to date and to grant continuity within a still under-research field, we stick to the term that has been widely used.

language, and (b) L1 production, processing, or comprehension are affected by the presence of this other language’ (Schmid & Köpke, 2017a, p. 638).

Along the same lines, and arguably thus encompassing both L1 changes at the level of competence but also performance in the traditional Chomskyan sense (Chomsky, 1957, 1965), Schmid and Köpke (2017a, p. 640) argue against the need to exclusively consider attrition effects as those that go beyond online manifestations of crosslinguistic influence and which should be ‘permanent, irreversible, and affect underlying structure’, a claim that has been disputed by several researchers (Bardovi-Harlig & Stringer, 2017; Gürel, 2017; Meisel, 2017). Instead, in their keynote paper, Schmid and Köpke (2017a) call for the study of L1 attrition effects within a continuum (Porte, 2003; Rossi et al., 2019; Schmid & Cherciov, 2019; Schmid & de Leeuw, 2019) from online/transient effects or loss of access to mental representations to permanent changes affecting underlying knowledge, although the latter have been very infrequently attested in the evidence that is available to date³ (but see de Leeuw et al., 2018; Iverson, 2012). The idea of a continuum led Schmid and Köpke (2017a, p. 641) to conclude that ‘every bilingual is an attriter’, a statement which has been challenged by several authors (de Leeuw, 2017; Flores, 2017; Gürel, 2017; Kupisch et al., 2017, among others). Schmid and Köpke (2017b, pp. 766–767) argue that attrition should be understood as a matter of degree considering it is affected by different variables such as proficiency, length of residence, type of acquisition (instructed or immersed), or age of onset, among others, which helps them to hold the position that ‘every bilingual is an attriter’, emphasising the idea of degree.

In our view, and in line with de Leeuw (2017) and as also raised by Kupisch et al. (2017), we restrict our analysis of L1 attrition to late bilingual adults, who possess ‘already established [L1] linguistic knowledge’ (Schmid & Köpke, 2017a, p. 639), i.e., knowledge that ‘has been fully acquired’ before the onset of attrition (de Leeuw, 2017, p. 726). From our perspective, the claim made by Schmid and Köpke (2017a, p. 641) should look more like ‘every [late] bilingual can be or has the potential to be an attriter’, and precisely, research should aim at identifying the ways in which L1 attrition manifests (e.g., either as online or as representational changes) and the variables (and their

³ Nevertheless, it is still unknown whether those changes could be re-structured upon re-immersion in the L1 environment (Schmid & Köpke, 2017b).

interactions) which lead to different outcomes in the L1 of late bilinguals, some of which will be discussed in section 2.2.

Connected with the previous idea, we introduce a not-so-novel but largely under-researched avenue to explore potential attrition(-like) effects in instructed bilinguals who experience both ‘co-activation of languages’ and ‘crosslinguistic transfer’ (Schmid & Köpke, 2017a) in a mainly L1-dominant environment. Within instructed bilinguals, we include those who largely receive considerable L2 exposure in a formal instructed setting (e.g., Spanish speakers pursuing a degree in L2 English that is taught in the L2) in their home country, as opposed to immersed bilinguals who mostly receive L2 naturalistic exposure in a foreign language environment. Even if complete L1 disuse is understandably not attested in the former scenario, despite L1 use being consequently reduced due to higher use and exposure to the L2, bilinguals in this context can experience both co-activation of the languages and potential crosslinguistic influence from the L2. This will allow for the possibility to explore whether and to what extent immersion, and thus arguably L1 disuse are required for attrition(-like) effects to surface, or whether attrition can (only) result from the interconnectedness of the languages in the bilingual brain and subsequent competition (Yilmaz & Schmid, 2018).

Importantly, research on L1 attrition to date has not sufficiently explored whether potential L1 attrition effects equally arise in bilinguals who experience language co-activation and crosslinguistic influence but who differ in degree of L1 (dis)use as a matter of the context of L2 exposure, i.e., whether they are in an L2 instruction (i.e., L2 formal exposure in an L1 environment) or in an L2 immersion setting (i.e., L2 naturalistic exposure in an L2 environment). Even though previous research has explored potential L2 effects on the L1 of instructed bilinguals or foreign language learners (Balcom, 1995; Cenoz, 2003; Cook, 2003; Cook et al., 2003; Długosz, 2021; Kecskes, 1998; Kecskes & Papp, 2000, 2003; Requena & Berry, 2021; Satterfield, 2003), the evidence on L1 effects at the level of morphosyntax is rather scarce and will be further investigated in this dissertation.

2.1.2 A note on the use of monolingual controls

Grosjean’s (1989) famous quote that ‘the bilingual is not two monolinguals in one person’ has had several far-reaching implications in the fields of bilingualism and second

language acquisition (SLA). In particular, two of the main claims within his article were the encouragement to study ‘the bilingual [...] not always in comparison to the monolingual’ and ‘that using the monolingual as a yardstick is questionable’ (1989, p. 14)⁴. The studies that have indeed used monolinguals as a control group may have considered them to be the norm or the standard that bilinguals should aspire to become in relation to a number of different language domains: e.g., morphosyntax, pragmatics, phonetics, or phonology. Presumably, this has been done so considering that the language of monolinguals remains rather stable throughout the lifespan. However, this practice has been questioned from different angles (Castro et al., 2022; Dewaele et al., 2021; Ortega, 2013, 2018; Rothman et al., 2022).

First, (completely) monolingual adults have proved to be either rare or almost inexistent nowadays. Learning at least a second language starting from primary education (if not before) has become the standard practice and hence, most young adults (have) receive(d) instruction in another language other than their first language from a relatively young age. Furthermore, added to second language classes, using the second language as the means of instruction in content courses has gained widespread acceptance both at secondary and upper-secondary or university levels: e.g., CLIL (Content and Language Integrated Learning) (Coyle, 2007; Pérez-Cañado, 2012) and EMI (English as a Medium of Instruction) (Dearden, 2014; Lasagabaster, 2022). Particularly, in EMI courses, language learning mostly takes place implicitly through exposure to L2 English (Lasagabaster, 2022, p. 36). Thus, these courses offer considerable opportunities for L2 exposure as well as to communicate using the L2. This has led to a context in which monolingualism is no longer the norm, particularly in contexts where societal bi/multilingualism was not already in place (e.g., Catalonia). Thus, such a context makes it likely that interaction between the languages of a functional monolingual, who has knowledge of at least another language taught through instruction in classroom settings, is widely observed.

In light of the current context where bilingualism is rather the norm added to the accumulated findings on L1 attrition in different settings, functional monolinguals are no longer thought to possess linguistic knowledge that is completely stable and that remains unchanged throughout their lifespan. Current evidence suggests that not only bilinguals

⁴ In fact, this idea clearly relates to Bley-Vroman’s comparative fallacy (Bley-Vroman, 1983).

in an immersion setting experience changes in their L1 either at the level of production, interpretation, and/or processing (Chamorro, Sorace, et al., 2016; Dussias & Sagarra, 2007; Gargiulo & van de Weijer, 2020; Schmid, 2016), but instructed bilinguals living in their L1 environment have also been shown to exhibit differences in the L1, arguably as a result of the interaction of the two (or more) languages in the brain and/or reduced use of the L1 (Bice & Kroll, 2019; Cook et al., 2003; Długosz, 2021; Kecskes & Papp, 2003; Requena & Berry, 2021). As Yilmaz and Schmid (2018, p. 229) put it, ‘first language attrition is a natural and logical outcome of becoming bilingual’ and thus, the use of ‘pure’ monolinguals as controls becomes questionable.

Another interesting point is that variability within functional monolingual speakers has also been attested (Castro et al., 2022; Cheng et al., 2021; Dąbrowska, 2012). Despite this finding, previous studies have largely selected monolingual controls on the basis of their (self-reported) limited L2 proficiency and reduced L2 use, and have barely controlled for additional variables assuming little variability, in cases in which both L2 proficiency and use have been purposefully tested and not simply taken for granted from self-reports. Nevertheless, cognitive variables such as working memory have been found to modulate linguistic outcomes in different tasks such as pronoun interpretation and processing (see section 3.3.4). Therefore, variability within supposedly functional monolingual controls needs to also be considered if we are still to include controls in our studies. Moreover, other variables such as education should also be catered for in current and future research. It appears then that performance within what has been used as the yardstick for control purposes is also evidenced and it is thus a practice that should be abandoned or should be carefully and purposefully justified if their inclusion is deemed relevant (Domínguez & Arche, 2021).

Using a monolingual control group has additionally been linked to a wide use of certain statistical analyses. For instance, analyses of variance (ANOVAs) or analyses whereby groups as a whole are compared between each other as well as conditions have been rather common in the field (Plonsky & Oswald, 2017). Much more infrequent have been the analyses that have considered gradient variability between participants in an individualised way, although the numbers are growing. The study of the effect of continuous variables has rather been done by splitting continuous measures into high or low, or high, medium, or low scores: e.g., working memory has been analysed considering participants with a high and with a low working memory span. In our view, research

should additionally consider individual variability, a factor that we will address in our analyses, and which has been central in sociolinguistic studies (e.g., Geeslin et al., 2015; Limerick, 2019; Shin & Otheguy, 2009). Hence, if a control group is to be included it should have a specific purpose: in our case, our control group of functional monolinguals will be included as a potential approximation of what potential L1 attriters would have looked like prior to being intensively exposed to the L1 in an instructed and in an immersed setting in the absence of a longitudinal design, which was not possible considering time constraints.

2.2 Key factors that modulate L1 attrition

Having defined the scope of L1 attrition that will be considered in this study as well as justified the need to include a control group of L1 Spanish functional monolinguals, we will now describe some of the factors that lead to different outcomes in L1 attrition. Similarly to L2 acquisition scenarios, which are modulated by a combination of different factors (e.g., age of onset to the L2, motivation, aptitude, or input quantity/quality), L1 attrition is determined by multiple variables as well as their interactions (Schmid & Cherciov, 2019; Schmid & de Leeuw, 2019; Schmid & Köpke, 2017a; Yilmaz & Schmid, 2018). This section will highlight the role played by a selection of these factors, which are mostly relevant and tested in this dissertation, i.e., language dominance, length of intensive exposure/immersion in the L2, frequency of L1 use, and L1 (re-)immersion, which will be carefully controlled.

2.2.1 Language dominance

Bilinguals are typically a rather heterogeneous group considering differences in variables such as L1/L2 proficiency, L1/L2 exposure and use, age of onset to the L2, or attitudes towards the L1/L2, among others. Different combinations of these variables generally give rise to distinct yet not categorically differentiated bilingual profiles, which are in fact the result of varied bilingual experiences and which are mainly located within a continuum (Luk & Bialystok, 2013). Notably, two main dimensions are largely associated with a great deal of variability found in previous studies both at the within-group and between-group levels: i.e., language proficiency and use. Such variables have in fact been

claimed to be central components of another multi-faceted and dynamic construct that has been extensively addressed in previous research as a key modulator of outcomes in bilingualism, i.e., language dominance (Treffers-Daller, 2019; Treffers-Daller & Korybski, 2016), both when investigating the L1 and the L2 of bilingual speakers (e.g., Köpke & Genevska-Hanke, 2018; Puig-Mayenco et al., 2018, 2020; Schmid & Yılmaz, 2018). Language dominance, which has been addressed from different angles in bilingualism research (Silva-Corvalán & Treffers-Daller, 2016), has been claimed to be gauged both via direct measures assessing aspects of language proficiency (e.g., lexicon or grammar) or via indirect experiential measures that tap into variability in bilinguals' use and exposure to different languages (Treffers-Daller, 2019).

It is important to note that different conceptualisations of the construct of language dominance in bilinguals have given rise to different measurements and its subsequent inclusion as a predictor in studies testing its potential modulating effects (Bedore et al., 2012; Silva-Corvalán & Treffers-Daller, 2016). Firstly, language dominance has been used as a categorical predictor that determines which of the languages of the linguistic repertoire of a bilingual is their dominant language, which does not necessarily coincide with the societal dominant language, although it typically does (Treffers-Daller, 2016, 2019). For instance, this has been argued to influence phenomena such as directionality of crosslinguistic influence (Argyri & Sorace, 2007; Gathercole & Thomas, 2009; Genesee & Nicoladis, 2007; Hemández-Chávez et al., 1978; Nicoladis, 2016; Schmeißer et al., 2016; Silva-Corvalán, 2014). To do this, relative proficiency has largely been used as a proxy to determine the dominant language of a bilingual (Daller et al., 2011; Hemández-Chávez et al., 1978; Snape & Kupisch, 2016). For example, proficiency in the two languages of a bilingual has been measured using mean length of utterance (MLU) (Yip & Matthews, 2006), particularly in children under 3 (Scarborough et al., 1991), sentence repetition tasks (Flege et al., 2002; Verhoeven, 2007), or through vocabulary tests such as the Peabody Picture Vocabulary Test (L. M. Dunn & Dunn, 2007), verbal fluency tasks, or other lexical diversity measures (Treffers-Daller, 2011; Treffers-Daller & Korybski, 2016). The use of these tasks has generally triggered an analysis where dominance is included as a dichotomous predictor, one language is dominant over the other(s), i.e., the one with the highest score. Such an approach has been problematised considering the difficulty in selecting comparable tasks yielding similar results in each language (Treffers-Daller, 2016, 2019). Additionally, treating language dominance

categorically has indeed been recognised as a limitation of previous studies (Birdsong, 2016) since ‘it might be underestimating nuances implicit to the dynamic nature of what it means to be dominant in one or another language (Silva-Corvalán & Treffers-Daller, 2016)’ (Puig-Mayenco et al., 2020, p. 9).

As an alternative to the former approach to dominance or one that almost exclusively considers the relationship between L1 and L2 language exposure (La Morgia, 2016; Unsworth, 2016), language dominance has been investigated as a continuous or gradient multi-faceted construct that results from a composite score of different relevant measures (Birdsong, 2014, 2016; Flege et al., 2002; Gertken et al., 2014; Grosjean, 1998; Montrul, 2016; Puig-Mayenco et al., 2020; Treffers-Daller, 2016). Such a view is more in line with a psycholinguistic definition of dominance, i.e., ‘based on the availability of each of the languages of a bilingual’ (Köpke & Genevska-Hanke, 2018, p. 3). In this direction, several questionnaires that include different dimensions within the wider construct of language dominance have been designed and broadly used: e.g., the *Bilingual Language Experience Calculator* (BiLEC) (Unsworth, 2013), the *Bilingual Dominance Scale* (BDS) (A. L. Dunn & Fox Tree, 2009), the *Language Experience and Proficiency Questionnaire* (LEAP-Q) (Marian et al., 2007), the *Language and Social Background Questionnaire* (LSBQ) (Anderson et al., 2018; Luk & Bialystok, 2013), or the *Bilingual Language Profile* (BLP) (Birdsong et al., 2012; Gertken et al., 2014) (see section 6.2.2), to name but a few.

The advantages of measuring dominance using questionnaires that provide a gradient score are related to the fact that this practice enables the exploration of fine-grained subtleties that are confounded when dominance is understood in a binary fashion. For instance, both a functional Spanish monolingual who knows some English but does not use it daily and an advanced L1 Spanish-L2 English bilingual living in Spain and who uses it roughly on a daily basis would possibly qualify as Spanish dominant. Nevertheless, their bilingual experience would certainly be unequal and different outcomes might be expected when comparing their performance in linguistic and non-linguistic tasks. Importantly, among the aforementioned questionnaires, the BLP, a context-independent dominance assessment, proves to be a suitable tool to investigate variability among populations of bilingual speakers whose L2 is likely to influence their L1, e.g., potential L1 attriters (Gertken et al., 2014, p. 221), which are the focus of this dissertation. Within such questionnaire, language dominance, which is understood ‘in relativistic, not

absolute, terms' (2014, p. 208), is assessed as a composite score that includes relevant information from the following four modules (see section 6.2.2): language history (e.g., age when the L1/L2 were learnt, time spent in an L1/L2 environment, or length of instruction in the L1/L2), language use (L1/L2 use with friends, with family, or at home), language proficiency (in L1/L2 speaking, reading, writing, and understanding)⁵ and language attitudes (e.g., identification with the L1/L2 culture, identification as a native speaker of the L1/L2). Notably, all these domains have been shown to be relevant for the variability attested in L1 attrition studies (Schmid & Köpke, 2017a, 2019). In sum, the BLP provides a continuous measure on a scale that ranges from -218 to +218, which indicates whether bilinguals are more L2-dominant (i.e., negative end of the scale) or more L1-dominant (i.e., positive end of the scale).

Furthermore, the scores from the BLP have been widely used to account for variability in different bilingual populations, e.g., simultaneous (Amengual, 2016a, 2016b; Bonvin et al., 2021; Perpiñán, 2017) and sequential bilinguals (Black et al., 2020; Bonvin et al., 2021; Garraffa et al., 2017; Olson, 2017; Onnis et al., 2018), or heritage speakers (Kim, 2019). Despite the fact that L1 'attrition appears to be very sensitive to immediate language context at both the macro- and the micro-level' (Köpke & Genevska-Hanke, 2018, p. 14), differences which could be captured by a gradient measure (e.g., the one provided by the BLP), such an approach has not been widespread in L1 attrition research since categorical measures have been traditionally employed (Köpke & Genevska-Hanke, 2018; Schmid & Yılmaz, 2018) and future studies, as it will be done in this dissertation, should include dominance as a continuous measure to allow for a more nuanced and subtle understanding of its modulating effects in L1 attrition.

In summary, language dominance is understood in this dissertation as a multi-faceted, dynamic, and non-dichotomous construct that includes the added combination of several factors which are essential predictors of different outcomes in bilinguals, that is, language history (e.g., age of onset to the L2 or length of L2 instruction and immersion, among others), language use in different contexts, language proficiency in different domains, and language attitudes towards the L1 and the L2. Thus, overall, language

⁵ It is important to highlight that language dominance and proficiency are, although usually correlated to some extent, two distinct constructs (Birdsong et al., 2012; Gertken et al., 2014).

dominance is taken to be a proxy for bilingualism in line with de Rocafiguera (2023) and is thus expected to predict different outcomes in linguistic tasks.

2.2.2 Length of intensive exposure to the L2

Despite the fact that several approaches have been proposed to account for overall differences between functional monolinguals and L1 attriters (see section 3.4), research suggests that L1 attriters perform rather heterogeneously in different (non-)linguistic tasks. This increased variability, apart from language dominance as mentioned in the previous section, can additionally be explained in terms of several factors where (late) bilinguals (can) differ to varying degrees: e.g., amount and contexts of L1/L2 use and exposure, length of residence in the L2 context, age at immigration, attitudes towards the L1/L2, or level of integration in the L2 community, to name but a few (Schmid & Köpke, 2019; Yilmaz & Schmid, 2018). Among these factors, length of residence in the L2 environment has largely been claimed to be a central modulator of attrition effects (Schmid, 2019; Schmid & Cherciov, 2019). A possible argument supporting such statement would be in line with the effect of recency in modulating potential attrition effects as it is proposed within the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007) (see section 3.4.3). In sum, Paradis (1993, 2004, 2007) argues that recency of L1 use will have an effect in the activation threshold of such language. If a language (e.g., the L1) has been used recently, it will need less neural impulses to become activated again and its activation threshold will be lower. On the contrary, more prolonged and frequent L1 disuse will raise the activation threshold of such language, and its linguistic items in turn, and will therefore make them more vulnerable to potential attrition effects. However, even though this line of reasoning would have been possible in the initial studies conducted on language attrition, where late bilinguals would move to an L2 environment and would then lose partial or complete access to the L1 (de Bot & Clyne, 1994; Waas, 1996), the current situation has proved to be less straightforward. Social networks and different forms of communication (e.g., videocalls) and entertainment through different platforms (e.g., films, books, or newspapers) nowadays make access to the L1 rather likely and frequent in some cases (de Bot et al., 1991; Schmid, 2019). This must also be added to the much more frequent trips back to the L1 environment, which increase L1 exposure and use intensively. Thus, a recency factor might not hypothetically be behind such higher length of L2 immersion, given that the effect of length of residence might

indeed interact with other factors such as frequency of L1 exposure and use, which will be additionally controlled in this dissertation.

Notably, considering the above, it is not surprising to see that most of the evidence available to date on the role played by length of residence in the L2 environment is (still) inconclusive. Schmid (2019) reports that out of 41 studies that include length of residence in the L2 environment as a predictor in their research on L1 attrition, only 12 of them find a significant effect of time on the outcome variables selected (e.g., Bergmann et al., 2016; de Bot et al., 1991; Gargiulo, 2020; Kasparian & Steinhauer, 2017; Schmid & Dusseldorp, 2010), whereas others did not (de Leeuw et al., 2010; e.g., Kasparian et al., 2017; Schmid & Fägersten, 2010; Schmid & Jarvis, 2014). These studies have tested different domains (e.g., overall accuracy, fluency, lexicon, morphosyntax, phonology, or overall proficiency) and further research is required to discern whether length of residence is crucial in the differential outcomes obtained in L1 attrition. Particularly focusing on the effect of length of residence on L1 morphosyntax and pronominal resolution, Wilson (2009) found her results to be modulated by such a variable, whereas Gürel (2004) and Tsimpli et al. (2004) did not report such an effect. Furthermore, Schmid (2019) highlights that those studies where length of residence has been found to have an impact on L1 attrition effects have used bilinguals who have been immersed in the L2 environment for less than 10 years. It is precisely within this time window that more studies on L1 attrition should be conducted (see section 2.1). None of the studies testing considerably long-immersed bilinguals have reported a significant contribution of length of residence to the results. Interestingly, this finding could be in line with the further claim made by several authors (de Bot & Clyne, 1994; Waas, 1996) that attrition effects tend to become stabilised after 10 years of immersion.

It is worth noting that most research on L1 attrition focusing on morphosyntax has assumed that both an intensive and an extensive immersion period in the L2 environment is required for attrition effects to surface as pointed out previously (e.g., Chamorro, Sorace, et al., 2016; Gürel, 2004, 2007; Köpke & Genevskaja-Hanke, 2018; Tsimpli et al., 2004). Crucially, very few studies have tested such a phenomenon in early-immersed bilinguals (although see Giannakou, 2018; Wilson, 2009) despite the contention that L1 attrition occurs within the first 10 years of intensive exposure or immersion in the L2 (Köpke & Genevskaja-Hanke, 2018; Köpke & Keijzer, 2019; Schmid, 2019). Therefore, additional research is necessary to explore the timeframe of L1 attrition effects in

morphosyntax by concentrating on the first 10 years of L2 immersion (Yilmaz & Schmid, 2018), which, as Schmid and Cherciov (2019, p. 273) argue, has been ‘a period more often than not completely neglected by attrition studies’.

Moreover, considering the scarcity of research on attrition(-like) effects in intensive L2 instructed bilinguals in their L1 environment, despite some limited evidence that L2 effects on the L1 are possible and attested in such settings (Balcom, 1995; Cenoz, 2003; Chang, 2012; Cook, 2003; Cook et al., 2003; Długosz, 2021; Kecskes, 1998; Kecskes & Papp, 2000, 2003; Requena & Berry, 2021), future studies should address this population to explore the under-researched L1 (in)vulnerability in this type of bilinguals and how it is potentially modulated by cumulative length of L2 exposure in an instructed setting, one of the main questions addressed in this dissertation (see Chapter 5).

In sum, when exploring length of residence in immersed bilinguals, it is important to make sure that continued L2 exposure has taken place and collecting relevant information on variables such as L1 use and exposure should be essential. Moreover, periods of L1 re-immersion should also be taken into account considering the potential reversion of attrition effects that has been found following re-immersion in the L1 environment (Chamorro, Sorace, et al., 2016). In instructed bilinguals, however, the effect of L2 instructed exposure, which would be more difficult to surface considering sustained and relatively frequent L1 use, should be visible considering accumulated L2 exposure over a given period of time. Nevertheless, in the context of our instructed bilinguals, periods of almost complete L1 exposure and use following the end of the academic year are likely to take place, and thus, an effect of continued L2 exposure is more difficult to investigate.

2.2.3 Frequency of L1 use

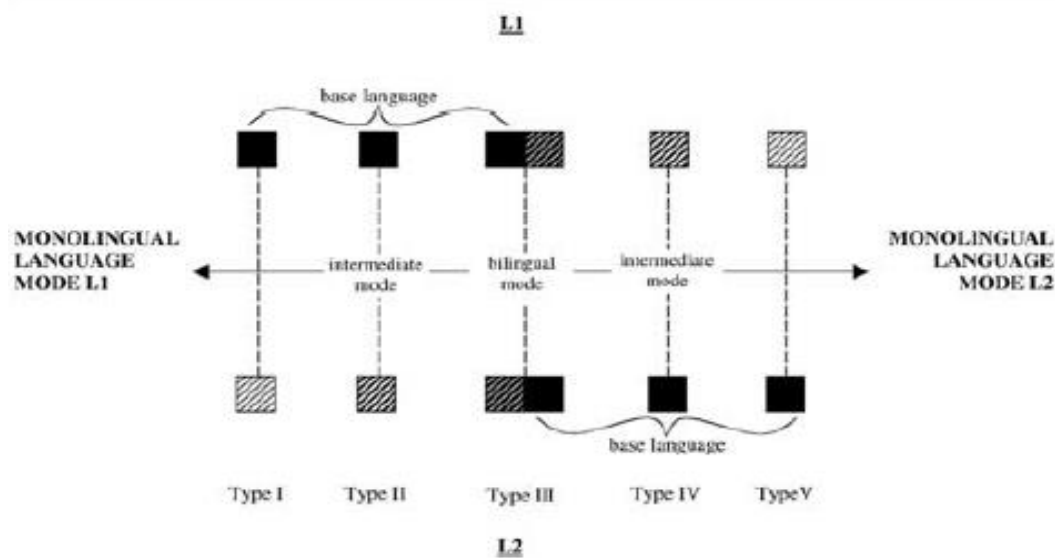
Another relevant factor that accounts for variability in L1 attrition outcomes is frequency of L1 use. Using the L1 more frequently leads to its increased activation, which makes it more accessible and thus, less L1 vulnerability is expected from the point of view of the ATH (see section 3.4.3). When the L1 is used both more frequently and recently, its linguistic items increase in activation and are arguably less influenced by L2 items, which are inhibited in turn. If, by contrast, the L2 is more frequently used than the L1, L1 items will need more neural impulses to become activated due to their consequently higher

activation threshold. These L1 items, and particularly those that have a competing counterpart in the L2 (e.g., overt pronouns in Spanish), will be more likely to attrite.

Connected with the idea of activation and inhibition of the languages of a bilingual, Schmid (2007) discusses the different modes where L1 and L2 use can take place L1 attrition contexts departing from Grosjean's (2001) bilinguals' language modes. In the monolingual mode, the L1 is activated and the L2 is largely inhibited. Therefore, code-switching is very unlikely in this part of the continuum. On the other end, the bilingual mode represents contexts in which both languages are highly active, and code-switching and interference are frequently attested. The last mode within Grosjean's continuum would be the intermediate mode, where one language is highly active but the other one is not completely switched off, although it is much less active than the other language. Departing from these, Schmid (2007, p. 139) presents different types of L1 and L2 use in potential attriters (see Figure 1). On the two extremes of the continuum, she introduces both L1 and L2 monolingual modes, that is, where either the L1 (Type 1) or the L2 (Type 5) are only used. Type III corresponds to the bilingual mode, where both languages are almost equally activated, and interference is expected. Moreover, two intermediate modes are added, one where the L1 is the base language (type II) and another one where it is the L2 (Type IV). Thus, considering the above, L1 use should be investigated considering the contexts in which it takes places, given that activation and inhibition will be differently involved in each one of them.

Figure 1

Types of L1 use among potential attriters from Schmid (2007)



In order to explore the impact of L1 use in modulating attrition effect differences, Schmid (2019, p. 294) provides an analysis of the studies that have included such variable. Out of 46 studies included in her analysis, 26 of them do report a significant effect of L1 use, whereas 20 of them reveal that L1 use does not significantly account for variability in individual attrition outcomes. Particularly, of these studies, only 5 of them tested morphosyntax, and from the findings presented, it appears that the effect of L1 use on morphosyntax is inconclusive, with only 3 studies reporting no impact of L1 use and only 2 that do report such impact. Another relevant insight, as Schmid (2019, p. 295) reveals, is that many of the studies that did report an effect of L1 use did not specify the types of L1 use and thus, comparability of such an effect across studies becomes more challenging.

Overall, the effect of L1 use on individual variability in L1 attrition outcomes is then not straightforward considering the multiplicity of contexts in which L1 use can take place (see Figure 1), where activation and inhibition of the L1 and the L2 are differentially engaged. In addition, it is also important to highlight that L1 use among potential attriters could also be different to L1 use with L1 functionally monolingual speakers given that the L1 of potential attriters could very likely be different to that of functional monolinguals. These changes in the L1 of attriters could in fact accelerate L1 attrition in other bilinguals with whom they interact, a factor that has not been duly addressed to date. Although the potentially modulated effect of L1 use has not been directly explored in this dissertation, frequency of L1 use in different contexts is indeed an essential component of the BLP, which is used to address language dominance, as already mentioned. Furthermore, our three groups of bilinguals clearly differ in frequency and recency of L1 use, which will be essential to explore the claims made by the ATH.

2.2.4 L1 (re-)immersion in attrition

Bilinguals who live in an L2 environment differ both quantitatively and qualitatively in terms of L1 and L2 exposure and use from those who live in the L1 environment as well as from functional monolinguals. Firstly, exposure to the L2 increases exponentially in an L2 immersion setting considering it is needed for daily use and communication. Moreover, use of the L2 is also essential in daily social interactions and for work or academic purposes, if required. Therefore, such an increase in L2 exposure and use consequently leads to a corresponding decrease in L1 values. Following the ATH

(Paradis, 1993, 2004, 2007) (see section 3.4.2), as already mentioned, this increased activation of the L2 requires inhibition (and expected disuse) of the L1. Given such scenario, Paradis claims that L1 items which have a competing counterpart in the L2 (e.g., overt pronouns in Spanish unlike null pronouns, which are only grammatical in Spanish across the board, see section 3.1), and which are less used in the L2 environment, will have an increased activation threshold. This raised activation threshold implies that such a linguistic item will be predicted to be more vulnerable since more neural impulses will be required for its activation. By contrast, when a late bilingual returns to their L1 setting, the patterns get reverted. Both L1 exposure and use are enhanced during re-immersion and hence, the activation of L1 linguistic items raises and their activation threshold is lowered. L1 items which were in competition with their L2 counterparts due to increased activation of the latter get arguably reverted to the former patterns prior to L2 immersion. However, the amount of re-exposure needed for L1 attrition effects to completely disappear remains to be explored.

The predictions from the ATH in relation to pronominal resolution have already been tested in a series of studies investigating L1 morphosyntactic attrition (see section 4.2.3), which is also the focus of this dissertation. For example, Gürel (2004) reported vulnerability of the overt pronoun *o* ‘s/he’ in Turkish under influence from the overt pronoun *s/he* in English and due to activation and inhibition factors as predicted by the ATH (Paradis, 1993, 2004, 2007) (see sections 3.4.3 and 4.2). No such attrition effects were found for the overt pronoun *kendisi* ‘oneself’ and the null pronoun since they do not have competing L2 counterparts.

In another study, Chamorro, Sorace, et al. (2016) tested both offline interpretation and online processing of null and overt subject pronouns in L1 Spanish-L2 English late bilinguals living in the UK. Apart from an immersed group of late bilinguals or potential attriters who had been living in the UK, they included an additional exposed group who was comparable to the attriters but had returned to their L1 environment for at least one week and after which they were tested. Under the lens of the ATH, the potential attrition effects found in the attriter group could arguably be reverted following L1 re-immersion. The results showed that, while the interpretation and processing of null pronouns did not differ among the two experimental groups and the control group of Spanish functional monolinguals, the only group that did not show sensitivity to interpretation mismatches for the overt pronoun in online processing was that of the attriters. In a group-by-group

comparison, the re-exposed group was not significantly different from the monolinguals or from the potential attriters. Nevertheless, the authors found a significant difference between the monolinguals and the attriters, which led them to argue that the exposed participants are placed somewhere between the attriters and the functional monolinguals. These results then evidence the potential effect of re-immersion in reverting L1 attrition effects in morphosyntax as predicted by the ATH.

Similarly, in a case study testing the effect of re-immersion in the L1 environment of an L1 Bulgarian-L2 German speaker, Köpke and Genevska-Hanke (2018) reported monolingual-like convergent patterns of production of null and overt subject REs once the late bilingual was tested in her L1 environment. When tested in Germany, the authors found significant differences between her production, which was largely overexplicit in the use of overt subject pronouns, when compared to an L1 Bulgarian control group. Moreover, the late bilingual was tested after 5 years, both in her L2 and L1 environment subsequently. In these two instances, the bilingual's performance was found to be native-like. The authors argue that such an effect could be the result of a reversal in her patterns of use of the L1 and the L2 between investigation point 1 and 2 after marrying an L1 Bulgarian speaker and therefore increasing her L1 use and exposure considerably. These results also lend support to the predictions on activation and inhibition formulated within the ATH.

On another note, it is worth noticing that these claims have largely been explored in L2-immersed late bilinguals who then get re-immersed in the L1 environment as described above. However, the predictions from the ATH could additionally be applicable to bilinguals in an L1 environment who still use and are exposed to the L2 (rather frequently considering both languages are also co-activated in their brain, as discussed in previous sections as one of the potential factors triggering L1 attrition. This situation is common in undergraduate students pursuing a degree that is taught in their L2. For instance, in most universities in Spain, a degree in English Studies is extensively taught in L2 English and students must interact using the L2 regularly. Furthermore, they receive additional L2 exposure and use through the completion of assignments and tasks that are compulsory after class hours, e.g., additional readings or writing essays. Not only that but some students choose the L2 as the medium for their leisure activities: e.g., reading, watching films, or talking to friends, to name but a few. Considering such a particular context, late bilinguals enrolled in these programmes receive intensive instructed L2

exposure and use, which inevitably reduces L1 exposure and use in the L1 setting. This L2 increase and subsequent L1 decrease contributes to the raising of the activation threshold of L1 items even if bilinguals are exposed to the L1 more frequently than in an L2 immersion setting. While the recency effect proposed within the ATH would not hold in this scenario bearing in mind the continuous presence of the L1, which is not that straightforward in an L2 immersion context as previously discussed, a clear frequency of (dis)use effect would be at play. Therefore, future research should further test to what extent this decrease in L1 use and exposure could contribute to L1 vulnerability of certain morphosyntactic phenomena, one of the main questions addressed in this dissertation (see Chapter 5). The potential attrition(-like) effects found in bilinguals in an intensive L2 instruction programme could possibly be similar to those found in an immersion context, although comparatively and expectedly milder. This context, nevertheless, has not received enough attention so far.

2.3 Chapter summary

This chapter has contextualised the need to study L1 attrition within the field of bilingualism. In doing so, the current scope of L1 attrition has been presented taking into consideration the wider definition proposed by Schmid and Köpke (2017a, 2019), which invites for a new conceptualisation of L1 attrition understood as a continuum from transient to more permanent changes that might eventually affect underlying L1 knowledge. In addition, considering current evidence on L1 attrition and the linguistic context in most societies nowadays, the use of a functional monolingual control group, a standard practise in the fields of bilingualism and SLA, has been questioned and it has been suggested that its inclusion should be duly justified, if required. Moreover, this section has additionally delimited the scope of the study of L1 attriters. While research on L1 attrition has traditionally investigated late bilingual adults in an immersion setting, this dissertation also focuses on instructed bilinguals, an under-researched population which deserves further attention.

To conclude, several modulating factors such as language dominance, length of intensive L2 exposure, frequency of L1 use, and L1 re-immersion have been discussed to contextualise the variables that will be included in the current study. Firstly, language dominance, which has not been widely investigated in L1 attrition studies, is understood

in this dissertation as a continuous measure that encompasses different dimensions within the bilingual experience, i.e., language history, language use, language proficiency, and language attitudes. It is then thought to be a proxy for bilingualism. Secondly, length of intensive exposure to the L2 will be considered both as length of residence in the L2 environment for immersed bilinguals and as length of intensive instructed L2 exposure for instructed bilinguals. While the results from the exploration of the effect of length of residence in the L2 environment have been under-researched and are not conclusive when it comes to morphosyntax, the effect of length of intensive instructed exposure in the L2 has been overlooked in previous studies. Subsequently, the role of frequency of L1 use proves to be important in L1 attrition, although the available evidence to date does not make it possible to claim that the higher the amount of L1 use, the less likely different language properties will be to attrite. L1 use should be considered differentially depending on the contexts where it occurs (i.e., monolingual, bilingual, or intermediate mode), although previous research has not approached this consistently. Finally, from the findings on L1 re-immersion for immersed bilinguals, it becomes necessary to control for potential re-immersion periods in bilinguals given that returning to a context in which the L1 is more frequently and recently used appears to revert potential attrition effects. Importantly, from this chapter, it has become clear that the different factors presented generally interact (e.g., L1 re-immersion involves frequent and recent L1 use) and should thus be carefully scrutinised.

Having presented L1 attrition within the wider field of bilingualism as well as having discussed some of the factors that modulate its outcomes, the following chapter will present both the distribution of null and overt subject REs in L1 Spanish and the factors that modulate distribution in production, interpretation, and processing, in addition to the theoretical models that motivate the research questions and hypotheses that this research addresses.

CHAPTER 3. Referring expressions in subject position in native Spanish: factors and theoretical models

The aim of this chapter is to present the main phenomenon under investigation: i.e., the production, interpretation, and processing of subject REs in L1 Spanish-L2 English potential attriters. To do so, the distribution of subject REs in Spanish and English will be presented, as well as the factors that trigger their null or overt realisation. Furthermore, the factors that condition both the interpretation and processing of null and overt subject REs will also be scrutinised. Although the factors that will be presented may equally affect production, interpretation, or processing, the separate presentation of these factors into production and interpretation/processing relates to the ones that will be particularly explored within each of the tasks included in this dissertation. Finally, the theories that make the relevant predictions as to the direction of the potential attrition effects that are likely to surface in the contexts that are the object of this thesis will be scrutinised.

3.1 Distribution of subject referring expressions in Spanish and English

Subject expression and distribution have proved to be essentially defining properties of human languages. Differences in subject expression can be framed within one of the main distinctions proposed within the Principles and Parameter model (Chomsky, 1981). While null-subject languages (e.g., Spanish, Italian, or Greek) allow for the dropping of overt subject REs with finite verbs, since they exhibit the [+null subject] value of the Null Subject Parameter⁶, non-null-subject languages⁷ (e.g., English, German, or French) do not syntactically license null pronouns generally because they instantiate the [-null subject] value (Jaeggli, 1982; Rizzi, 1982, 1986). Thus, the following example (see 1) illustrates (un)grammatical options of subject realisation in Spanish and in English.

1. *Él/∅_i se levanta a las 10 todos los días⁸.*
'He_i/*∅_i wakes up at 10 every day'.

⁶ The positive value of the Null Subject Parameter has also been associated with other grammatical properties such as null expletives, the possibility to have inverted subjects and the absence of that-trace effects (Camacho, 2013). Null-subject languages tend to additionally have (relatively) free word order, and thus, they allow subject-verb inversion, which is conditioned by definiteness, information structure, and verb class, among other factors (Lozano, 2006; Tsimpli et al., 2004).

⁷ Also referred to as pro-drop and non-pro-drop languages, respectively.

⁸ Indices mark the antecedent of each RE.

In addition, both Spanish and English allow subjects to be realised by NPs, which can largely alternate freely with overt and null pronouns in subject position in the former and with overt pronouns in the latter (e.g., 2).

2. *Fernando_i/Él_i/∅_i siempre ha querido ser doctor.*

‘**Fernando_i/He_i/*∅_i** has always wanted to become a doctor’.

The rich Spanish verbal system, which inflects for both number and person, makes it possible for subjects to be understood without being overtly expressed (Geeslin et al., 2015; Lozano, 2016; Montrul & Rodríguez-Louro, 2006; Shin & Otheguy, 2009), contrary to what happens in non-null-subject languages like English (see 3 and 4). However, when the same verb form coincides for two persons in Spanish, contextual cues are necessary for disambiguation purposes (Camacho, 2013) (see 5).

3. *Mañana ∅_i (nosotros_i) volvemos a la rutina de una vez por todas.*

‘Tomorrow **we_i** return to routine once and for all’.

4. *¿∅_i (tú) vienes al piso de María mañana?*

‘Are **you_i** coming to María’s flat tomorrow?’

5. *El otro día ∅_{i/j} quería ir a la piscina de Andrea. (∅ for 1st or 3rd person singular). / El otro día ∅_{i/j} quería ir a la piscina de Andrea, pero al final (a) no ∅_i pude / (b) no ∅_j pudo.*

‘The other day **I_i /he_j** wanted to go to Andrea’s swimming pool. / ‘The other day I/he wanted to go to Andrea’s swimming pool but (a) I_i/ (b) he_j couldn’t in the end’.

While the subject in the first sentence of example 5 above is ambiguous and can be interpreted in two different ways, the last part of the sentence makes it possible to disambiguate with either (a) a 1st person or (b) a 3rd person singular reading.

Moreover, it is worth mentioning that some contexts require the use of either explicit or null subject pronouns. Three of these scenarios (Blackwell & Quesada, 2012; Montrul & Rodríguez-Louro, 2006) correspond to sentences with verbs expressing atmospheric conditions (6) and existential constructions (7), which require null pronouns in Spanish but overt REs in English, and subjects realised by relative pronouns (8), whose omission is not allowed in any of the two languages.

6. *En Edimburgo* \emptyset /**lo/*ello*⁹ *llueve mucho*. (Only \emptyset is allowed in such contexts)
‘It rains a lot in Edinburgh’.
7. *\emptyset /*Ello* *hay muchos perros en este parque*.
‘**There**/** \emptyset* are many dogs in this park’.
8. *Ese_i es el profesor visitante* **que_i** *vino el lunes a clase*. (Relative pronoun unable to be omitted)
‘He_i is the visiting professor **who_i** came to class on Monday.’

Despite the differences between English and Spanish, there are some restricted contexts where null pronouns are allowed in both languages (Haegeman & Ihsane, 1999; Harvie, 1998): null pronouns can be used in coordinated contexts with coreferential subjects (see 9).

9. *Elena_i fue a la playa y* \emptyset _i *se llevó su libro favorito*.
‘Elena_i went to the beach and \emptyset _i took her favourite book’.

In particular, this dissertation will explore the distribution of 3rd person singular pronouns, which have been found to be the most problematic ones in the acquisition of L2 Spanish (Lozano, 2009) and are thus hypothesised to be vulnerable in L1 attrition. In addition, 3rd person pronouns are selected given that they are largely used anaphorically to refer to entities that are mentioned in discourse, as opposed to 1st and 2nd person pronouns, which are generally used to denote participants in the speech act, i.e., the speaker and the addressee, respectively.

3.2 Factors that constrain the production of null and overt subject referring expressions in native Spanish

The selection of null or overt subject REs in a language such as Spanish, where they can alternate, is not completely free. Given that such a phenomenon is constrained at the syntax-discourse interface (see 3.4.1), several previously investigated (discursive) factors have been shown to constrain the form of the RE used in each context. This section will highlight the importance of some of these variables, and particularly the ones relevant for

⁹ * is used to mark ungrammaticality in a language.

this study (e.g., information structure, syntactic configuration, or number of potential antecedents, among others), in how they trigger the use of fuller or less explicit REs in production. Nevertheless, there are other factors that have been previously explored (e.g., characterhood or verb semantics, among others) but which will not be addressed in depth in this dissertation (but see T. Quesada, 2021) since they are out of the scope of the current investigation.

3.2.1 Information status: topic continuity vs. topic shift

Despite the grammatically possible alternation between overt and null subject REs in Spanish, considering information status, different subject forms are expected to be produced in different contexts. A first distinction can be established between TC and topic shift (TS) scenarios, which draws on the central notion of *topic* in information structure. *Topic*, which is understood as information that has been previously established in discourse or *old information*, contrasts with *focus*, which refers to *new information* that has been highlighted or non-presupposed (see discussion in Georgopoulos, 2017; Lozano, 2003; Sánchez, 2010). Notably, REs are sensitive to these features (Runner & Ibarra, 2016) and two main contexts can thus be distinguished (Bel & García-Alcaraz, 2015; Blackwell & Quesada, 2012; Collewaert, 2019; Georgopoulos, 2017; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021; Shin & Smith Cairns, 2009). First, TC¹⁰ contexts are characterised by the maintenance of a given referent, which typically coincides with the topic (and generally with the subject), from one clause to the following one. The main referent in example 10 below, i.e., Chaplin, is maintained from the first clause onwards and continues to be the subject that carries out the actions from the subsequent verbs.

10. *Chaplin_i intenta entrar en la casa y Ø_i busca las llaves para poder entrar.*

[ES_SP_20_15_LPS]¹¹ (Functional monolingual)

‘Chaplin_i tries to enter the house and Ø_i looks for the keys to get inside’.

¹⁰ This context has also been termed topic maintenance, same-reference or non-switch reference, to name but a few (Blackwell & Quesada, 2012; Montrul & Rodríguez-Louro, 2006; Shin & Erker, 2015; Shin & Otheguy, 2009).

¹¹ The filename identifies participants in CEDEL2 (<http://cedel2.learnercorpora.com/>), and includes the following: L1(e.g., ES for Spanish)_Mode(Written/Spoken)_Age_Task(14. Chaplin and intervening characters/15. Chaplin alone)_Initials. Although these files are not available in version 02, they will be publicly accessed from version 03 onwards.

Given that the referent is kept constant in such scenarios, the use of an explicit form, be it an overt pronoun or an NP, is not required. Thus, TC contexts in Spanish are typically conveyed through minimal forms such as null pronouns (Collewaert, 2019; Geeslin et al., 2015; Lozano, 2009, 2016; Montrul & Rodríguez-Louro, 2006; Shin & Erker, 2015)¹². Importantly, the REs used in these contexts clearly differentiate null and non-null-subject languages, i.e., Spanish and English. Given that English does not allow for the dropping of overt subject REs across the board¹³, mostly overt forms are used in TC instead (see example 11). Hence, partly due to this difference, TC has been argued to be among the most difficult contexts to acquire by L2 learners (Contemori & Dussias, 2016; Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021) and is thus hypothesised to be the most vulnerable one in other bilingual settings such as L1 attrition, which is the main focus of this dissertation.

11. Chaplin_i picks up the child_j. Eventually he_i sits down on the pavement.
[EN_WR_57_14_HW]¹⁴

On the other hand, in TS¹⁵ scenarios, the topic is changed and thus requires an overt form to explicitly and clearly mark that the referent is different. This is illustrated in the following example (12), where reference is changed from Chaplin to the woman.

12. *Chaplin_i se encuentra a la mujer_j con el carro. Ella_j ya tenía otro bebé_k.*
[ES_SP_20_14_AMP] (Immersed bilingual)
'Chaplin_i meet the woman_j with a pram. She_j already had another baby_k'.

In TS, overt subject REs (e.g., overt pronouns, NPs, or proper names) are largely employed in both null and non-null-subject languages. The acquisition of the forms used in subject position in these contexts has been found to be less demanding in L2 learners

¹² Even though null pronouns are the preferred referring expression used in TC, native Spanish speakers also resort to the use of overt subject REs although marginally. Nevertheless, their use might be motivated by other factors such as the number and gender of potential antecedents, among others (Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021), a factor which will be further scrutinised in this dissertation.

¹³ Despite the fact that overt subject REs are required in non-null-subject languages like English, null forms are expected in a particular set of contexts, i.e., coordination with coreferential subjects, in both null and non-null-subject languages, as has been already mentioned in the previous section.

¹⁴ *Corpus of English as a Foreign Language*, COREFL, <http://corefl.learnercorpora.com/> (Lozano et al., 2021).

¹⁵ This context has also been referred to as switch reference (Blackwell & Quesada, 2012; Montrul & Rodríguez-Louro, 2006; Shin & Erker, 2015; Shin & Otheguy, 2009).

and less vulnerability is expected in L1 attriters (Collewaert, 2019; Georgopoulos, 2017; Lozano, 2016; T. Quesada, 2021; Shin & Erker, 2015; Shin & Otheguy, 2009).

However, available research additionally suggests that null pronouns can also be expected in TS although largely when the referent is clearly identifiable¹⁶ (Blackwell & Quesada, 2012; Giannakou & Sitaridou, 2022; Montrul & Rodríguez-Louro, 2006; T. Quesada, 2021), as shown in the following example.

13. *La madre_i le_j dice que ∅_j se lo_k tiene que llevar de nuevo.* [ES_SP_21_14_LGS]
(Functional monolingual)

‘The mother_i tells him_j that he_j has to take him_k back’.

Considering the above, the main focus in the production tasks in this dissertation will be TC scenarios. These contexts have been selected since they have been found to be the most problematic ones in L2 acquisition (Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021) and are hence tested to explore whether they are equally vulnerable in L1 attrition. In addition, a potential influence from L2 English in L1 Spanish production as a potential explanation of different L1 attrition outcomes would be more visible in these contexts, since different subject REs are to be expected in Spanish (i.e., null pronouns) and in English (i.e., overt material). Hence, an increase in the use of overt subject REs in TC in L1 Spanish speakers under the influence of L2 English could arguably be explained in part due to crosslinguistic effects¹⁷.

3.2.2 Salience/prominence/accessibility of the antecedent

Another factor that has been argued to determine subject realisation is the salience, prominence, or accessibility of the antecedent that a given RE refers to. The interrelated notions of salience, prominence, or accessibility¹⁸ of antecedents, which are central for both the interpretation and production of null or overt subject REs, have been discussed within several theories. Some of these theories such as Accessibility Theory (Ariel, 1990,

¹⁶ These contexts, nevertheless, are out of the scope of the current investigation.

¹⁷ To this crosslinguistic potential explanation, one that is based on bilingualism factors could also be added (Sorace, 2016).

¹⁸ Although these three notions are not tantamount, they are equally relevant to explore the interpretation and production of null and overt subject REs. These theories provide useful insights in terms of the factors that might modulate the different forms used in production in this dissertation such as distance between a given RE and its antecedent, or the number of potential antecedents and are thus subsumed within the same section.

1991), the Givenness Hierarchy (Gundel et al., 1993) or Givón's (1983) Continuity Scale within the Topicality Model, have provided different scales or hierarchies that correlate the use of more or less explicit REs in terms of how salient, accessible, or 'in focus' a given antecedent is as well as whether the contexts where they are found are continuous or discontinuous. Hence, we now offer a brief description of the main factors considered within these theories that determine the form of the RE used in each context, e.g., number of potential antecedents or distance from a given subject RE and its antecedent.

Firstly, in relation to the idea of a graded continuum of topicality, Givón (1983) established a continuity scale placing REs depending on the context(s) where they would be expected to appear in discourse. While less explicit (null or overt pronouns, depending on the language) would be found in continuous contexts where antecedents are more accessible, more informative REs (NPs) would be required with discontinued or inaccessible topics. Within his account, Givón (1983) additionally highlights the role played by factors such as referential distance between a given referent and its antecedent, potential interference of intervening antecedents, and persistence, i.e., maintenance of the topic in the following clauses.

Another account that locates REs within a scale is the Accessibility Hierarchy proposed by Ariel (Ariel, 1990, 1991). Taking the listener's perspective into account, Ariel suggests that the speaker will use more or less reduced REs depending on how accessible a given antecedent is for the addressee. More accessible antecedents tend to be those that are closer to the anaphor they refer to (i.e., distance), do not compete with other potential antecedents (i.e., number of potential antecedents), are in topic position, and belong to the same thematic unit together with the anaphor they refer to. Notably, accessibility is graded within a scale depending on whether all these factors are met or not. Hence, those antecedents that are highly accessible and can be easily recovered from the context are largely realised by more reduced REs (e.g., null pronouns in null-subject languages). By contrast, fuller forms are required to refer to less accessible antecedents.

Thirdly, Gundel et al. (1993) also provide the Givenness Hierarchy, which consists of six different cognitive statutes that determine the form of the RE required in each context. When referents are *in focus*, i.e., in the centre of attention, the use of minimal forms is expected to recover them in the discourse context. Referents located on the other end of the scale (e.g., referential or type identifiable) tend to be expressed resorting to more informative REs such as NPs. Whereas referents that are *in focus* could

arguably correspond to the TC contexts that will be explored within this dissertation, the boundaries between these statuses are, nevertheless, not very easily established and operationalised, and there does not seem to be a corresponding form associated with a given cognitive status.

Finally, the Activation Model by Kibrik (2011) explains that the choice of REs is modulated multi-factorially. A speaker will choose a reduced RE when the activation of the referent is high in working memory, while full REs will be prioritised when the referent's activation in working memory is low. Moreover, Kibrik's (2011) multi-factorial model considers several factors as modulators of referential choice, i.e., referent (e.g., animacy, gender, or person), anaphor (e.g., grammatical role), antecedent (e.g., referential form) and distance factors.

Overall, these theories highlight that the use of fuller or more reduced REs is determined by the salience, prominence, accessibility, or level of activation in working memory of a given antecedent. Moreover, theories such as the Activation Model draw attention to the multiplicity of factors that, together, modulate subject realisation. Among the factors discussed within these theories, the following will be of particular relevance within this dissertation: number (and gender) of potential antecedents, distance between a given subject RE and its antecedent, and information status (e.g., TC). It is worth mentioning that, regarding the distance factor, the distinction between a more explicit antecedent that can uniquely identify a given referent (e.g., Chaplin), which we name *textual* antecedent, and one that recovers a given referent regardless of its form (a null pronoun that refers to Chaplin), i.e., a *cognitive* antecedent (see section 7.1.2.4), has not been previously addressed and will be explored in this dissertation.

3.2.3 Syntactic configuration: coordination vs. subordination

As addressed above, languages like English and Spanish typically differ in the subject forms that are expected in different contexts based on information status, i.e., TC or TS. This can largely be explained bearing in mind that, while English, as a non-null-subject language, requires the use of explicit forms in almost all contexts, given that their dropping is not syntactically licensed, a division of labour is generally established in Spanish, i.e., null pronouns are typically found in TC and overt material (i.e., overt pronouns and NPs) in TS. However, in contexts involving coordination with co-

referential subjects (see example 14 below), null pronouns are the expected form in both languages.

14. *Chaplin_i turns and \emptyset_i sees the officer.* [EN_WR_29_14_SW] (English native speaker)

‘Chaplin_i se gira y \emptyset_i ve al oficial’.

It is almost exclusively in these contexts where null pronouns can be found in English¹⁹. Therefore, even though TC contexts have been found to be more taxing in L2 acquisition and are supposed to be more vulnerable in L1 attrition considering differences between English and Spanish, such differences are likely to be less apparent in coordination where the subject is maintained. This is indeed what previous studies comparing these cases of coordination against other contexts involving subordination or juxtaposition have found (for L1 English-L2 Spanish, see Georgopoulos, 2017; Lozano, 2016; Martín-Villena & Lozano, 2020; for L1 English-L2 Spanish and L1 Spanish-L2 English, see T. Quesada, 2021). An analysis of the potential differences that might be found between L1 Spanish bilinguals under the exposure of L2 English and those that are not exposed to other languages should reveal whether all syntactic configurations are equally vulnerable or whether a higher proportion of null pronouns will be found in coreferential coordinated contexts as opposed to the rest, which is a factor that will be analysed in this dissertation.

3.2.4 Nature of the antecedents: potential antecedents and their gender

Apart from factors such as information status or the specific syntactic configuration where a given anaphoric subject is embedded, the number²⁰ and gender of potential antecedents have been found to trigger different subject REs. It is important to note that, in most cases, selecting a fuller or less explicit subject RE first requires narrowing down from a choice of potential antecedents that are active in discourse. For instance, in the following discourse context (see 15), three potential antecedents are introduced (i.e., Chaplin, a man, and a baby).

¹⁹ They are also common in diary-drop styles (Haegeman, 1990; Haegeman & Ihsane, 1999, 2001).

²⁰ Number refers to the amount of antecedents and it is not related to grammatical number.

15. *Chaplin_i coge el bebé_j y Ø_i se va corriendo y Ø_i encuentra a un hombre_k para deshacerse del bebé. **Chaplin_i le_k da el bebé_j al hombre_k.** [ES_SP_18_14_ASO]*

(Functional monolingual)

‘Chaplin_i takes the baby_j and Ø_i runs off and Ø_i finds a man_k to get rid of the baby_j.

Chaplin_i gives the baby_j to the man_k’.

Selection of the required RE in the second sentence (*Chaplin le da el bebé al hombre* ‘Chaplin gives the baby to the man’) needs to be done bearing in mind the number of active potential antecedents that could match in features (e.g., 3rd person singular) with the verb. In the presence of matching features in more than one potential antecedent, a fuller RE should be selected to avoid ambiguity. On the one hand, paying attention to example 16 where there are two potential antecedents that match in number and gender features (e.g., two masculine and singular potential antecedents), a less explicit overt form such an overt pronoun would not be enough to disambiguate. Therefore, in such contexts, NPs or proper names are largely favoured in an attempt to be maximally clear and avoid ambiguity in line with the predictions from the PPVH, which will be later addressed in section 3.4.2 (Lozano, 2016, 2018; T. Quesada, 2021).

16. *Chaplin_i se gira y Ø_i ve al policía_j. Por lo tanto, Chaplin_i coge el bebé_k.* [ES_SP_18_14_ASO] (Functional monolingual)

‘Chaplin_i turns around and Ø_i sees the policeman_j. Chaplin_i therefore takes the baby_k’.

On the other hand, if two potential antecedents match in number but not gender features, that is, Chaplin and the woman (see 17 below), an overt pronoun would be the preferred subject RE used (e.g., *él no ha sido* ‘he didn’t do it’) since a null pronoun results in ambiguity (e.g., see *Ø se cabrea mucho* ‘she gets very angry’ and *Ø empieza a tener un debate* ‘he starts to have a debate’). A fuller form in this case (i.e., *Chaplin* or *the woman*) would lead to redundancy.

17. *Esta mujer_i se cree que ha sido él_j y Ø_i se cabrea mucho. Ø_j Empieza a tener un debate y una discusión porque él_j no ha sido pero la mujer_i piensa que sí.* [ES_SP_20_14_LOT] (Instructed bilingual)

‘This woman_i thinks he_j did it and (she_i) gets very angry. He_j starts to have a debate and an argument because he_j didn’t do it but the woman_i thinks he did’.

In addition, handling with several competing and intervening antecedents in discourse requires an exercise of working memory given that they need to be active for the appropriate one to be selected. This makes retrieving an antecedent from a larger set of potential ones more cognitively costly and more explicit subject REs are favoured in such contexts. The higher the number of potential antecedents in the previous discourse context, the fuller the RE that is used (Arnold & Griffin, 2007; Contemori & Dussias, 2016; Fukumura et al., 2010; Fukumura & van Gompel, 2011; Hendriks et al., 2014). This can in turn be explained focusing on concepts such as salience or prominence, which are crucial in the theories developed in section 3.2.2, among others. The presence of multiple competing antecedents tends to make a given referent less salient and therefore, a fuller form is necessary to relieve the processing load. Thus, when few or no competing antecedents are present, the referent in question is rather salient and a minimal form is expected (Ariel, 1990, 1991), which will be a factor that we will further expand in this dissertation.

3.3 Factors that constrain the interpretation/processing of null and overt subject referring expressions in Spanish

In the previous literature dealing with the interpretation and processing of null and overt subject REs, which has mostly focused on null and overt subject pronouns, several factors have been reported to modulate the strength of their online and offline biases (Alonso-Ovalle et al., 2002; Bel, Sagarra, et al., 2016; Chamorro, 2018; de Rocafiguera & Bel, 2022; Gelormini-Lezama & Almor, 2011; Jegerski et al., 2011). For instance, following the formulation of the Position of Antecedent Strategy or PAS (Carminati, 2002), which is addressed next, several studies have tried to further test whether the original predictions articulated for native Italian could be extended to L1 and L2 Spanish and whether they could apply to contexts other than the subordinate-main syntactic configuration for which it was initially proposed. The following subsections will illustrate the PAS first and whether differences in offline and online interpretation biases of null and overt subject REs have been found considering several linguistic and cognitive factors (e.g., clausal order, subordinating conjunction used to link main and subordinate clauses, or working memory), which will help narrow down the scope of this dissertation.

3.3.1 Syntactic prominence: Position of Antecedent Strategy

In order to account for the interpretation of null and overt subject pronouns in ambiguous intrasentential contexts, Carminati (2002) offered the Position of Antecedent Strategy for native Italian. The PAS was a structural parsing strategy which claimed that, in intrasentential syntactic configurations (see example 18 below), null pronouns were more likely to bias towards the subject of the previous clause (i.e., antecedents in preverbal subject position²¹) and overt pronouns were more commonly linked to antecedents in object position (i.e., antecedents that were lower in the hierarchical structure of the sentence).

18. *El policía_i sigue al ladrón_j mientras Ø_i/él_j corre por la calle.*

‘The policeman_i follows the thief_j while Ø_i/he_j runs down the street’.

This account is based on syntactic prominence of the antecedents and is in line with accounts of accessibility such as Ariel’s (1990, 1991) Accessibility Hierarchy explained in section 3.2.2. Antecedents in (pre-verbal) subject position are more salient or prominent than those in object position (i.e., lower positions in the hierarchical sentence structure) and thus require to be recovered by less explicit material. While the subject-null preference was widely attested, the preference for the overt pronoun to select object antecedents was milder in native Italian and was more dependent on contextual factors (Carminati, 2002, p. 67). It is also worth noting that the PAS does not make predictions about grammaticality: rather, it deals with preferences based on pragmatic (in)felicity of utterances resulting from the interpretation of ambiguous forms.

The original predictions formulated for native Italian have later been tested in other null-subject languages such as Greek (Di Domenico et al., 2020; Giannakou & Sitaridou, 2022; Torregrossa et al., 2020), Catalan (e.g., Bel & García-Alcaraz, 2018; de Rocafiguera, 2023), or Spanish (Alonso-Ovalle et al., 2002; Contemori & Di Domenico, 2021; de Rocafiguera & Bel, 2022; Gelormini-Lezama & Almor, 2011; Keating et al., 2016), among others. Regarding Spanish, which is the focus of this dissertation, the subject-null interpretation bias reported for Italian has been replicated in numerous studies (Alonso-Ovalle et al., 2002; de la Fuente, 2015; Jegerski et al., 2011; Keating et

²¹ In Carminati’s (2002) terms, preverbal subjects in topic position were referred to as antecedents in SpecIP position, which were contrasted with subjects that were not in SpecIP position, typically corresponding to object antecedents.

al., 2011, among others), although such a pattern has not been found in others (Chamorro, 2018; Chamorro, Sorace, et al., 2016; Giannakou, 2018). The bias of the overt pronoun to the object antecedent has been argued to be weaker and an object-overt interpretation bias has been less widely attested in native Spanish (Chamorro, 2018; de la Fuente, 2015; de Rocafiguera & Bel, 2022). Interestingly, it is worth mentioning that several factors have been argued to modulate (the strength of) these interpretation preferences such as syntactic configuration (main-subordinate vs. subordinate-main or subordination vs. juxtaposition). Hence, the following sections will highlight the contribution of several relevant factors to differences in PAS bias strengths.

3.3.2 Clausal order

Interpretation of null and overt subject pronouns has focused on both intersentential (e.g., Alonso-Ovalle et al., 2002; Gelormini-Lezama & Almor, 2011, 2014) (see 19) and intrasentential contexts (e.g., Filiaci et al., 2014; Jegerski et al., 2011; Keating et al., 2011) (see 20)²² and differences have indeed been argued to surface (Baumann et al., 2014; Hemforth et al., 2010; Miltsakaki, 2002; Runner & Ibarra, 2016).

19. *Juan_i se encontró con María_j. Él_i la_j vio triste.*

‘Juan_i met with María_j. He_i found her_j sad’.

20. *Cuando Carlos_i pidió ayuda a Diego_j para preparar el examen, él_{i/j} aprobó con notas excelentes.*

‘When Carlos_i asked Diego_j for help to prepare the exam, he_{i/j} passed it with excellent marks’.

Nevertheless, most of the previous research in Spanish has investigated intrasentential configurations. Crucially, relative clause order (subordinate-main vs. main-subordinate) has been found to modulate interpretation preferences of null and overt subject pronouns in null-subject languages such as Spanish (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015, 2018; de Rocafiguera & Bel, 2022). Firstly, while some studies have replicated the object-overt preference in both clausal orders separately (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015, 2018 but only in Spanish-Catalan bilinguals), the pattern subject-null has less strongly or only been found in subordinate-

²² The examples are taken from Gelormini-Lezama and Almor (2011) and Filiaci et al. (2014).

main order in studies comparing both configurations (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015, 2018; de Rocafiguera & Bel, 2022; Filiaci, 2011)²³. Secondly, it is worth noticing, however, that whereas some studies have indeed found a subject-null coreference pattern, but not an object-overt bias in main-subordinate clause order (Alonso-Ovalle et al., 2002; Filiaci, 2010; Filiaci et al., 2014; Jegerski et al., 2011; Keating et al., 2011), others have attested the opposite trend, i.e., only overt pronouns being coreferential with object antecedents (Chamorro, 2018; Chamorro, Sorace, et al., 2016). Finally, both PAS-like biases in main-subordinate order (de la Fuente, 2015; García-Alcaraz, 2015) have also been replicated in previous research. Therefore, it appears that the existing evidence on the effect of clause order is far from being conclusive and more evidence is needed to account for differences in biases and their strength²⁴. Even though clearer patterns may have been found in subordinate-main configurations, the context analysed in this dissertation will be that of main-subordinate clauses in order to keep consistency with the studies that we are partially replicating or extending.

On another note and as an important point for the discussion of the results from this dissertation, de Rocafiguera and Bel (2022) argue, based on Bever and Townsend (1979) and Garnham et al. (1998), that referents introduced in the first clause in subordinate-main syntactic configurations are more accessible (as well as the information contained within the clause) since subordinate clauses need to be interpreted in relation to the main clause, and structural and surface representations of such clause need to be kept in short-term memory. By contrast, main clauses can be interpreted in isolation without further additional information and short-term memory demands are released or freed up. Additionally, they provide evidence from a study by Rummer et al. (2003), who finds that subordinate-main clause configurations are processed faster and thus claims that the main clause is stored separately in memory if it is presented first, while the combination of subordinate-main clauses is represented as a chunk instead.

²³ These results should be interpreted considering some methodological limitations of the studies reported since most of the participants used were Spanish-Catalan bilinguals (see section 4.1.3).

²⁴ Regarding differences found on the effect of clausal order, de Rocafiguera and Bel (2022) argue that the type of tasks that have been used have also been different. They claim that acceptability judgement tasks could enable the exploration of more graded preference patterns focusing on the effect of clause order, which seems to disappear with the use of forced-choice tasks, where speakers tend to be less sensitive to such discursive factor.

3.3.3 Subordinating conjunction

Another relevant factor that has been found to play a role in modulating antecedent biases of null and overt subject pronouns are (subordinating) conjunctions. Conjunctions largely express coherence relations between clauses such as causal (21), temporal (22), or concessive (23), to name but a few, as the following examples show.

21. *El niño_i golpeó su juguete porque \emptyset_i estaba enfadado.*/The child_i hit his toy because he_i was mad.

22. *El niño_i golpeó su juguete cuando \emptyset_i estaba enfadado.*/The child_i hit his toy when he_i was mad.

23. *El niño_i golpeó su juguete aunque \emptyset_i no estaba enfadado.*/The child_i hit his toy although he_i was not mad.

They can help establish a coherent discourse representation (Xu et al., 2019), which can in turn increase the prominence of a given antecedent and thus decrease referential uncertainty (Kehler et al., 2008). Hence, conjunctions are crucial in establishing relationships between propositions and help understand the meaning of a given piece of discourse, i.e., their discourse relation, which is essential to interpret (ambiguous) REs (Holler & Suckow, 2016). Importantly, different discourse relations have been found to trigger or suppress pronoun interpretation preferences (Kehler et al., 2008; Kehler & Rohde, 2019). For instance, causal conjunctions such as *because* tend to trigger a subject antecedent interpretation for the overt pronoun *he* in a sentence like *John disappointed Bill because he...*, as opposed to consequential conjunctions, which are more likely to strengthen a bias towards an object antecedent in a sentence like *John disappointed Bill so he...* (Stevenson et al., 1994). There is additional evidence that other conjunction types are associated with different interpretation biases in anaphora resolution (Ellert & Holler, 2011; Fukumura & van Gompel, 2010; Holler & Suckow, 2016; Kehler, 2002; Koornneef & Sanders, 2013; Miltsakaki, 2007; Stevenson et al., 2000; Xu et al., 2019). Overall, conjunctions provide both semantic and structural properties to a given discourse and these properties can indeed affect the salience of antecedents (Holler & Suckow, 2016)

A large body of research exploring interpretation preferences of null and overt subject pronouns in null-subject languages, and particularly testing the PAS (Carminati, 2002), has adapted the stimuli used in Tsimpli et al. (2004) in Italian (Belletti et al., 2007; Sorace & Filiaci, 2006), Spanish (Clements & Domínguez, 2017), or Greek (Kaltsa et al.,

2015; Papadopoulou et al., 2015; Peristeri & Tsimpli, 2013). The set of sentences included in their study contained sentential configurations where a subordinate clause was linked to a main clause through the temporal conjunctions *when* and *while*. However, both temporal conjunctions used have not been counterbalanced in most of these studies. Therefore, even though both conjunctions could be argued to express the same or a very similar meaning, they present nuanced subtleties that could arguably trigger different interpretation biases, a factor which has not been thoroughly tested to date and which we will explore in this dissertation departing from the stimuli used in Tsimpli et al. (2004), where the conjunction used was indeed not counterbalanced.

Several authors have pointed out that *while* is more restricted in meaning than its counterpart *when* (Kupersmitt & Nicoladis, 2021; Silva, 1991; Winskel, 2003, 2004)²⁵. On the one hand, *while* is largely used to express simultaneity. This implies that two events are overlapping almost completely. On the other hand, *when* can have either a simultaneity or a sequentiality reading, among others. Winskel (2004, p. 334) argues that connectives with multiple senses are especially sensitive to the sentence context: for instance, interpreting *when* as simultaneous or sequential could be influenced by the aspect of the clause or world knowledge (Kavanaugh, 1979; Keller-Cohen, 1981). It could be argued that *while* is usually straightforwardly assigned a simultaneous reading whereas *when* could accept more than one interpretation. This could arguably modulate interpretation preferences of null and overt subject pronouns considering the tighter or more relaxed link that could be established between the main and subordinate clause, a factor which will be addressed in this dissertation.

3.3.4 Working memory

As stated by Cunnings (2017, p. 674), ‘successful sentence and discourse comprehension crucially relies on the ability to encode, store and retrieve information from memory’. In particular, effective interpretation of null or overt subject pronouns generally requires recalling a number of potential antecedents they might refer to. Thus, when sentences are parsed and additional processing is taking place, (potential) antecedents need to be maintained active in working memory for its subsequent retrieval and therefore successful

²⁵ The same semantic values are also replicated in Spanish (Bosque & Demonte, 1999; Rodríguez Barreiro, 2004).

pronoun interpretation (Almor, 1999; Cunnings, 2017; Kuijper et al., 2015; Nieuwland & Van Berkum, 2006; van Rij et al., 2013). Hence, differences in pronoun interpretation could arguably surface depending on the amount of information a speaker can actively maintain in working memory (Cunnings & Felser, 2013; Daneman & Carpenter, 1980; Just & Carpenter, 1992; Nowbakht, 2019), understood as the cognitive resources that are required to temporarily and simultaneously store and process information during complex actions (Baddeley, 1986, 2000, 2007). Moreover, antecedents' relative prominence in working memory has also been argued to differ. Subject NP antecedents are generally assigned a more prominent status in working memory (J. L. Nicol & Swinney, 2003, p. 84; Vogelzang et al., 2021). In line with Cunnings and Felser (2013), it could be hypothesised that speakers with a higher working memory span could more easily maintain antecedents in working memory and for longer, and hence select the most prominent subject antecedent for ambiguous pronouns in a language such as English, whereas those with lower working memory capacity would prefer to link potentially ambiguous pronouns to the closest (object) antecedent due to the decay of prominence over time.

On another note, for languages where null and overt pronominal forms alternate, based on data from Italian children and adults, Vogelzang et al. (2021) argue that null pronouns are likely to be influenced by working memory capacity, whereas overt pronouns are subject to other factors such as processing speed, which increases as a result of language experience. In discussing their results, children, who are hypothesised to have lower working memory capacity, 'will have difficulty with discourse processing and keeping referents activated in memory, which will lead to mistakes in [...] retrieving the discourse topic, resulting in [...] fewer topical interpretations for null pronouns compared to adults'. In addition, they state that '[c]hildren are expected to become more adult-like in their interpretations of [...] null pronouns as they grow older and their working memory capacity increases' (Vogelzang et al., 2021, p. 17). Although this prediction was only met in their modelling and not in their experimental data with children, they might need to be older than the ones tested in their study (i.e., from 6 to 8 years old) for null pronouns to be interpreted in line with adult patterns, i.e., referring to discourse prominent subject antecedents. Therefore, it could be argued that adults with higher working memory will be more likely to select subject antecedents when interpreting null pronouns (Bel, Sagarra, et al., 2016, p. 152), a factor which was not tested in their study since working memory was not purposefully analysed, and which will be addressed in this dissertation.

Hence, stronger subject-null associations are likely to be found in our bilinguals with higher working memory.

3.4 Theoretical approaches to the production, interpretation, and processing of null and overt subject referring expressions

In trying to account for the source of divergence in the production, interpretation, and processing of REs within bilinguals, several testable hypotheses have been proposed. These hypotheses have addressed how different aspects of the bilingual experience might trigger the selection of different REs in production as well as different interpretation patterns or processing costs emerging in online tasks. Considering differences between representation and (online) processing, the Interface Hypothesis (Sorace, 2011, 2012, 2016; Sorace & Filiaci, 2006) has been widely used within bilingualism studies to explain why bilinguals might perform differently with some types of pronouns and not others. Departing from findings on production data, the Pragmatic Principles Violation Hypothesis (Lozano, 2016) was formulated to address non-convergent patterns of production between L2 speakers and native controls, which were later confirmed experimentally (Lozano, 2018). Additionally, other accounts such as the Form-Specific Multiple-Constraints Approach (Kaiser & Trueswell, 2008) highlight the multiplicity of factors that constrain the interpretation of different REs to different degrees. Finally, the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007) provides working hypotheses that, although not specifically proposed for pronoun resolution, can be useful to test which subject forms are to be affected in attrition settings. Thus, this section will summarise the main points of these theories to frame the predictions articulated in this dissertation (see Chapter 5). Despite the fact that these theories have largely or exclusively been applied to L2 acquisition, its predictions have also been extended to potential L1 attriters in the case of the IH (Chamorro & Sorace, 2019) or the ATH, or provide enough potential for the application to other bilingualism contexts as is the case of the PPVH or the FSMC approach (see Lozano, 2021; and M. L. Quesada, 2015, for reviews of different models).

3.4.1 The Interface Hypothesis

Since its initial formulation (Sorace & Filiaci, 2006), the Interface Hypothesis has been widely used to test predictions about the non-convergence or residual or emerging optionality that has been attested in highly advanced late bilinguals or near-natives in both the production, interpretation, and processing of certain linguistic phenomena. Additionally, the predictions derived from the IH were also extended to bilingual L1 acquisition and L1 attrition, thus providing a unitary framework to account for differences in bilingual language development. Particularly, the domain of anaphora or pronominal resolution has been widely investigated thoroughly as a fruitful testing ground to test the IH (e.g., Belletti et al., 2007; Chamorro, Sorace, et al., 2016; Clements & Domínguez, 2017; Jegerski et al., 2011, 2011; Serratrice, 2007; Sorace & Filiaci, 2006), and it is also the domain selected in this dissertation.

The IH (Sorace, 2011, 2012) proposes that, while properties within narrow syntax (e.g., licensing of null pronouns in a null-subject language) are fully acquirable in L2 acquisition and remain rather stable in L1 attrition, properties located at the interface between syntax and other (external) cognitive systems (e.g., discourse/pragmatics) typically present indeterminacy or residual/emerging optionality. For instance, anaphora resolution with pronominal forms has been argued to be a vulnerable domain in bilingual language development, since it combines both knowledge of syntax with that of discourse constraints²⁶. For instance, considering null-subject languages, where null and overt subject pronominal forms can alternate²⁷, the IH predicts deficits exclusively in the case of overt pronouns, whereas null pronouns are thought to remain rather stable in bilinguals²⁸. More precisely, bilinguals (both near-native L2 speakers and potential L1 attriters) have been reported to overextend the scope of overt pronouns to refer to subject antecedents, that is, in TC (e.g., Georgopoulos, 2017; Kaltsa et al., 2015; Lozano, 2016,

²⁶ By contrast, internal interfaces (e.g., syntax-semantics) have been found not to be vulnerable in L1 attrition (Chamorro, Sturt, et al., 2016).

²⁷ Moreover, in languages such as German, where personal and demonstrative pronouns can alternate in some contexts and be used anaphorically, interpretation patterns of personal pronouns biasing towards the previous subject appear to be acquirable, whereas those of demonstratives show more indeterminacy (Sorace, 2011, p. 3).

²⁸ Even if research on experimental anaphora resolution has mostly focused on the dichotomy null/overt pronouns, corpus evidence shows that NPs are largely employed in TS scenarios or TC to a lesser extent (Blackwell & Quesada, 2012; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021) and should be considered in research testing anaphora resolution (but see Gelormini-Lezama & Almor, 2011, 2014; T. Quesada, 2021, among others).

2018; Montrul & Rodríguez-Louro, 2006; T. Quesada, 2021; Sorace & Filiaci, 2006; Tsimpli et al., 2004).

The locus of optionality or instability argued for overt pronouns has been addressed by both a *representational* and a *processing resources* account. The *representational account* predicts differences in knowledge representations between bilinguals and native speakers. This has been argued to be the case due to the influence of one language on the other. For example, knowledge of a language like English, where subjects are largely (or almost exclusively) overtly expressed, influences a language with the most complex interface system (e.g., Spanish or Greek) where null and overt REs (can) alternate in subject position. This alternation is guided by discourse constraints, and it is these constraints that are affected or vulnerable in bilingual language development. In the case of pronominal forms in bilinguals, overt pronouns tend to additionally allow a [-topic shift] reading, which is common of null pronouns in null-subject languages, apart from its preferred [+topic shift] interpretation. Therefore, there seems to be an underspecification or weakening of the interpretable feature [+topic shift]²⁹, given that such feature is not present in the L2 in the same syntactic contexts (Tsimpli, 2014). In L1 attriters, the overt pronoun is hypothesised to involve two mappings, [+/- topic shift], whereas the null pronoun retains its initial mapping [-topic shift]. Hence, under this account, crosslinguistic effects are predicted from the language with the least restrictive syntax-pragmatics interface system (e.g., English) to the one with the most restrictive system (e.g., Spanish). Sorace (2011, p. 13) argues that this account could only be applied to bilinguals whose language repertoire includes languages with different (more or less complex) settings that depend on syntax-pragmatics interface conditions. However, in light of evidence showing potential differences in the scope of overt and null pronouns in null-subject languages (Contemori & Di Domenico, 2021; Di Domenico et al., 2020; Filiaci, 2010; Filiaci et al., 2014; Torregrossa et al., 2020), one could still predict such crosslinguistic effects from the language with the least restrictive pragmatic constraints on pronominal forms to the other (see Romano, 2019).

Under the *processing resources account*, bilinguals have been found to use different online processing strategies required for interface structures. They appear to be

²⁹ While interpretable features contribute to sentence meaning (e.g., tense and aspect), uninterpretable ones do not (e.g., case and grammatical gender) (Rothman & Slabakova, 2018, p. 422). Interestingly, the Interpretability Hypothesis (Tsimpli & Dimitrakopoulou, 2007) predicts difficulties in bilingual settings particularly when dealing with interpretable features such as [+topic shift].

less efficient than monolinguals when integrating multiple sources of information from different domains simultaneously. These differences could be the result of a less automatic syntactic processing of interface structures. This limited automaticity has in turn been explained by a potential less efficient access to knowledge representations or the fact that these representations are less developed. According to Sorace (2011, p. 20), this account is coherent with the fact that

‘(a) bilingual-monolingual differences appear to be more quantitative than qualitative, (b) performance is affected by the characteristics of the task, and (c) much variation is attested both within and across individual speakers’.

Under this account, the overt pronoun is overextended and used as a default strategy to compensate for potential failures that might arise when computing mappings at the syntax-pragmatics interface in real time. Interestingly, this overextension of the overt pronoun would result in redundancy, which is preferred (and more widely attested) to ambiguity in bilinguals following the PPVH (Lozano, 2016).

Furthermore, it is important to mention that the use of the overt pronoun as a default strategy has been explained in terms of input-related factors and/or executive control in bilinguals. Firstly, considering L1 attriters in an immersion setting, increased L2 use and exposure lead to reduced L1 input and use in the first place. Moreover, L1 attriters are likely to receive L1 exposure from other potential attriters, and therefore, more overt forms could arguably be used to refer to subject antecedents, following the L2 English trend. Secondly, since it has been argued that both languages are active in bilinguals (Green, 1998), executive control must be constantly exercised, hence requiring attentional resources to inhibit the language not in use. These attentional resources are needed in pronominal resolution to properly identify the antecedent of a given referent and thus, this phenomenon could partly explain differences between native speakers who are not exposed or use a second language and potential L1 attriters.

Overall, the predictions from the IH for adult L1 attrition³⁰ are that advanced bilinguals become slower at quickly integrating syntactic and discursive information in the L1, while their knowledge representations tend to remain intact (Sorace, 2011, 2016).

³⁰ Chamorro and Sorace (2019, p. 26) emphasise that this prediction applies to ‘first generation individual attrition in speakers who have acquired the L1 completely before the onset of attrition’, which is the case of the participants investigated in this dissertation.

In order to relieve processing demands, the overt pronoun is mainly used as a default when integration is more demanding. Furthermore, the differences between bilinguals are more quantitative than qualitative (Sorace, 2011, 2012, 2016) and depending on several factors such as input quantity and/or quality, different results might be expected for different types of bilinguals, which will be further addressed in this dissertation. This account appears to be favoured over a representational account considering that overextension of overt pronouns has also been attested in bilinguals of two null-subject languages (e.g., Bini, 1993; Georgopoulos, 2017; Lozano, 2018; Margaza & Bel, 2006; Serratrice et al., 2012; Sorace & Serratrice, 2009). Nevertheless, differences in the scope of null and overt subject pronouns have also been reported, and hence, these microparametric differences could indeed be the source of crosslinguistic influence in such scenarios (see Romano, 2019 for a full account)³¹. Lastly, despite its potential limitations, it is important to mention that the IH has provided a prolific testing ground for interface phenomena in an attempt to unify a framework that can account for differences in multiple bilingual settings. It has favoured a continued dialogue between research on linguistic aspects of bilingualism and on non-linguistic cognitive factors involved in processing of interface structures.

3.4.2 The Pragmatic Principles Violation Hypothesis

Departing from the study of the division of labour of REs in native and L2 grammars, Lozano (2016) recently proposed the Pragmatic Principles Violation Hypothesis to account for the observed divergence in their performance. Remarkably, anaphora resolution offers the possibility to explore an interface phenomenon where syntax and pragmatics or discourse interact. This domain has been hypothesised to be vulnerable by, for instance, the IH, whereas syntax alone is thought to pose no major problems, as has been mentioned in the previous section. For example, in null-subject languages like Spanish, Greek, or Italian, even though the dropping of overt subject material is grammatically possible, the distribution of null and overt subject REs has been found to be constrained by discursive factors as illustrated in section 3.2 (e.g., Blackwell & Quesada, 2012; Collewaert, 2019; Lozano, 2016; M. L. Quesada, 2015). Despite the

³¹ Future research should investigate whether L1 influence is the responsible factor for differences between bilinguals or whether it should be rather seen as a reinforcing factor additional to more general bilingualism effects that make the scope of the overt pronoun more malleable in bilingual settings.

abundant evidence that learners of null-subject languages are aware of the grammatical options that a language like Spanish would offer (i.e., the alternation of null and overt forms) from earlier stages of acquisition (Al-Kasey & Pérez-Leroux, 1998; Hilles, 1986; Licerias, 1989; Phinney, 1987; White, 1986), they are still found to struggle with its appropriate distribution in larger stretches of discourse (Bel, García-Alcaraz, et al., 2016; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; Montrul & Rodríguez-Louro, 2006; T. Quesada, 2021). On the one hand, L2 learners are shown to be largely overexplicit in contexts where a null pronoun would be expected, i.e., in TC scenarios. On the other hand, it has also been found that they are underexplicit in TS by producing inappropriate null pronouns, which would then result in ambiguity (García-Alcaraz & Bel, 2019; Giannakou & Sitaridou, 2022; Lozano, 2009, 2016; T. Quesada, 2021). It is important to note that redundancy has been more widely attested than ambiguity in L2 production consistently with the IH and in different populations (L2 speakers, L1 attriters, or simultaneous bilinguals) and this is indeed the main motivation and prediction within the PPVH, which can indeed account for bidirectionality of deficits, i.e., redundancy and ambiguity, and adds a pragmatic explanation to account for such bidirectionality.

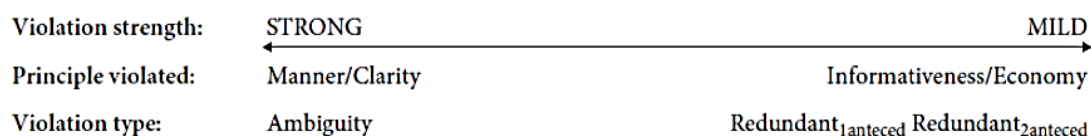
Based on previous work that used Grice's (1975) Maxims of Quantity and Manner³² to explain differences in the distribution of null and overt subject forms in anaphora resolution³³, Lozano (2016, p. 261) formulated the PPVH including principles that would 'call for the avoidance of ambiguity and redundancy as long as the anaphora can be resolved'. The PPVH introduces the idea of different violation strengths (mild to strong), which are connected to the principle violated (Manner/Clarity vs. Informativeness/Economy) and to a specific violation type (ambiguity vs. redundancy), as can be seen in Figure 2.

³² Within Quantity, Grice (1975, p. 45) included two maxims: 'make your contribution as informative as is required (for the current purposes of the exchange)' and 'do not make your contribution more informative than is required'. The four maxims proposed under Manner are: 'avoid obscurity of expression', 'avoid ambiguity', 'be brief (avoid unnecessary prolixity)' and 'be orderly'.

³³ For example, Chomsky (1957) for the formulation of the *Avoid Pronoun Principle*, Blackwell (1998) for her *Manner Principle* and *Informativeness Principle*, or Geluykens (2013) for the *Clarity Principle* and *Economy Principle*.

Figure 2

Pragmatic Principles Violation Hypothesis



Thus, Lozano (2016) argues that violating the Informativeness/Economy Principle results in redundancy, which is understood as a mild violation, considering it does not lead to a communicative breakdown as the anaphora can be easily resolved. Within this scenario, an additional gradience is included within redundancy: an overt form (e.g., an overt pronoun) is more redundant in TC when only one antecedent is present than where there are two (or more). By contrast, violating the Manner/Clarity Principle typically makes it impossible to resolve the anaphora due to its ambiguity, and thus, it is considered a strong violation since communication breakdowns are likely to emerge. It is then hypothesised that, in learners, the violation of one principle (Informativeness/Economy Principle) will be more frequent than the violation of the other (Manner/Clarity Principle).

Additionally, Lozano (2016) observes that the pragmatic violations attested in learners are also parallel in native grammars, although rather marginally. To a much lesser extent, it has been found that native speakers also produce explicit material that results in redundancy in TC, but their production of ambiguous subject forms is rather infrequent. Moreover, Shin and Smith-Cairns (2009) provide additional evidence that ambiguity is avoided earlier on in the development of L1 Spanish (before 9 years) than redundancy (after 15 years). This, from a PPVH perspective, would indicate that the Informativeness/Economy Principle is violated for longer than the Manner/Clarity Principle in L1 acquisition.

Following the original formulation of the PPVH (Lozano, 2016) and the corroboration of the predictions in an acceptability judgement task in Lozano (2018), Quesada (2021) expanded it in a new version trying to accommodate the interaction of redundancy with other factors such as information status (TC vs. TS), syntactic configuration (e.g., coordination), picture transition (same vs. new image), and characterhood (main vs. secondary character). Particularly, these factors are hypothesised to trigger a milder or a stronger violation within the redundancy spectrum. Hence, this second formulation of the hypothesis further expands on the variables that contribute to

gradience within redundancy, apart from the number of potential antecedents initially proposed. In a series of studies testing the developmental acquisition of L2 English and L2 Spanish anaphoric expressions in a mirror learner design³⁴, Quesada (2021) corroborates the claim made by the PPVH that learners more frequently violate the Informativeness/Economy Principle compared to the Manner/Clarity Principle. Importantly, this was true for both L2 learners of Spanish and English. Another interesting finding and an expansion of the PPVH is that learners appear to developmentally reduce the number of violations of the Informativeness/Economy Principle, i.e., instances of redundancy decrease across proficiency levels. Quesada (2021) explains that she does not address the relationship between redundancy and number of antecedents since information status was not considered when investigating the number of potential antecedents. In her studies, TC and TS scenarios were conflated when investigating such factor. Interestingly, the interaction between redundancy and number of antecedents in TC will be addressed in this dissertation in depth.

It is important to note that the PPVH has exclusively been applied to L2 acquisition contexts to date (Feng, 2022; García-Tejada, 2022; Lozano, 2016, 2018; Lumley, 2020; Margaza & Gavarró, 2022; T. Quesada, 2021). Native speakers have been found to obey pragmatic principles and their violations of such principles are thought to be minimal. Furthermore, bilingual adults ‘are supposed to already manage pragmatic principles in their L1’ (T. Quesada, 2021, p. 300). Nevertheless, there is ample evidence that suggests that the two languages of a bilingual are in constant interaction and that they (can) influence each other in multiple domains (Chamorro & Sorace, 2019; Green, 1998; Schmid & Köpke, 2017a). Therefore, it remains to be explored whether the violations associated to the production and interpretation of more or less explicit subject REs could be articulated within a continuum between ambiguity and redundancy as proposed by the PPVH in the L1 of highly proficient bilinguals. With this aim in mind, this dissertation will investigate to what extent the predictions generated from the PPVH can be extended to L1 attrition contexts and how redundancy interacts with factors such as the number and gender of potential antecedents in TC contexts in L1 Spanish-L2 English bilinguals differing in their L2 proficiency and/or (type of) exposure to the L2. Although further developed in section 5.1, we expect immersed bilinguals to be more redundant than instructed bilinguals and the latter than functional monolinguals considering differences

³⁴ The studies tested L1 Spanish-L2 English and L1 English-L2 Spanish learners.

in frequency and recency of L1 use. Moreover, several factors such as number of potential antecedents and distance between the subject RE and its antecedent are expected to contribute to grading redundancy contexts, thus exhibiting stronger or milder violations to the Informativeness/Economy Principle.

3.4.3 The Activation Threshold Hypothesis

Another relevant theoretical contribution is the Activation Threshold Hypothesis by Paradis (1993, 2004, 2007), which, even though it was not formulated specifically for the domain investigated, can make relevant predictions within this dissertation. Within this hypothesis, there are three main predictions that are crucial for L1 attrition. The first one claims that language disuse will generally lead to language loss, which places frequency of use as central in language attrition. The second prediction states that those items from the L2 that are more frequently used will replace their (arguably less used) L1 counterparts. This introduces the notion that items which have competing L2 counterparts will be more likely to attrite and highlights the selective nature of L1 attrition, in line with other accounts such as the IH. Finally, Paradis (2007) also claims that comprehension will be retained longer than production. Essentially, these predictions are articulated based on the fact that ‘any mental representation requires a certain amount of neural impulses in order to reach activation (its activation threshold)’ (Paradis, 2007, p. 124). It is then important to note that, when a given item is used (more frequently and recently), its activation threshold gets lowered, which facilitates its subsequent activation. By contrast, such threshold rises when a given linguistic item is inactive or disused. Generally, competing items in the language not used get inhibited following the activation of the counterpart in the language that is being used. This inhibition is argued to raise the activation threshold of that linguistic element. Bearing this in mind, production requires generating a given impulse from within, as opposed to comprehension, where such impulse is externally provided. In addition, Paradis (2007, p. 125) argues that ‘activation of a particular element (e.g., a word, a syntactic construction) raises the activation threshold of competing candidates’.

Crucially, the main claims of the ATH have already been tested on research investigating vulnerability of interface structures such as interpretation of null and overt subject pronouns in L1 Spanish and L1 Turkish under the influence of L2 English

(Chamorro, Sorace, et al., 2016; Gürel, 2004), which will also be the focus of this dissertation. In the case of L1 Turkish, attrition effects are predicted for the overt pronoun *o* ‘s/he’ since it has a corresponding competing element in English, i.e., the third person singular overt pronoun ‘s/he’. By contrast, the overt pronoun *kendisi* (‘oneself’) and the null pronoun are argued and have been found to remain rather stable in attrition settings. Regarding the combination of English and Spanish (Chamorro, Sorace, et al., 2016), overt pronouns in L1 Spanish are hypothesised to show attrition effects in language contact settings, whereas null pronouns will be unaffected given that they do not have an overall competing counterpart. These predictions are also expected to be met in this dissertation, i.e., vulnerability of only overt pronouns in L1 attrition settings, effects that will be more apparent in immersed than in instructed bilinguals due to L1 recency and frequency of use factors. Furthermore, Chamorro, Sorace, et al. (2016) used the ATH to explain the temporary nature of L1 attrition effects at the syntax-discourse interface. L1 attrition effects diminished after re-exposure in the L1 environment due to its recent and frequent activation. Studies testing attrition should then take potential re-immersion effects into account, as will be done in this dissertation.

3.4.4 The Form-Specific Multiple-Constraints Approach

Kaiser and Trueswell (2008) proposed the Form-Specific Multiple-Constraints approach to account for pronoun resolution. In their proposal, rather than opting for a single-factor approach where salience of a given referent would be determined by a single specific factor (e.g., word order or linear order), they argued that salience of a referent would be determined by the added weights of different constraints. Apart from understanding pronoun resolution as the result of the weighted combination of different cues, different REs were thought to be sensitive to different constraints and to different degrees. This multi-factorial account is not then compatible with others that assume all REs to be sensitive to the same constraint(s) and to the same degree (Kaiser & Trueswell, 2008, p. 723). The interpretation of sentences containing REs requires, according to Kaiser and Trueswell (2008, p. 741), the activation of two representations of the prior linguistic input:

- ‘a. The syntactico-semantic representation of the preceding sentences, which we assume includes information about grammatical and thematic roles.

- b. the comprehender's mental model of the discourse, which we assume includes information about the situation or event being described and the entities involved in it'.

Under this approach, salience of referents is ranked both at the syntactico-semantic level and on the mental discourse model level. For instance, in their study investigating interpretation preferences of the gender-neutral overt pronoun *hän* and the demonstrative *tämä* in Finnish (Kaiser & Trueswell, 2008), the overt pronoun was found to link back to subject antecedents regardless of word order (i.e., it was largely sensitive to syntactic role), whereas the demonstrative preferred postverbal, discourse-new, especially object antecedents (i.e., it was mostly sensitive to word order). Their findings support the claim that different REs are sensitive to different constraints (e.g., grammatical role and word order) and to different degrees, and therefore, salience of a referent should not be unified in a single scale. Interestingly, most of the research carried out under this approach has been done on non-null subject languages such as Finnish, Estonian, German, Dutch, or English, among others, where several overt forms can alternate (Kaiser, 2010, 2011). However, recent research has used this framework to explore interpretation and processing of null and overt pronouns in Polish (Wolna et al., 2022). Therefore, the claim that different, but informationally equivalent, REs could be differentially sensitive to different cues is a working hypothesis that deserves being explored in languages like Spanish, where null and overt pronouns alternate, as will be done in this dissertation. According to Wolna et al. (2022, p. 5), the FSMC approach could account for the differential processing costs attested in Italian and Spanish when forcing coreference of the overt pronoun towards the subject, which is more evident in Italian than in Spanish. This could arguably be the result of a difference in degree of sensitivity to specific syntactico-semantic cues in both these languages. Therefore, we predict different syntactico-semantic cues (e.g., different subordinating conjunctions, see section 3.3.3) to affect interpretation of null and overt pronouns differently in Spanish.

3.5 Chapter summary

In sum, this chapter has described the distribution of subject REs in native Spanish, as well as the factors that condition their specific realisation (e.g., information status, salience of the antecedent, number of potential antecedents, or clausal order, among

others). Furthermore, the focus of this dissertation has been delimited to 3rd person singular subject REs found in TC, since they have been found to be the most problematic ones in L2 Spanish learners (Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021; T. Quesada & Lozano, 2020) and we then set out to test whether these are equally vulnerable in L1 attrition settings. Considering the aforementioned factors, different subject REs have been exhibited in different syntactic configurations, with an almost exclusive use of null pronouns in coreferential coordinated scenarios as opposed to those involving subordination. In addition, more overt forms have been found in contexts with less salient antecedents and distance between a given RE and its antecedent has been found to affect saliency. More distant antecedents mostly require the use of more explicit material to be recovered. Similarly, more overt forms in TC have also been found under the presence of a higher number of potential antecedents. Considering the final factor explored, i.e., gender of potential antecedents, whereas more overt pronouns are attested with different-gender antecedents, NPs are favoured with same-gender antecedents.

Regarding factors that modulate both interpretation and processing of subject REs mostly in PAS contexts, clausal order has been explored. Importantly, the findings from such a factor are still inconclusive, although it appears that a milder subject-null association is found in main-subordinate syntactic configurations, which are explored in this dissertation, as opposed to subordinate-main ones. Another relevant factor that has been discussed has been the subordinating conjunction used to link main and subordinate clauses. Concerning temporal subordinating conjunctions such as *cuando* ‘when’ and *mientras* ‘while’, it appears that the restricted simultaneous-only reading of the latter makes it more likely for the subject-null association to be stronger compared to clauses linked by *cuando* ‘when’. Finally, working memory has been hypothesised to play a role in modulating pronoun interpretation biases, particularly of null pronouns.

Importantly, this chapter has also outlined some of the main theories that are relevant to frame the research questions included in this study. Firstly, the IH predicts attrition effects largely in the online processing of interface structures, hypothesising vulnerability of mainly overt pronouns and not of null pronouns. The ATH, which also claims attrition effects to be selective based on frequency and recency of use factors, predicts L1 attrition of only overt pronouns since they have a competing element in the L2 and an increased activation threshold in the L1 due to disuse, which makes them more

vulnerable. Moreover, under the PPVH, bilinguals are expected to be more redundant than functional monolinguals, and more redundant than ambiguous. Finally, the FSMC makes predictions as to the differences in the degrees of sensitivity to different factors for null and overt subject pronouns.

Having discussed the distribution of subject REs in Spanish and English, the factors that trigger their realisation, interpretation, and processing, as well as the theories that make relevant predictions for the research questions formulated within this dissertation, the following chapter will discuss the main findings from previous studies conducted on the production, interpretation, and processing of subject REs in native Spanish as well as those testing L1 attriters.

CHAPTER 4. Previous studies on the production, interpretation, and processing of null and overt subject referring expressions in native Spanish and native English

This chapter summarises the main findings from studies conducted on the production, interpretation, and processing of null and overt subject REs in native Spanish. Notably, most of the evidence is gathered from studies that have used native Spanish speakers as a control group and which actually focus on L2 acquisition of subject RE. Importantly, a note on the profile of speakers selected to be included in control groups will also be added. However, there is additional research that has specifically focused on this population (Chamorro, 2018; Filiaci et al., 2014; Giannakou & Sitaridou, 2020, among others), in order to establish differences between L1 Spanish potential attriters and a control group. Importantly, a note on the profile of speakers selected to be included in control groups will be added. Moreover, this section also includes a summary of the findings from studies focusing on L1 pronominal attrition in primarily null-subject languages (e.g., Spanish, Italian, or Greek, among others) and a final section on the interpretation and processing of overt pronouns in English to address whether L1 differences in L1 attriters might be due to L2 distribution patterns of subject REs.

4.1 Studies on native Spanish

This section illustrates the results from Spanish natives, which will serve as the baseline against which to compare the results from the bilingual groups in the oral corpus-based video-retelling, the picture selection, and the self-paced reading tasks used in this dissertation (see Chapter 7, 8, and 9, respectively).

4.1.1 Studies on production of subject referring expressions in native Spanish

The aim of this section is to show the main patterns that have been found in the corpus-based production of null and overt subject REs in native Spanish with a special focus on TC. Following what was already discussed in section 3.2.1, TC contexts are explored in detail since different REs are expected in native Spanish and English (i.e., null pronouns in Spanish, and overt material in English) and hence, they are hypothesised to be more

vulnerable in attrition settings³⁵. Furthermore, this section highlights the main factors that have been investigated in corpus and production studies that trigger the use of more or less explicit forms in discourse, e.g., number and gender of potential antecedents or syntactic configuration where the referential expression is found (see section 3.2). The presentation of each study will include, when possible, a critical description of the native Spanish participants, the methodology, and the main results that are relevant for this dissertation, which will then be essential for the discussion of the results of the present study (see section 7.3).

One of the first relevant studies in the production of subject REs in discourse is Montrul and Rodríguez Louro (2006). In their study, they used an oral production task elicited from pictures adapted from the story *Little Red Riding Hood* to test both the morphosyntactic and discourse-pragmatic properties of subjects in the interlanguage of L1 English-L2 Spanish learners. The control group included in their study was composed of 20 native Spanish speakers (mean age = 32.8), excluding those who spoke a Caribbean variety bearing in mind their high production of overt forms in TC (García-Alcaraz, 2015; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; Rothman, 2009; Shin & Erker, 2015)³⁶. When investigating the types of overt subjects native Spanish speakers used, lexical NPs were more frequent than overt pronouns in preverbal subjects (84.6% vs. 15.4%). When it comes to their distribution, overt subjects were used to mark topic shift or for emphatic purposes, whereas most null pronouns (99%) were used to encode TC. The results from this study, which are further scrutinised in Liceras et al. (2010), fail to address the distribution of different types of overt subjects (overt pronouns vs. lexical NPs), which have been further scrutinised in later studies (Lozano, 2009, 2016; Martín-Villena & Lozano, 2020, among others), and which this study will also address.

Blackwell and Quesada (2012) also analysed the oral production of 3rd person subject REs in Charlie Chaplin film-retelling narratives produced by 30 beginner, intermediate, and advanced L1 English-L2 Spanish learners, and compared them against

³⁵ In topic shift scenarios, native Spanish and native English speakers typically employ overt material (T. Quesada, 2021) and thus, less differences should be expected in these contexts. Alternatively, given that bilinguals have been found to overextend the use of overt pronouns to refer to prominent antecedents (Chamorro & Sorace, 2019; Sorace, 2016), i.e., in TC, where functional monolinguals largely employ null pronouns, a potential attrition effect would also become apparent in these contexts in bilinguals whose L1 and L2 are both null subject languages, which additionally justifies the focus on these particular contexts.

³⁶ The authors did not provide additional information about the native speaker control group other than the fact that they were not speakers of Caribbean varieties and their mean age.

those produced by 10 Mexican Spanish speakers³⁷. Their analysis was based on Gundel et al.'s (1993) Givenness Hierarchy (i.e., more minimal anaphoric forms are used with referents which are more salient) and investigated the subject REs used considering different cognitive statuses depending on saliency and activation of the referent as well as its recoverability. The subject REs used by native speakers to recover the most salient entity from the preceding utterance (i.e., in focus), which is also the topic, are mostly null pronouns (90.5%). In this context, which would coincide with what is understood as TC in this dissertation, native speakers also employ other explicit forms (9.5%) such as overt pronouns or NPs, but their use is triggered by other pragmatic factors such as emphasis or to mark the beginning of a new event or action (Blackwell & Quesada, 2012, p. 154). Crucially, these pragmatic factors do not appear to be relevant in the production of overt material in the narratives produced by the learners. In addition, native speakers also use null pronouns in traditional topic shift contexts, but mainly when they can be easily recovered from the previous context as has been addressed in previous research (e.g., Giannakou & Sitaridou, 2022; T. Quesada, 2021). Another interesting finding in this study is the high proportion of proper names produced by native speakers typically when two activated antecedents have the same (mostly male) gender. Overall, the findings from this study show that null pronouns are largely used by native Spanish speakers to refer to salient entities and where their use does not result in ambiguity, but fuller forms are preferred in order to avoid ambiguity even if the entities they refer to are activated, which is in line with the PPVH (see section 3.4.2).

A large proportion of corpus-based evidence has been made available from studies by Lozano and colleagues at the Universidad de Granada. Using written corpus evidence from CEDEL2 (*Corpus Escrito del Español L2* 'L2 Spanish Written Corpus')³⁸ (Lozano, 2022), Lozano (2009) explored whether the whole pronominal paradigm (three persons and two numbers) was equally vulnerable in the acquisition of L2 Spanish by L1 English natives. The focus of the study was to investigate whether the acquisition of 1st and 2nd personal pronouns, which have a deictic use, were equally problematic than 3rd person anaphoric pronouns, as well as features such as animacy (animate vs. inanimate) and number (singular vs. plural). As expected, the control group of 12 native Spanish speakers

³⁷ The Mexican Spanish speakers in this study were pursuing a degree in Modern Languages at a Mexican university. Even though the control group was composed of bilingual speakers, there is not a very detailed description of their profile which would have been extremely beneficial for comparative purposes.

³⁸ (<http://cedel2.learnercorpora.com/>)

(mean age = 37) encoded TC via the use of null pronouns (97%) with marginal use of overt pronouns (1.8%) and full NPs (1.2%). Topic-shift scenarios were marked with the use of full NPs (87.2%) or overt pronouns (12.8%). Notably, the only case where L2 Spanish learners significantly differed from Spanish natives was in the use of 3rd person singular animate pronouns. This was shown both in overproduction of overt forms where null pronouns were expected and underproduction of overt material to encode a shift in reference. Thus, it was argued that 3rd person singular pronouns were the most vulnerable and where L2 learners showed deficits. Additionally, TC contexts seem to be the most problematic for learners since those are where they significantly differed from native Spanish speakers. Importantly, these scenarios are indeed the focus of this dissertation since they are argued to be loci of vulnerability in L1 attriters' grammars.

Another study testing subject realisation in L2 Spanish using data from CEDEL2 is Lozano (2016). In his study, Lozano used a film retelling task to analyse the written production of 3rd person singular subject anaphoric forms by very advanced English-speaking L2 Spanish learners plus a control group of 10 Spanish native speakers (mean age = 34.5) from Spain, Mexico, and Argentina. As expected, native Spanish speakers encoded TC via the use of null pronouns (93.3%) and much less through overt forms such as overt pronouns (2.7%) and NPs (4%). By contrast, topic shift was preferably marked via NPs (70.8%) and overt pronouns (19.4%), and only two instances corresponded to null pronouns (2.8%). Interestingly, out of the overproduction instances in TC in the L2 Spanish learners, Lozano argues that the number of potential antecedents is a modulating factor which had gone unnoticed in previous studies (see section 3.2.4). In the overt forms used in topic shift, more overt pronouns (52.9%) are produced when there are 2 potential antecedents, and NPs (84.2%) are favoured in contexts with 3 potential antecedents to avoid ambiguity. Additionally, when considering the gender of the two previous potential antecedents, native Spanish speakers produced NPs when the gender was the same and mostly overt pronouns when the gender differed, since NPs would be uneconomical in such a scenario, i.e., additional explicit information would be provided when a simpler explicit form (an overt pronoun) can be used and is enough to disambiguate. This factor will be further explored in this thesis, but mostly focusing on TC contexts. Finally, in order to account for the findings from overproduction and underproduction resulting in redundancy and ambiguity, Lozano proposed his Pragmatic Principles Violation Hypothesis (section 3.4.2), which, as already argued, claims that learners often violate

the Informativeness/Economy Principle since redundancy does not typically lead to communication breakdowns whereas the violation of the Manner/Clarity Principle results in ambiguity and is rather disfavoured in both learners and natives. These hypotheses will be further developed in this dissertation.

Departing from Lozano (2009, 2016) and using corpus data from CEDEL2, Martín-Villena and Lozano (2020) analysed the written production of 3rd person singular anaphoric subjects in TC developmentally (L1 English-L2 Spanish beginners, intermediate, and advanced learners) and compared them against that of 20 native Spanish speakers of peninsular Spanish. Similarly to previous studies, Spanish native speakers largely select null pronouns to encode TC (93.9%) and to a much lesser extent NPs (5.1%) and overt pronouns (1%). Another interesting finding in this study relates to the syntactic configuration where overt forms are found: the control group always produces a null pronoun in coordinated contexts which are coreferential³⁹ but uses some overt REs (both overt pronouns and NPs) in non-coordinated scenarios, i.e., subordination or juxtaposition. The production of these overt forms has been argued to be further constrained by the presence of additional potential antecedents and importantly their gender similarities or differences (Lozano, 2016; T. Quesada, 2021; T. Quesada & Lozano, 2020). Whereas more NPs are likely to be produced when the gender of the antecedents is the same, overt pronouns are more frequent when the gender is different. This phenomenon will be further explored in this dissertation, where two Charlie Chaplin videoclips have been selected to manipulate the number of potential antecedents (see section 7.2).

Georgopoulos (2017) also analysed the written production of 3rd person anaphoric subjects in L1 English and L1 Greek-L2 Spanish learners and 20 L1 native Spanish speakers (mean age = 30) from Spain (N = 16), Mexico (N = 3) and Argentina (N = 1) using the CEDEL2 corpus. Following a corpus-based multifactorial approach, the results from the production of null and overt subjects where participants had to summarise a film they had recently watched or write about a famous person show that, as expected, TC is primarily encoded using null subject pronouns (86.26%) in Spanish natives, although

³⁹ It is indeed in coreferential coordinated contexts where L2 Spanish learners start producing a high percentage of expected null pronouns (82.6% in beginner, 86% in intermediate, and 91.1% in advanced learners) as opposed to non-coordinated scenarios (11.6%, 33.9%, 62.6%, respectively). The authors argue this could be the result of the similarity in the coordinated structures between English and Spanish, which is said to be transferred to their L2.

overt material is also employed in these contexts (13.74%). Interestingly, Georgopoulos (2017) explores, among others, the role of several additional factors such as clause type, antecedent distance, or active referents (what we refer to as activated/competing antecedents) in favouring the use of more or less explicit subject REs in writing. First, it appears that coordination leads to a higher use of null pronouns (93.59%) as opposed to subordination (also in Martín-Villena & Lozano, 2020). Considering the distance between null or overt material and their antecedents, null pronouns are mostly used with closer antecedents, i.e., when the antecedent is in the previous clause (74.61%) as opposed to when it is four or more clauses away (3.03%), whereas the picture for overt material is the opposite, i.e., overt material predominates with distant antecedents (96.97%). Finally, regarding the role of active referents, null pronouns are more frequent with a smaller number of active referents and overt pronouns and NPs are largely used when the number of activated antecedents is high. However, the role played by the aforementioned factors has not been analysed considering information status, which will indeed be the focus of the production study in this dissertation paying attention to TC exclusively.

A series of studies following a multifactorial approach to anaphora resolution in written production using data from CEDEL2 are presented in T. Quesada (2021). Several corpus studies were conducted investigating anaphora resolution in the written narratives of Spanish and English native and L2 speakers. Study 3 of her dissertation analysed the written production⁴⁰ of L1 English-L2 Spanish intermediate to upper-advanced learners compared against a group of L1 Spanish native speakers (mean age = 25.6). The focus of the study was the detailed investigation of PAS scenarios in written discourse from a corpus perspective. As for the 27 L1 Spanish natives included in the study, the division of labour of null and overt REs appears to be in line with the predictions generated for the PAS: null pronouns typically select antecedents in subject position (93.6%), whereas overt material (both overt pronouns and NPs, respectively) selects non-subject antecedents (34.4% and 64.7%). Interestingly, Quesada (2021) introduces NPs within the PAS analysis unlike in most experimental studies (but see Gelormini-Lezama & Almor, 2011, 2014) and shows that they also specialise in retrieving antecedents in non-subject position. Therefore, when analysing null versus overt material, the findings seem to fully support the PAS: null pronouns are largely coreferential with subject antecedents (93.6%)

⁴⁰ The two tasks that she analysed required participants to *Talk about a famous person* and *Retell a film that they had recently seen*.

and overt material mostly biases towards non-subject antecedents (97.1%). When focusing on information status, results confirm previous findings that show that null pronouns are typically produced in TC (95%) and NPs (63.9%) and overt pronouns (30.6%) in topic shift contexts. Finally, another finding that seems remarkable relates to the production of REs in terms of syntactic configuration in PAS contexts. In intrasentential contexts, all null pronouns Spanish native speakers produce link back to subject antecedents, whereas some overt material was produced intersententially to refer back to the previous subject (9.5%), which was restricted to the production of NPs. Regarding the forms used that were coreferential with non-subject antecedents, overt pronouns were mostly used in intrasentential contexts (6/7, 85.7%) and NPs in intersentential contexts (21/27, 77.8%).

In study 4, T. Quesada (2021) used a Spanish native subcorpus from CEDEL2 that included 12 peninsular Spanish native speakers (mean age = 20.7) who completed a written production task prompted by a short clip from the Charlie Chaplin film *The Kid*, which is also one of the prompts used in this dissertation (see Chapter 7). Regarding information status, L1 Spanish speakers largely produce null pronouns (83.6%) in TC scenarios, followed by NPs (15.4%) and overt pronouns (1%). It is also important to mention that native Spanish speakers produce more null pronouns in TC when they additionally involve coreferential coordination (93.1%) than when coordination is not involved (73.4%). The results from this study also show that the production of overt material and particularly that of NPs increases with a higher number of activated antecedents in native Spanish (1 activated antecedent: 8.3%; 2 activated antecedents: 18.8%; 3 activated antecedents: 34.6%; and more than 3 activated antecedents: 44.8%)⁴¹. Considering the number of intervening antecedents, that is, those that are present between a given anaphoric expression and its antecedent, it appears that the proportion of overt material (i.e., overt pronouns and NPs) is more prolific with 2 intervening antecedents (61.4%) than with 1 intervening antecedent (25.8%) or no intervening antecedents (17.8%). A final finding that deserves attention is the fact that the results from the analysis of PAS scenarios and, in particular, those where reference to the previous subject is analysed, appear to be in line with some studies investigating this phenomenon

⁴¹ These results are presented without considering information status unlike the data presented in Lozano (2016). It would be illuminating to investigate whether the number and gender of potential antecedents plays a similar role considering information status. Notably, this will be further scrutinised in this dissertation focusing precisely on TC scenarios.

experimentally: null pronouns tend to be selected to refer to the previous subject (87.6%) more often than NPs (12.4%) (Alonso-Ovalle et al., 2002; Filiaci et al., 2014; Gelormini-Lezama & Almor, 2011, among others).

Collewaert (2019) used a similar methodology to investigate the production of null and overt subject REs in the oral narratives of L1 Dutch-L2 Spanish learners and 21 L1 Spanish native speakers as controls. The Spanish natives were both speakers of Peninsular and Latin American varieties, with the exception of the Caribbean variety, as has been done in previous studies (Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021, among others). Based on data from a film-retelling task from some excerpts from the soap opera *Yo soy Bea*, regarding the analysis of TC scenarios, Spanish native speakers prefer to use null pronouns (87.79%) to encode these contexts and, to a lesser extent, NPs (9.07%) and overt pronouns (2.96%). Additionally, the results reveal that felicitous null pronouns are used in TC despite the presence of competing antecedents, which mostly occupy a non-subject syntactic position.

The distribution of subject REs in discourse has also been the focus of work done by Bel and colleagues. Bel, García-Alcaraz, et al. (2016) investigated the written production of 3rd person subjects in 20 Moroccan Arabic-Spanish bilinguals and 10 adolescent speakers of peninsular Spanish (mean age = 12.9) who acted as a control group. Although not separated by information status, the authors provide the proportion and frequencies of types of subject REs used: native Spanish speakers produced 33 NPs (25.78%), 7 overt pronouns (5.47%) and 88 null pronouns (68.75%). Importantly, while the authors argue that NPs do not refer back to any antecedent and hence, they do not further analyse them, there is plenty of evidence that NPs are used by both natives and learners anaphorically (Collewaert, 2019; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021, among others) and will also be addressed in this dissertation. Leaving aside NPs, the results from this study illustrate the tendency for null pronouns to be used in the native production to refer back to subject antecedents (77.27%), that is, to mark TC. The results from the overt pronoun, even if they are more frequently used to refer to non-subject antecedents (57.14%), despite the difference not being significant, need to be interpreted with caution since they only represent 7 occurrences. This finding is in line with the limited production of overt pronouns which has been found in both written and oral production in native Spanish previously (e.g., García-Alcaraz & Bel,

2019; Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021), and which is also replicated in this dissertation (see section 7.2.2).

In another study, García-Alcaraz and Bel (2019) tested the production of 3rd person subject pronouns in 34 Moroccan Arabic-Spanish early sequential bilinguals and 30 L1 Spanish controls. They used a (semi)spontaneous written production task to analyse the distribution of null and overt subject pronouns regarding their discourse function (topic continuity vs. topic shift), sentence relations (intrasentential vs. intersentential), clause order within intrasentential contexts (main-subordinate vs. subordinate-main) or felicitous conditions of use (redundancy vs. ambiguity). Even if the group of Spanish controls were university students who had been born and raised in Catalonia (mean age = 20.68), the authors state that given that Spanish and Catalan have similar discourse constraints that determine subject pronoun choice, the fact that they speak Catalan should not necessarily interfere in this domain⁴². Regarding the results, null pronouns were used more often in TC scenarios, both in intrasentential (69.01%) and intersentential contexts (64.5%), respectively. Notably, all null pronouns which were used in topic shift scenarios had a clear referent. They were therefore used unambiguously since they could be identified appropriately relying on pragmatic or semantic clues, a finding which has also been reported in previous studies (Giannakou & Sitaridou, 2022; T. Quesada, 2021). Regarding clause order, native Spanish controls are found to produce null pronouns in TC in both sentence configurations equally (main-subordinate and subordinate-main). The picture from overt pronouns, which are rather infrequent in production as previously stated, appears to be different. The authors argue that overt pronouns encode topic shift mainly in intersentential contexts whereas they encode TC at the intrasentential level. However, the analysis presented collapses data from bilingual participants and L1 controls and should be interpreted with caution. Finally, even though data are presented on the production of NPs, which represent a considerable percentage of the REs used in the Spanish control group (37.45%), there is no in-depth analysis of their distribution and the factors that constrain them in written discourse. Crucially, this thesis will address the factors that constrain the use of NPs in TC.

⁴² This statement should be interpreted with caution considering the results from de Bel and García-Alcaraz (2018), where they report differences in the interpretation of the overt pronoun, which could in turn result in differences in production (Contemori & Di Domenico, 2021).

Finally, Giannakou and Sitaridou (2020, 2022) investigated the oral production of 3rd person subject REs in Greek and Spanish monolinguals and bilinguals of these two languages using elicited narratives from the Horse Story and the Cat Story (Hickmann, 2003). The 20 monolingual Spanish participants from Chile (mean age = 45.2, SD = 13.72, range = 28-77) had no or minor knowledge of other languages and had been raised monolingually. In TC, Spanish natives mainly produced null pronouns (93.67%)⁴³, followed by NPs (5.91%) and overt pronouns (0.42%). Interestingly, the overt pronouns found in their production were not considered redundant since a qualitative analysis of these forms shows that they were used for contrastive or emphatic purposes. Regarding NPs, a qualitative analysis of their distribution shows that most of them are produced non-redundantly (75%): they can be used for rephrasing purposes, as an equivalent to a previous mentioned referent but which adds some additional connotation, or in emphatic contexts, among others. Importantly, Giannakou and Sitaridou (2022, p. 17) state that ‘redundancy is context-dependent and that [NPs] in TC do not a priori imply infelicity’.

4.1.2 Summary of findings on production of subject referring expressions in native Spanish

In sum, there is robust evidence that null pronouns are largely employed by native Spanish speakers in both oral and written production in TC contexts. Interestingly, even though there are some instances of null pronouns in topic shift, they are mostly easily recoverable from the previous discourse context. Despite the very high production of null pronouns in these contexts, overt pronouns and NPs have also been attested when the topic is maintained throughout clauses. It is important to mention that NPs are more likely to be produced than overt pronouns, whose production is extremely limited. Notably, their distribution has been found to be constrained by factors such as the number and gender of potential antecedents: more explicit forms are produced with a high number of potential antecedents. Moreover, NP production is favoured with same-gender antecedents whereas overt pronouns are more common with antecedents with different gender.

⁴³ Giannakou and Sitaridou (2022) also state that null pronouns are also frequently used in topic shift (25.32%), but their use is largely non-ambiguous (98.31%) since the referent can be easily identified through morphological, semantic or contextual cues.

Finally, it is important to note that null pronouns are more likely in coordinated contexts with coreferential antecedents as opposed to non-coordinated scenarios (see section 3.2).

4.1.3 Studies on interpretation of subject referring expressions in native Spanish

In this section, the main findings from the interpretation of overt and null subject REs in native Spanish will be discussed. Particularly, the studies reviewed investigate the predictions generated from the Position of Antecedent Strategy (Carminati, 2002), which is the basis of the picture selection task used in this dissertation, which is in fact a partial replication from the task used in Tsimpli et al. (2004) (see section 8.1.1). Moreover, this section highlights the main variables that have been manipulated in previous studies that have been argued to modulate interpretation patterns of null and overt subject pronouns in native Spanish: e.g., clause order (main-subordinate vs. subordinate-main) or syntactic configuration (intersentential vs. intrasentential), among others (see section 3.3).

Recall that in her pioneering study, Carminati (2002) proposed a parsing strategy for null and overt subject pronouns in intrasentential contexts in native Italian. According to the PAS, null pronouns select antecedents in subject position (i.e., SpecIP), whereas overt pronouns typically exhibit a non-subject interpretation. In order to test whether the predictions made by Carminati (2002) could also be extended to Spanish, in their first experiment, Alonso-Ovalle et al. (2002) used twelve ambiguous intrasentential items like 24 in an offline questionnaire to test null and overt pronoun interpretation biases in 80 Peninsular Spanish speakers.

24.

Juan pegó a Pedro. Ø/Él Está enfadado.

‘Juan hit Pedro. (Ø/He) is mad’.

The results showed that whereas the null pronoun typically biased towards the subject of the previous clause (73.2%), overt pronouns displayed a non-categorical bias, referring to subject antecedents 50.2% of the time. Thus, it appears that only the null pronoun displays the expected bias predicted by the PAS. Interestingly, the authors note that, although Carminati (2002) tested intrasentential contexts and their study included intersentential scenarios, Carminati (2002) conducted an acceptability judgement task with two-sentence discourses and found that the most natural continuation for a subject

antecedent was with a null and not an overt pronoun. This finding was further corroborated in native Spanish in their experiment 2. However, Alonso-Ovalle et al. (2002) do not account for interpretation differences of the overt pronoun.

Other studies by Bel and colleagues have also addressed the PAS in Spanish. Bel and García-Alcaraz (2015) and Bel, García-Alcaraz, et al. (2016) used an acceptability judgement task to test anaphora resolution in intrasentential contexts. Unlike previous studies, they controlled for implicit causality of the verb in the first sentence to keep the sentence as ambiguous as possible (see 25 below).

25.

Iker evita a Iván cuando Ø/él tiene problemas. Iker tiene problemas.

‘Iker avoids Iván when Ø/he is in trouble. Iker is in trouble’.

Iker evita a Iván cuando Ø/él tiene problemas. Iván tiene problemas.

‘Iker avoids Iván when Ø/he is in trouble. Iván is in trouble’.

Cuando Sheila vio a Natalia Ø/ella estaba nerviosa. Sheila estaba nerviosa.

‘When Sheila saw Natalia Ø/she was nervous. Sheila was nervous’.

Cuando Sheila vio a Natalia Ø/ella estaba nerviosa. Natalia estaba nerviosa.

‘When Sheila saw Natalia Ø/she was nervous. Natalia was nervous’.

In the first place, it is worth mentioning that the control group of Spanish natives in Bel and García-Alcaraz (2015) and Bel, García-Alcaraz et al. (2016) were 34 university students from Barcelona (mean age = 22.9; range = 20-25), all of whom had knowledge of Catalan. As already emphasised in the previous section, even though Catalan, as argued by the authors, does not exhibit ‘a very different picture from that of Spanish’ (Bel & García-Alcaraz, 2015, p. 215), their participants are bilinguals, and that could arguably influence pronoun production and interpretation (Sorace, 2016)⁴⁴. In terms of the results obtained in both studies when the two clause orders were analysed independently, whereas the overt pronoun displayed the predicted bias towards objects in both main-subordinate and subordinate-main contexts, the null pronoun only exhibited coreference with the subject of the previous clause in subordinate-main contexts (see section 3.3.2). This difference in their results and those evidenced in previous studies are attributed to task differences, given that their participants are not forced to make a choice (e.g.,

⁴⁴ This statement is in fact at odds with the findings reported in Bel and García-Alcaraz (2018), where they find that Catalan displays a clearer division of labour of the Italian type when compared to Spanish. This could have in fact influenced their results to some extent.

Alonso-Ovalle et al., 2002). Interestingly, given that the effect of clause order was shown to be non-significant overall, when the two were collapsed together, clear PAS patterns were found for both null and overt pronouns. This PAS pattern in L1 Spanish is also reported from the findings of the analysis of half of the comprehension questions in Bel, Sagarra, et al. (2016), which is presented in the next section.

Considering the inconclusive findings reported in studies exploring the role of clause order, de Rocafiguera and Bel (2022) set out to further investigate this in 49 monolingually-raised native speakers of Peninsular Spanish (mean age = 22.16, SD = 2.49, and age range = 18-32) using an acceptability judgement task with the following stimuli (see 26).

26.

Ana esperó a Olga cuando Ø/ella llegó de viaje. Ana llegó de viaje.

‘Ana waited for Olga when Ø/she came back from a trip. Ana arrived from a trip’.

Ana esperó a Olga cuando Ø/ella llegó de viaje. Olga llegó de viaje.

‘Ana waited for Olga when Ø/she came back from a trip. Olga arrived from a trip’.

Cuando Tomás vio a Alberto, Ø/él estaba nervioso. Tomás estaba nervioso.

‘When Tomás saw Alberto, Ø/he was nervous. Tomás was nervous’.

Cuando Tomás vio a Alberto, Ø/él estaba nervioso. Alberto estaba nervioso.

‘When Tomás saw Alberto, Ø/he was nervous. Alberto was nervous’.

The pattern that emerged is slightly different from previous studies by Bel and colleagues. On the one hand, null pronouns only exhibit a predicted PAS-like bias in subordinate-main contexts. On the other hand, even if there are no significant differences in bias strength of overt pronouns towards object antecedents in main-subordinate and subordinate-main contexts, there is only a significant difference in the ratings of overt pronouns towards subject and object antecedents in main-subordinate contexts. Thus, de Rocafiguera and Bel (2022) argue that clause-order effects are selective and mostly affect null pronouns, which was also attested in Bel and García-Alcaraz (2018). Interestingly, after adding a complex interaction which included conjunction type (*cuando, mientras*), the authors state that neither the interaction was significant, nor the model fit was improved. However, their experimental design was not manipulated such that the effect of conjunction type could be further explored, which will be addressed in this dissertation (see Chapter 8).

Another set of studies testing the PAS in native Spanish offline has been Jegerski et al. (2011) and Keating et al. (2011). Jegerski et al. (2011) analysed whether the syntax of null and overt pronouns as well as discourse structure influenced anaphora resolution in intrasentential contexts in native Spanish speakers. Interestingly, their 26 participants (mean age = 26.7; age range = 20-53) in this experiment were recruited from American universities⁴⁵ and were native Spanish speakers from Spain and Latin America. The interpretation task they used contained 40 main-subordinate contexts⁴⁶, where they manipulated pronoun type (null/overt) and discourse structure⁴⁷ (discourse coordination ‘*mientras*’/discourse subordination ‘*después de/antes de*’), as shown below:

27.

Discourse coordination:

Susana dio con Roberto mientras Ø corría en el parque esta mañana.

‘Susana met Roberto while Ø was running at the park this morning’.

Discourse subordination:

Humberto pegó a José cuando Ø estaba jugando.

‘Humber hit José when Ø was playing’.

Results report a significant tendency for subject antecedents to be selected with null pronouns in both discourse contexts. Even though there was a higher selection of subject antecedents for contexts of discursive coordination, this difference did not reach significance. The overt pronoun behaved more freely and did not show a clear bias towards any of the antecedents in any discourse context. The authors argue that the weaker antecedent preference for overt pronouns is replicated from Alonso-Ovalle et al. (2002). We believe that this finding should be taken with caution due to the complex

⁴⁵ Although not explicitly mentioned in the paper, their Spanish native participants would fall along a bilingual continuum with English and could presumably show attrition effects (Chamorro, Sorace, et al., 2016). Additionally, some of them had not been raised monolingually and were bilingual speakers of Basque and Catalan, both of which are null subject languages. However, different interpretation patterns have been reported for Catalan (Bel & García-Alcaraz, 2018) and bilingualism could also influence pronoun biases (Sorace, 2016). Notably, Bel and García-Alcaraz (2018) report both PAS-like patterns in Spanish-Catalan bilinguals, which were not found in their monolingual participants. Therefore, Spanish-Catalan bilinguals in their study exhibited clearer PAS-like patterns, which supports the claim that bilinguals could exhibit different pronoun interpretation patterns from monolinguals and thus, questions the validity of the results presented in Jegerski et al. (2011) to make claims about L1 Spanish pronoun interpretation.

⁴⁶ It is worth mentioning that the sentences containing null and overt pronouns and discourse coordination and subordination were not lexically matched. The authors state that the coordination stimuli were the ones used in Keating et al. (2011) and the subordination stimuli had been translated from Carminati (2002).

⁴⁷ Discourse coordination is not to be confused with syntactic coordination (see Jegerski et al., 2011 for additional information).

nature of the participants included in this study as controls: different varieties of Spanish, different levels of English proficiency and bilingually- and monolingually-raised participants have been conflated in one group. Moreover, given that no effect of discourse context was found unlike in their experiment in English, Jegerski et al. (2011) argue that Spanish may be guided by syntactic principles (null/overt distinction) leaving discourse structure cues more peripheral. We will discuss this in relation to our findings.

Keating et al. (2011) conducted an offline sentence comprehension task using main-subordinate contexts with 19 monolingually-raised Spanish speakers.⁴⁸ The experiment contained main-subordinate contexts linked by the temporal conjunctions *when*, *after*, (*ever*) *since* and *while*, and included manipulations for pronoun type in the subordinate clause (overt/null) (see 28).

28.

Daniel ya no ve a Miguel desde que Ø se casó.

‘Daniel no longer sees Miguel since Ø married’.

Alicia se encontró con Elena mientras ella corría en el parque.

‘Alicia met Elena while she was running at the park’.

They were followed by comprehension questions to elicit antecedent preferences from the participants. Results reported a clear bias of null pronouns towards prominent subject antecedents and a relatively at chance selection of object antecedents for overt pronouns. Keating et al. (2011) discard the possibility of their results from overt pronouns being due to the exposure to and use of English from their monolingually-raised participants due to similarity with previous studies such as Alonso-Ovalle et al. (2002), although this could certainly be the case based on research on L1 Spanish attrition (Chamorro, Sorace, et al., 2016) and considering the results of this dissertation.

Other studies testing interpretation preferences of null and overt subject pronouns in Spanish are Chamorro, Sorace, et al. (2016) and Chamorro (2018). Chamorro et al. (2016) explored offline interpretation biases of null and overt pronouns in L1 Spanish

⁴⁸ The participants in this study (mean age = 24.84; age range = 20-33) were recruited in the USA, where they had arrived between the ages of 18 and 29 and were speakers of different Spanish-speaking countries: Mexico, Spain, Peru, Nicaragua, Ecuador, and Chile, although excluding Caribbean varieties. What is more, their Spanish participants had been immersed in an L2 environment for a mean of 2.26 years (range = 6 months-5.5 years) and were reported as relatively proficient in English (around 8 out of 10 in reading, understanding, and speaking). All these differences could certainly affect pronoun resolution, so the results should be taken with caution.

natives and L1 Spanish attriters using offline an acceptability judgement task. The control group were 24 Spanish native speakers who had spent a mean number of weeks in the UK (7.958; SD = 7.117). Their knowledge of L2 English was described as low, and they were reported to use their L1 more than their L2 on a 5-point Likert scale (L1 – mean = 4.312, SD = .639 vs. L2 – mean = 2.708, SD = .908)⁴⁹. The stimuli used in this study contained a main clause with two potential antecedents with the same gender, but different number and a subordinate clause introduced by *cuando*⁵⁰ ‘when’ and which contained either a null or an overt pronoun. There were four conditions whereby a subject-null or object-overt match or mismatch was created following the PAS. Results report no differences between groups in offline preferences for null and overt pronouns, even if only the overt pronoun showed a significant tendency to corefer with object antecedents, a finding to which we will return when discussing the results from the self-paced reading task used in this dissertation (see section 9.3).

Chamorro (2018) used an offline judgement task to investigate anaphora resolution by native speakers of Spanish. The study reports the results from 24 Spanish monolingually-raised speakers (mean age = 26.54; SD = 2.064, range = 22-30) from Spain who had no knowledge of other languages from birth but had some knowledge of English since they had spent a mean number of weeks of 12.583 (SD = 8.366) in the UK, with a mean L2 English use of 2.875 (SD = .824) on a 5-point Likert scale. The stimuli contained 32 semantically neutral main-subordinate contexts like the ones in Chamorro et al. (2016), except that it did not include number disambiguation cues (see 29). The subordinating conjunction which preceded anaphoric overt/null pronouns was always *cuando* (‘when’) and the verbs in the main clause did not bias towards the previous subject or the object.

29.

La madre saludó a la chica cuando ella cruzaba una calle con mucho tráfico.

‘The mother greeted the girl when she crossed a street with a lot of traffic’.

La madre saludó a la chica cuando Ø cruzaba una calle con mucho tráfico.

‘The mother greeted the girl when Ø crossed a street with a lot of traffic’.

Participants had to answer a comprehension question following each sentence to select their interpretation preferences of null and overt pronouns between a subject

⁴⁹ It is important to note that participants do report using the L2, although not as frequently as the L1.

⁵⁰ As illustrated in this dissertation, the type of subordinating conjunction has been shown to play a role in the interpretation of null and overt subject pronouns (see section 8.2).

interpretation, an object interpretation, or an external referent interpretation and could choose more than one option. The results showed that while the preferred bias of both types of pronouns was towards object antecedents, only overt pronouns exhibited a significantly different trend to bias towards non-prominent antecedents. The difference of interpretation bias of null pronouns did not reach statistical significance.

Another experiment testing offline interpretation preferences in native Spanish is de la Fuente (2015). In experiment 3 within his dissertation, de la Fuente (2015) used a sentence interpretation task where 24 native speakers of Spanish from Spain, Mexico, and Colombia⁵¹ had to provide their preferred antecedent for the ambiguous null or overt pronoun presented in the subordinate clause. The stimuli contained a main clause which introduced two potential antecedents with the same gender, and which was followed by a temporal subordinate clause introduced by *cuando* with either a fully ambiguous null or overt pronoun (see 30).

30.

Eduardo llamó a Samuel cuando Ø/él estaba en la oficina.

‘Eduardo called Samuel when Ø/he was in the office’.

The results showed that, following the predictions from the PAS, null pronouns are interpreted as coreferential with subject antecedents and overt pronouns with object antecedents in native Spanish. Interestingly, de la Fuente (2015) argues that the same null pronoun sentences were used in another experiment and were not interpreted as exhibiting a clear antecedent bias. It is worth noting that all conditions within such experiment included instances of null pronouns, which leads the author to think that the clear division of labour found in experiment 3 could arguably be explained by a potential metalinguistic strategy displayed by participants after noticing the presence of the experimental manipulation (i.e., the alternation between null and overt pronominal forms) and their conscious differentiation of these two types of pronouns.

Clements and Domínguez (2017) used a picture verification task adapted from Sorace and Filiaci (2006) and Tsimpli et al. (2004)⁵² to test the interpretation of null and

⁵¹ No additional information is provided from the participants other than the fact that they were 'native speakers of Spanish of various countries' (de la Fuente, 2015, p. 122). Information about their age or knowledge of other languages as well as their proficiency level would have been appreciated, among others.

⁵² It is important to mention that participants were presented with the same 8 sentences with an overt or a null pronoun (16 in total) and were required to choose their interpretation of each sentence by selecting one

overt pronouns in 20 advanced L1 English-L2 Spanish speakers and 16 L1 Spanish native speakers (see 31).

31.

La mujer empuja a la niña en el columpio mientras Ø/ella se come un helado.

‘The woman pushes the girl on the swing while Ø/she is eating an ice-cream’.

The Spanish control group is composed of speakers from Spain (N = 14) and Mexico (N = 2) and their age ranges from 22 to 60. Spanish natives prefer to link null pronouns back to the subject of the previous clause (77.4%) in line with previous studies. By contrast, overt pronouns do not exhibit such a clear bias in that they only bias towards object antecedents 53.9% of the times. Following these results, it appears that the PAS is only confirmed partially (Alonso-Ovalle et al., 2002) since only null pronouns display a clear bias.

Schimke et al. (2018) set out to investigate the interpretive biases of null and overt subject pronouns in native Spanish in *before* clauses. Their experimental items contained a main clause with two NP antecedents in subject and object position which share gender features and it was followed by a temporal subordinate clause introduced by *antes de que* (‘before’) and either a fully ambiguous null or an overt pronoun (see 32).

32.

El barrendero se reunió con el cartero antes de que Ø/él se fuera a casa.

‘The street sweeper met the postman before Ø/he went home’.

The results from 25 native Spanish participants (mean age = 35)⁵³ in a sentence completion task where they had to provide the antecedent of the ambiguous pronoun in written form showed that overt pronouns were clearly biased towards object antecedents (78.4%). By contrast, a subject antecedent for null pronouns was not very strongly selected (49%), and the results from the statistical analysis revealed that the selection of

of the two pictures which displayed either a subject or an object interpretation. Exposing participants to the same sentences containing the experimental manipulation could be dispreferred and the two versions of the same item should have been presented in different lists (Keating & Jegerski, 2015).

⁵³ The nationality of the participants was rather mixed: Spain, Chile, Peru, Bolivia, Argentina, Colombia, Costa Rica, Ecuador, Mexico, and Venezuela. These varieties can arguably present different production and interpretation patterns of null and overt subject REs, as previous research suggests (Carvalho et al., 2015).

a subject or object antecedent did not differ from chance, hence only supporting the PAS partially.

A recent study by Giannakou and Sitaridou (2020) tested anaphora resolution using an offline self-paced listening experiment, where aural stimuli were followed by a comprehension question to gather participants' interpretation of null and overt subjects in the subordinate clause (see 33)⁵⁴.

33.

El director saludaba a un doctor cuando Ø/él salía del ascensor.

'The director was greeting a doctor when Ø/he was exiting the lift'.

In line with Chamorro (2018) and Chamorro et al. (2016), Chilean Spanish speakers (N = 20; mean age = 47.8; age range = 20-85) did not exhibit a clear bias in the interpretation of null pronouns both with definite and indefinite object antecedents in the main clause. Their interpretation of overt pronouns was similarly unclear in that they did not significantly select one antecedent (subject vs. object) over the other. These unclear interpretation biases could be both due to the fact that a different Spanish variety has been included (i.e., Chilean Spanish) as well as the focus on main-subordinate syntactic configurations, where less clear patterns have been argued to be manifested for null pronouns (de Rocafiguera & Bel, 2022). Additionally, the authors reported that demonstrative pronouns like *este* in Spanish clearly biased towards non-prominent object antecedents.

Contemori and Di Domenico (2021) tested offline interpretation preferences of null and overt pronouns in order to compare preference patterns in Italian and Spanish native speakers. Their 33 native Mexican-Spanish⁵⁵ speakers (mean age = 23) were undergraduate students and reported intermediate knowledge of English as a second language, which they learnt after the age of 6. The main sentence comprehension task in the offline experiment included instances of anaphoric and cataphoric pronouns. In particular, sentences containing anaphoric pronouns contained a main clause introducing two same-gender antecedents in subject and object position, respectively, and a

⁵⁴ It is important to note that the subordinating conjunction linking main-subordinate sentences was always *cuando* 'when'. This will be further developed in the discussion section of the interpretation task used in this dissertation (see section 8.3).

⁵⁵ It is important to note that Mexican and Peninsular Spanish could present different distribution and interpretation patterns of null and overt subject REs (Chamorro, 2018; Chamorro, Sorace, et al., 2016; Contemori & Di Domenico, 2021; Keating et al., 2016).

subordinate clause introduced by *cuando* and which contained either a null or an overt ambiguous pronoun (see 34).

34.

Jorge vio a Luis cuando Ø/él iba a la cafetería.

‘Jorge saw Luis when Ø/he was going to the café’.

Cuando Ø/él iba a la cafetería, Jorge vio a Luis.

‘When Ø/he was going to the café, Jorge saw Luis’.

After each sentence was presented, participants were required to answer the question which related to the person who performed the action in the subordinate clause: the subject, the object, or an external referent. In terms of antecedent patterns, subject antecedents were largely selected for null pronouns (62%) and much less object (36%) or external antecedents (2%) in Spanish in main-subordinate contexts. The picture for overt pronouns is somewhat different: object antecedents (58%) were preferred for explicit pronouns over subject (38%) or external referent antecedents (4%). The planned comparisons performed for a language group (Italian vs. Spanish) by type of pronoun (overt vs. null) interaction in the analyses of subject and object interpretations demonstrated that more subject interpretations were significantly chosen for null pronouns and more object interpretations for overt pronouns. This demonstrates that there seems to be a division of labour of null and overt pronouns in (Mexican) Spanish, which is in line with the predictions formulated within the PAS (Carminati, 2002). The potential reasons why this tendency, as illustrated by the percentages of selection presented, is not as robust as that found in previous studies will be addressed in the discussion section (see section 8.3).

4.1.4 Summary of findings on the interpretation of subject referring expressions in native Spanish

Taking the results on the interpretation of null and overt subject pronouns in native Spanish together, it appears that the picture emerged is rather heterogeneous. Even though some studies report evidence of PAS interpretation patterns considering both null and overt pronouns (Contemori & Di Domenico, 2021; de la Fuente, 2015), the division of labour has only been attested in null pronouns (e.g., Alonso-Ovalle et al., 2002; de la

Fuente, 2015; Keating et al., 2011; Keating & Jegerski, 2015, among others) or overt pronouns (e.g., Chamorro, 2018; Chamorro, Sorace, et al., 2016; Schimke et al., 2018) in other studies. Furthermore, the manipulation of different variables such as clause order (main-subordinate vs. subordinate-main) seems to trigger different interpretation patterns (see section 3.3.2): subject-null biases are more likely in subordinate-main contexts whereas object-overt associations are more common in main-subordinate scenarios when both configurations are manipulated within the same experiment. Nevertheless, studies testing only one of the two exhibit rather heterogeneous results. Finally, it could be argued that different results are found when different subordinating conjunctions have been used (see section 3.3.3). However, the role played by different temporal subordinating conjunctions has not been addressed experimentally and should be further tested. Precisely, this dissertation will provide evidence of the manipulation of such variable.

4.1.5 Studies on the processing of subject referring expressions in native Spanish

The main objective of this section is to summarise the main findings on the processing of null and overt subject REs in native Spanish. These findings will serve as the basis for the discussion of the data obtained from a self-paced reading task included in this dissertation (see section 9.3), which has also been adapted from Tsimpli et al. (2004) and Kaltsa et al. (2015).

The first relevant study testing the processing of null and overt subject pronouns was Filiaci (2010). She directly compared Italian and Spanish in order to test whether null and overt pronouns would exhibit similar interpretation biases online. The experimental materials used were adapted and translated from Carminati (2002), where pronoun type (i.e., null/overt) and position of the antecedent (i.e., subject/object) were manipulated, as in example 35. The sentences were disambiguated by the semantics/plausibility of the main clause.

35.

Cuando Ana visitó a María en el hospital, ella/∅ le llevó un ramo de rosas.

‘When Ana visited María in the hospital, she brought her a bunch of roses’.

Cuando Ana visitó a María en el hospital, ella/∅ ya estaba fuera de peligro.

‘When Ana visited María in the hospital, she was already out of danger’.

Thirty-two adult speakers of Peninsular Spanish (mean age = 26.47) who were international students at Edinburgh University (with a mean length of immersion of 3 months) completed a self-paced reading task in a clause-by-clause fashion. Additionally, participants were presented with comprehension questions to identify the antecedent of the main clause in half of the items, which were randomised at every run. Filiaci (2010) reports a significant difference in reading times (RTs) of null pronouns referring to either the subject or the object of the subordinate clause (RTs subject = 1998.32 ms vs. RTs object = 2319.09 ms). There was, however, no penalty when the overt pronoun was forced to corefer with the subject of the previous clause when compared to the object antecedent (RTs subject ms = 2507.60 vs. RTs object = 2389.32 ms). The results from the comprehension questions in Spanish are in line with RTs: null pronouns bias towards subject antecedents (RTs subject = 2687.30 ms vs. RTs object = 3190.65 ms), whereas overt pronominal forms display more flexibility (RTs subject = 2840.02 ms vs. RTs object = 3183.38 ms). Interestingly, when analysing the two languages together using adjusted RTs, the difference in the penalty incurred when the overt pronoun is forced to corefer with the previous subject is only marginally significant ($p = .057$) and Filiaci (2010) attributes this to a potential lack of statistical power.

In a follow-up study, Filiaci et al. (2014) set out to investigate potential interpretation biases in Italian and Spanish null and overt subject pronouns using the same stimuli in Filiaci (2010) with subordinate-main clause order, but using an additional phrase-by-phrase self-paced reading experiment in order to explore the time course of anaphora resolution. Results from the first experiment replicate the RTs and accuracy patterns found in Filiaci (2010) for native Spanish. Thirty-two undergraduate and postgraduate students at the University of La Laguna (Spain) completed experiment 2. Null pronouns were found to incur in processing penalties when forced to be coreferential with syntactically non-prominent antecedents, a finding that was not replicated for overt pronouns.

Gelormini-Lezama and Almor (2011) conducted an online self-paced reading task (clause by clause) using intersentential contexts as illustrated in the following example:

36.

Juan se encontró con María. Ø/Él/Juan la vio triste.

‘Juan met María. Ø/He/Juan found her sad’.

María se encontró con Juan. Ø/Él/Juan la vio triste.

‘María met Juan. Ø/He/Juan found her sad’.

Crucially, apart from null and overt subject pronouns, a third type of anaphor (Gelormini-Lezama & Almor, 2011, p. 443) was introduced, the NP or repeated name ‘Juan’ in order to investigate processing penalties associated with these three different subject REs when referring back to subject or object antecedents. In experiment 1, 45 Argentinian Spanish speakers (age range = 20-40) read 36 unambiguous passages (e.g., 36), which were fully randomised, followed by a yes/no comprehension question. Overall, sentences with null pronouns were read significantly faster when they were coreferential with subject antecedents (RTs subject = 1812 ms vs. RTs object = 2412 ms) as opposed to sentences with overt pronouns, which exhibited a processing delay, referred to by the authors as the *overt pronoun penalty*. When the second sentence contained an overt pronoun, they were read faster when the antecedent was in non-subject position (overt pronoun: RTs subject = 2264 ms vs. RTs object = 2157 ms)⁵⁶. Interestingly, Gelormini-Lezama and Almor (2011) found no significant differences between overt pronouns and repeated names in both subject and object scenarios. In a second experiment where repeated names, null and overt pronouns were embedded in emphatic cleft sentences, it is worth noting that sentences with null pronouns were read significantly slower than sentences with overt pronouns, which were in turn read significantly slower than those with repeated names. Even if the results from experiment 1 are in line with the predictions made by Carminati (2002), the authors conclude that syntactic configuration alone could not account for antecedent selection considering that the two experiments yielded different results even when the grammatical position of the antecedents was kept constant. It is also important to mention that another confound was included in their experiment given that the anaphor could additionally be resolved morphologically at the clitic pronoun, that is, preverbally.

In an online self-paced reading study testing online processing of null and overt subject pronouns in potentially ambiguous but semantically disambiguated sentences such as 37 below, Keating et al. (2016) found that Mexican Spanish speakers (N = 45;

⁵⁶ Nevertheless, it is worth mentioning that no analysis is offered by what the authors call ‘antecedent salience’, that is, whether the second sentence biases towards the subject or the object of the previous clause. Thus, the analysis provided only compares differences in RTs in sentences containing either of the 3 subject REs analysed in the subject or object condition separately (e.g., differences between RTs with null pronoun, overt pronoun, and NP sentences in the subject-biasing condition). However, no comparison is provided including whether the differences in RTs of null pronoun sentences in the subject- or object-biasing condition are significant, which would more directly address the predictions from the PAS.

mean age = 20.69) follow the expected PAS behaviour in their analysis of raw reaction times, both for null (RTs subject = 2186 ms vs. RTs object = 2447 ms) and overt pronouns (RTs subject = 2605 ms vs. RTs object = 2456 ms).

37.

Después de que el sospechoso habló con el policía, Ø admitió su culpabilidad.

‘After the suspect spoke with the policeman, Ø admitted his guilt’.

Después de que el sospechoso habló con el policía, él admitió su culpabilidad.

‘After the suspect spoke with the policeman, he admitted his guilt’.

Después de que el policía habló con el sospechoso, Ø admitió su culpabilidad.

‘After the policeman spoke with the suspect, Ø admitted his guilt’.

Después de que el policía habló con el sospechoso, él admitió su culpabilidad.

‘After the policeman spoke with the suspect, he admitted his guilt’.

However, the authors acknowledge their significance was restricted to the analyses by participants and not by items, just like in Filiaci et al. (2014). The analysis of residual times only revealed a strong object-overt association, and the data from accuracy of the comprehension question only suggest a subject-null coreference pattern.

In another study, Chamorro et al. (2016) investigated online processing of null and overt subject pronouns in L1 Spanish natives (N = 24) and L1 Spanish attriters using an eye-tracking-while-reading task manipulating antecedent bias and pronoun type as shown below:

38.

La madre saludó a las chicas cuando ella cruzaba una calle con mucho tráfico.

‘The mother greeted the girls when she was crossing a street with a lot of traffic.’

Las madres saludaron a la chica cuando ella cruzaba una calle con mucho tráfico.

‘The mothers greeted the girl when she was crossing a street with a lot of traffic.’

La madre saludó a las chicas cuando Ø cruzaba una calle con mucho tráfico.

‘The mother greeted the girls when Ø was crossing a street with a lot of traffic.’

Las madres saludaron a la chica cuando Ø cruzaba una calle con mucho tráfico.

‘The mothers greeted the girl when Ø was crossing a street with a lot of traffic.’

The analyses of the first-pass time, go-past time, and total time in the critical and post-critical regions revealed a significant interaction of pronoun by antecedent in the Spanish natives. The exploration of this interaction shows that this group of participants did not

read the two null pronoun conditions significantly differently, whereas they clearly showed longer RTs when an overt pronoun sentence was forced to bias towards the subject of the main clause. This difference within the two overt pronoun conditions was found for all measures in the critical region. Overall, the predictions from the PAS are only met partially, i.e., only in the overt pronoun condition.

Bel, Sagarra, et al. (2016) investigated online processing of null and overt subject pronouns in Spanish in L1 and L2 Spanish speakers with different L1 backgrounds (English and Moroccan Arabic) using an online word-by-word non-cumulative self-paced reading task which was adapted from Just et al. (1982). The native Spanish participants in the study were 38 Spanish natives collected in Catalonia, where they were born and raised⁵⁷, and their knowledge of English was reported to be limited. The experimental stimuli contained a main clause with two same-gender antecedents followed by a temporal subordinating clause with either a temporarily ambiguous null or an overt subject pronoun. The sentences were disambiguated through semantics at the NP object of the subordinate clause, which would either bias the null or overt pronoun towards the expected antecedent following the PAS, or against it, thus creating four different conditions (see 39 below).

39.

El músico saluda al bombero mientras \emptyset lleva un violín en la mochila.

‘The musician greets the firefighter while \emptyset is wearing a violin in his bag’.

El músico saluda al bombero mientras él lleva un violín en la mochila.

‘The musician greets the firefighter while he is wearing a violin in his bag’.

El músico saluda al bombero mientras \emptyset lleva un casco en la mochila.

‘The musician greets the firefighter while \emptyset is wearing a helmet in his bag’.

El músico saluda al bombero mientras él lleva un casco en la mochila.

‘The musician greets the firefighter while he is wearing a helmet in his bag’.

The results show that L1 Spanish participants partly complied with the PAS in terms of RTs at the object NP disambiguating region (i.e., *casco* ‘helmet’ or *violín* ‘violin’) in the subordinate clause: they read the object NP faster with subject rather than object

⁵⁷ The results from this study should also be considered with caution taking into account the differences found in Bel and García-Alcaraz (2018), where they find different interpretation patterns in monolingual and bilingual (Catalan) Spanish. Crucially, bilingual Spanish-Catalan speakers show more clear-cut pronoun resolution patterns when compared to Spanish monolinguals.

antecedents in the null pronoun condition (RTs subject = 798.79 ms vs. RTs object = 887.01 ms). The PAS-like behaviour for overt pronouns did not reach significance in the L1 Spanish controls. By contrast, the pattern found at the PP region (i.e., *en* ‘in’), which coincided with the end of the sentence and thus the wrap-up, depicted a different picture: L1 Spanish participants were slower with subject rather than object antecedents in sentences with overt pronouns (RTs subject = 1402.21 ms vs. RTs object = 1308.84 ms). Hence, it appears that the associated processing cost of linking a null or an overt pronoun to its unexpected antecedent following the PAS becomes evident at different times in sentence processing: null pronoun mismatches appear to be detected earlier on and then the effect arguably disappears, whereas overt pronoun mismatches surface later in the sentence⁵⁸.

Bel and García-Alcaraz (2018) conducted an online word-by-word self-paced reading testing the processing of subject pronouns in 49 monolingual speakers (mean age = 23.5) and 32 bilingual speakers (mean age = 22.7). While the former were born and raised in Valladolid, a largely monolingual region in Spain, the latter were born and raised in Catalonia and spoke Catalan and Spanish roughly on a daily basis. The task used manipulated both pronoun (null vs. overt) and antecedent (subject vs. object position), and contained 24 experimental sentences with a main clause with two antecedents with the same gender followed by a temporal subordinate clause that contained a null or an overt temporarily ambiguous pronoun. While the verb in the main clause was kept ambiguous controlling for its implicit causality, the sentence was later disambiguated at the object of the subordinate clause which would make it more likely for the pronoun to be interpreted as coreferential with the subject or the object of the previous clause similarly to their previous experiment presented above (see 40 below).

40.

El profesor sorprende al alumno mientras Ø lee un cómic en la clase.

‘The teacher surprises the student while Ø is reading a comic in class’.

El profesor sorprende al alumno mientras él lee un cómic en la clase.

‘The teacher surprises the student while he is reading a comic in class’.

El profesor sorprende al alumno mientras Ø lee un manual en la clase.

‘The teacher surprises the student while Ø is reading a handbook in class’.

⁵⁸ The authors state that this divergent results from the PAS might be related to their selection of clause order for their stimuli, being main-subordinate instead of subordinate-main as in Filiaci et al. (2014).

El profesor sorprende al alumno mientras él lee un manual en la clase.

‘The teacher surprises the student while he is reading a handbook in class’.

The results of the analysis of RTs in the preposition region following the disambiguating object of the subordinate clause showed that Spanish monolinguals did not exhibit any significant processing penalties when reading clauses with null or overt pronouns. By contrast, the bilinguals read clauses with overt pronouns significantly faster when the antecedent was the object and displayed no processing penalties in the null pronoun condition. In the analysis of the final wrap-up region, both Spanish monolinguals and bilinguals were found to process null pronouns slower than overt pronouns when the antecedent was in object position. The bilinguals further discriminated between the reading of null and overt pronouns when the antecedent was the subject⁵⁹. It appears then that, while the Spanish monolinguals only exhibited a processing penalty when reading overt pronouns as coreferential with the subject antecedent in the wrap-up region partially in line with the PAS, the authors argue that bilinguals have a more polarised system given that they discriminated between null and overt pronouns in a more reliable way⁶⁰.

Finally, Schimke et al. (2018) conducted a visual world task with 35 peninsular Spanish speakers (mean age = 22) to investigate the processing of null and overt pronouns through participants’ eye movements. The stimuli were similar to the ones used in their offline experiment with the exception that a disambiguating element was added at the end of the end of the sentence in the subordinate clause to bias towards either the subject or the object of the previous clause (see 41).

41.

El barrendero se encontró con el cartero antes de que Ø recogiera las cartas.

‘The street sweeper met the postman before Ø fetched the letters’.

El barrendero se encontró con el cartero antes de que Ø recogiera la escoba.

‘The street sweeper met the postman before Ø fetched the broom’.

⁵⁹ It is important to note that the *p* value reported in this case was .051 for the ‘significant’ processing penalty in the subject antecedent condition for bilinguals.

⁶⁰ It is worth noting that differences have been found between what Bel and García-Alcaraz (2018) refer to as Spanish monolinguals and Spanish-Catalan bilinguals. These differences in processing could be likely linked to differences in production (Contemori & Di Domenico, 2021) and thus, findings from Spanish-Catalan bilinguals should be interpreted with caution when trying to generalise them to how Spanish overt and null pronouns are interpreted and produced in both spoken and written discourse.

The authors discuss that both null and overt pronouns are processed as referring back to object antecedents, a tendency which is more pronounced in the overt pronoun condition. Hence, the predictions from the PAS are only met partially, only overt pronouns are processed as biasing towards their expected antecedents, i.e., the previous object.

4.1.6 Summary of findings on the processing of subject referring expressions in native Spanish

Overall, the online processing of null and overt subject REs has been found to be modulated by variables such as clause order (main-subordinate vs. subordinate-main) or information structure (e.g., cleft sentences). In line with the findings obtained in interpretation studies, the evidence on the online biases of null and overt subjects is inconclusive: some studies report PAS-like tendencies for the two types of pronouns (Bel, Sagarra, et al., 2016; Gelormini-Lezama & Almor, 2011; Keating et al., 2016), whereas others only find it for null (Filiaci, 2010; Filiaci et al., 2014) or overt pronouns (Bel & García-Alcaraz, 2018; Chamorro, Sorace, et al., 2016; Schimke et al., 2018). Additionally, it appears that the penalty emerging from a mismatch between null and overt subject pronouns and their preferred antecedent manifests itself differently according to the pronoun: whereas such a penalty emerges earlier on with null pronouns, it is delayed in the case of overt pronouns (Bel, Sagarra, et al., 2016).

4.1.7 A note on the use of L1 Spanish control participants

As has been noted in the previous sections, most of the evidence on the production, interpretation, and processing of subject REs in native Spanish has largely been made available from studies that have used native Spanish participants as a control group for comparable purposes when exploring L2 acquisition or L1 attrition. Nevertheless, potentially assuming little variability among L1 Spanish natives or arguably neglecting or downplaying the effect of some variables (e.g., L2 English proficiency or length of residence in the L2 environment) on L1 variability in the selected controls, different studies have included native Spanish speakers with differentiated profiles. For instance, several studies (Bel, Sagarra, et al., 2016; Bel & García-Alcaraz, 2015, 2018; García-Alcaraz & Bel, 2019) have included bilingual Spanish-Catalan controls for comparative

purposes. Notably, different patterns have been attested in interpretation when comparing monolingually-raised and bilingually-raised Spanish speakers (Bel & García-Alcaraz, 2018), i.e., bilinguals have been shown to exhibit clearer PAS-like biases than monolinguals.

Additionally, despite evidence on variability among L1 Spanish varieties that has been highlighted in previous studies (Carvalho et al., 2015; García-Alcaraz, 2015; Lozano, 2009; Rothman, 2009), a number of authors have included Spanish speakers from different varieties in their control groups (Clements & Domínguez, 2017; de la Fuente, 2015; Keating et al., 2011; Schimke et al., 2018) apart from the fact that some specific studies have selected Spanish speakers from different varieties such as Argentinian (Gelormini-Lezama & Almor, 2011), Mexican (Contemori & Di Domenico, 2021; Keating et al., 2016), Chilean (Giannakou & Sitaridou, 2020, 2022) or Peninsular Spanish (Chamorro, 2018; Chamorro, Sorace, et al., 2016).

Another point that is worth emphasising relates to the selection of native Spanish speakers with differing levels of L2 proficiency, a factor that has not been widely reported. For example, the participants in Keating et al. (2011) reported a high command in L2 English in both reading, speaking, and understanding, i.e., roughly 8 on a 10-point scale. However, not only did the participants in this study consider they were highly proficient in L2 English, but they had also lived in the L2 environment for a mean of 2.26 years, ranging from 6 months to 5.5 years. Similarly, the native controls used in a study on L1 Spanish morphosyntactic attrition (Chamorro, Sorace, et al., 2016) were tested when they were living in the UK, even though they reported low levels of L2 proficiency. These same circumstances are attested in Chamorro (2018), whereby predictions made on the interpretation of null and overt subject pronouns in Spanish are made based on a sample collected in the L2 environment, where they had spent a mean of roughly 12 weeks. The last point that deserves attention is the diversity in age profiles that has been observed in previous studies. While most of them include participants in their 20s, other studies have focused on older participants (Giannakou & Sitaridou, 2020 with a mean of 47.8; Schimke et al., 2018 with a mean of 35) and age differences could very well influence production and interpretation patterns (Giannakou, 2018; Kaltsa et al., 2015).

All in all, from the aforementioned picture presented, it appears that the selection of participants included within native speaker control groups, what some have called ‘monolinguals’, has largely been based on almost exclusively the criterion of the L1.

Nevertheless, taking into consideration evidence on variability of L1 production, interpretation, and processing of subject REs accounted for by variables such as L2 proficiency and use, length of residence in the L2 environment or age (Chamorro, Sorace, et al., 2016; Chamorro & Sorace, 2019; Kaltsa et al., 2015; Tsimpli et al., 2004), this thesis will try to further contribute to this by exploring the effect of some of these variables in a more controlled way (e.g., by objectively measuring L2 proficiency or testing the effect of L2 residence). Moreover, the group of functional monolinguals used in this dissertation has been carefully selected (see section 6.3) in order to obtain a clear(er) picture of how production, interpretation, and processing of subject REs manifests in functional monolinguals, given that completely monolingual speakers nowadays are exceptionally rare to find (see section 2.1.2).

4.2 Studies on L1 morphosyntactic attrition

This section summarises current evidence on the production, interpretation, and processing of null and overt subject REs in L1 attriters. Even though results from L1 Spanish attriters will be presented in a first subsection, studies dealing with other null-subject (e.g., Italian, Greek, Turkish, or Bulgarian) or non-null-subject languages (e.g., German) will also be discussed given that some of the studies included in this dissertation are also presented as a partial replication or extension of research conducted on Italian and Greek. This section thus presents the main findings from the (in)stability of the L1 in morphosyntax, particularly focusing on subject pronouns.

4.2.1 Studies on the L1 Spanish morphosyntactic attrition

In the first and only study testing L1 morphosyntactic attrition in L1 Spanish, Chamorro, Sorace, et al. (2016) explored the effect of L1 re-exposure in attrition effects in L1 Spanish-L2 English bilinguals living in the UK. To do so, they used two groups of L1 Spanish-L2 English bilinguals: 24 ‘attriters’ and 24 ‘exposed’ participants⁶¹. The participants in both groups were monolingually-raised Spanish native speakers and had spent a minimum of 5 years in the L2 environment, even though they slightly differed in

⁶¹ The participants’ L2 proficiency was not assessed objectively but through self-reported data from a questionnaire that addressed questions such as their age of onset to L2 English, their length of instruction, and their self-rated proficiency in listening, speaking, reading, and writing, among others.

their mean length of residence in the L2 environment as measured in number of years (see Table 1).

Table 1

Attriters and exposed participants' length of residence and L1 and L2 use from Chamorro, Sorace, et al. (2016)

	Attriters	Exposed
Length of residence⁶² (years)	7 (SD = 2.844)	5.833 (SD = 1.736)
L1 use (5-point Likert scale)	3.417 (SD = .843)	2.583 (SD = .880)
L2 use (5-point Likert scale)	4.333 (SD = .434)	4.417 (SD = .565)

The main difference between the two groups was that the ‘exposed’ group was tested after being exclusively exposed to Spanish in their L1-speaking environment for at least 1 week. The results from the online processing of sentences with null and overt subject pronouns (see 38) using an eye-tracking-while-reading task show that whereas ‘attriters’ did not exhibit a pronoun by antecedent interaction in any of the online measures, such an interaction was significant in the ‘exposed’ group in line with the control group. Notably, both ‘exposed’ and control groups distinguished the interpretation of the overt pronoun online with the matching and mismatching conditions. Furthermore, a significant triple interaction pronoun by antecedent by language group was found between ‘attriters’ and the control group in the critical region, whereas no such significant interaction was found when comparing controls and the ‘exposed’ group or the ‘exposed’ with the ‘attriters’. This suggests, according to Chamorro et al. (2016, p. 530), that ‘[‘exposed’] might be somewhere between [controls] and [‘attriters’] in terms of their online sensitivity to the pronoun mismatch’. In the offline judgement task, it is important to note that both ‘attriters’ and ‘exposed’ groups only distinguished in the mismatching conditions of the overt pronoun, which was rated higher when it referred to the previous object, as expected⁶³, in line with the performance from the control group. Crucially, no significant differences were found between the three groups in the offline task in line with the predictions from the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011,

⁶² Even if the difference in the mean of length of residence in the two groups does not appear to be large, an analysis showing whether the difference was statistically significant and another analysis on the potential effect of length of residence modulating attrition effects in both groups would have been illuminating, which is indeed addressed in this dissertation (see Chapters 8 and 9).

⁶³ It is important to mention that the biggest distinction between the two overt pronoun conditions was shown in the attrited group.

2012, 2016). Overall, the picture that emerges from these results is that ‘attriters’ are the only group that do not show online sensitivity to pronoun mismatch in any of the measures manifested as attrition effects, i.e., they do not follow the predictions from the PAS in any of the two pronoun conditions in online processing. By contrast, their performance did not differ from the other two groups in the offline component of the task where the overt pronoun expectedly biased towards the object antecedent although the expected PAS pattern was not attested in the null pronoun condition. The authors then conclude that L1 attrition affects processing of interface structures rather than knowledge representation and that attrition effects diminish with recent L1 exposure (see section 3.4.1).

Given that the studies that have focused on morphosyntactic attrition in L1 Spanish are extremely limited, a review of studies testing L1 morphosyntactic attrition in other null-subject languages will follow in order to establish comparisons between L1 Spanish and other L1s such as Italian, Greek, Turkish, or Bulgarian. In addition, other studies on morphosyntactic attrition of non-null-subject languages such as German will be of interest for the discussion of the results regarding in particular the effect of modulating variables in L1 attrition outcomes such as length of residence.

4.2.2 Studies on the L1 morphosyntactic attrition in other null-subject and non-null subject languages

The first relevant study investigating L1 attrition of two null-subject languages is Tsimpli et al. (2004), which serves as the basis for the interpretation and processing task in this thesis. Tsimpli et al. (2004) tested L1 morphosyntactic attrition of null and overt subject pronouns in 20 L1 Greek and 20 L1 Italian-L2 English near-natives who still retained L1 use daily. The participants from both experimental groups had spent a minimum of 6 years in an English-speaking country⁶⁴ and were rated as near-natives following performance on different spoken production data, whereas the controls had minimum or no knowledge of L2 English and lived in their L1 environment. The main task used to investigate interpretation of null and overt subject pronouns was a picture selection task, which contained 20 sentences with ambiguous null and overt subject pronouns, which

⁶⁴ The authors expected that ‘syntactic attrition would occur as the result of long-term contact with the second language (rather than extensive instruction) and that it would be most advanced in highly proficient speakers of the L2’ (Tsimpli et al., 2004, p. 265).

participants had to assign an antecedent to by selecting a picture depicting a subject, an object, or an external referent interpretation⁶⁵, as shown below.

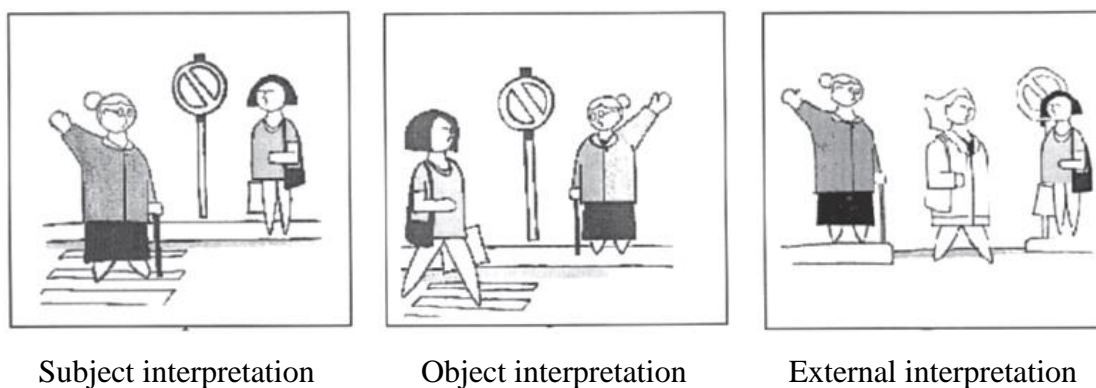
42.

L'anziana signora saluta la ragazza quando Ø/lei attraversa la strada.

‘The old lady waves at the girl when Ø/she crosses the street’.

Quando Ø/lei attraversa la strada l'anziana signora saluta la ragazza,

‘When Ø/she is crossing the street the old lady waves at the girl’.



The sentences presented either a main-subordinate (for backward anaphora) or a subordinate-main configuration (for forward anaphora) and the ambiguous pronoun was always placed in the subordinate clause in both conditions as shown in 42 above. The task additionally contained 10 distractors testing interpretation of pre- and postverbal subjects and 10 fillers. The results of this task were uniquely presented for the L1 Italian attriters since no attrition effects were found for the L1 Greek bilinguals. Considering the main-subordinate anaphora conditions, significant differences were found in the interpretation of null and overt ambiguous subject pronouns in the two groups. On the one hand, L1 Italian attriters selected significantly more subject antecedent responses for the null pronoun than the controls (69.8% vs. 50.75%). On the other hand, the authors found a significant difference in the bias of overt pronouns to subject antecedents in the two groups in that this preference in the Italian controls was significantly milder when compared to that of the L1 Italian attriters (7.6% vs. 21.15%)⁶⁶. Nevertheless, it is worth noting, despite the significant difference between the two groups, that L1 Italian potential attriters still prefer the object as the antecedent of an overt pronoun. Hence, it seems that

⁶⁵ It should be noted that participants could choose more than one option if they deemed it appropriate.

⁶⁶ Tsimpli et al (2004) also find a significant difference in the interpretation of the overt pronoun in subordinate-main configuration: the Italian controls prefer an external referent whether the L1 Italian attriters show indeterminacy.

the PAS-like interpretation has not drastically changed: it has become somewhat milder in the case of overt pronouns but has been reinforced for null pronouns, a finding to which we will return in the discussion of our interpretation results (see section 8.3).

Kaltsa et al. (2015)⁶⁷ conducted two self-paced listening with sentence-picture matching tasks to test differences in pronoun resolution between 25 L1 Greek-L2 Swedish attriters (mean age = 59)⁶⁸ and two groups of L1 Greek controls (younger and older)⁶⁹. In their experiments, each sentence with either a null or an overt pronoun, which were adapted from Tsimpli et al. (2004)⁷⁰, was presented with one of the three pictures shown above, which displayed either a subject, an object, or an external referent interpretation. Therefore, the presentation of one of these pictures while the sentence was heard in a segment-by-segment manner controlled by the participants was thought to create a given context against which participants would process the ambiguity of the overt and null pronouns. In this way, a null pronoun sentence could then be heard in combination with its expected subject interpretation picture, and an overt pronoun with its object interpretation counterpart, or they could in turn be presented with mismatching interpretation pictures. The latter would potentially lead to an added processing cost when processing the ambiguous pronouns, which would arguably surface for native speakers and not for attriters, particularly in sentences with overt pronouns. Moreover, participants had to indicate whether the picture matched the meaning of the sentence they had read once the aural presentation of the sentence had finished.

Firstly, focusing on the overt pronoun experiment, the results from the matching task show that L1 Greek attriters significantly accepted more subject interpretations for overt pronouns, even if their preferred interpretation was that of an object antecedent similarly to the Greek controls. Secondly, in the RTs for the matching task, both groups distinguished between subject and object conditions for the overt pronoun, but the attriters differed significantly from L1 Greek older controls in the object referent condition in that they were slower. Thirdly, in the analysis of the critical segment in the overt pronoun condition (which was the pronoun in the subordinate clause), neither the monolinguals

⁶⁷ Given that the findings from this study are very relevant for this dissertation since the processing study draws from the stimuli included in it, the review of this study has been rather comprehensive.

⁶⁸ Their length of residence in the L2 environment was considerably high (mean = 31 years, range = 25-44).

⁶⁹ The study also investigated the preferences of a heritage speaker group, but we will mostly discuss the findings from the attrited group to fit the purpose of our study.

⁷⁰ The structure of these sentences was always main-subordinate.

nor the attriters distinguished between the subject and object referent conditions, even if the L1 Greek attriters were significantly faster in all conditions. The fact that the authors did not find differences in such a region could be explained in relation to a delayed processing strategy which has been found in previous studies (Bel, Sagarra, et al., 2016), and which will be addressed in this dissertation. In addition, this delayed effect with the overt pronoun could be expected considering the significant difference that was found between the subject and object conditions in the RTs for the matching task once the listening of the sentence had finished.

Regarding the offline results of the null pronoun experiment, whereas the attriter group significantly differentiated between subject and object referents, showing a higher expected preference for subjects, the older monolingual controls were found not to significantly distinguish between the two conditions⁷¹. When it comes to the RTs for the matching task, it was only the attriters who significantly took longer in the subject referent condition (RTs = 1927 ms) when compared to the object (RTs = 1620), this difference not being significant for any of the other groups. As for the listening times in the verb in the subordinate clause, the dependent-samples t-test comparisons showed that none of the two groups distinguished between subject and object conditions.

Overall, in terms of the PAS, it appears that, while attriters have lost the sensitivity of pronoun mismatches in the critical region in both the overt and null conditions, they show the expected patterns both at the RTs in the matching tasks and in the matching scores. Interestingly, Kaltsa et al. (2015, p. 282) state that null pronouns are interpreted similarly by bilinguals (heritage speakers and attriters) and monolinguals (younger and older) when collapsing the groups together, and therefore claim that ‘the between-group differences found in the interpretation of null pronouns [...] are not due to bilingualism as such but a combination of bilingualism and age effects at best’. Finally, the authors also explore an age effect and claim that interface vulnerability might also be open to factors other than attrition or bilingualism (e.g., age).

Another relevant study testing interpretation preferences in highly proficient bilinguals is Miličević and Kraš (2017)⁷². They aimed to investigate whether the L1 of L1 Italian-L2 English trainee translators would undergo changes, or a form of L1 attrition,

⁷¹ This distinction was indeed significant in the younger Greek control group.

⁷² It is worth noting that this is, to the best of our knowledge, one of the very few studies that have investigated potential attrition effects in L1 morphosyntax in a non-immersed context.

due to prolonged influence of their L2, which is the source of translation. To do this, they investigated interpretation of null and overt subject pronouns in L1 Italian using an adaptation of the picture selection task used in Tsimpli et al. (2004), which is also one of the main tasks used in this dissertation (see Chapter 8). Focusing on the anaphora conditions, the group of highly advanced L2 English (i.e., C1 or above)⁷³ Italian trainee translators (N = 32, mean age = 23.22) selected more subject antecedents (74.48%) for sentences with null pronouns than the Italian native controls (66.67%), and similarly, more object interpretations for the overt pronoun (80.21% vs. 77.78%). Additionally, the trainee translators selected the subject interpretation for the overt pronoun significantly less frequently than the controls (10.42% vs. 18.06%). In discussing the results, the authors tentatively argue that their participants may not have engaged in translation long enough for their L2 English to affect their L1. However, after discarding this option, Miličević and Kraš (2017) argue that the results from their participants might in fact be due to their linguistic education, which leads to enhanced metalinguistic awareness.

Gargiulo and Van de Weijer (2020) set out to explore whether L1 attrition effects would also obtain in the interpretation of null and overt pronouns in 20 L1 Italian-L2 Swedish bilinguals (mean age = 42.96) living in Sweden, and whether these effects would diminish after L1 re-exposure in an Italian environment. It is important to note that the potential attriters were re-immersed in the L1 environment for a mean of 23.2 days (ranging from 11 to 47 days) between the two testing sessions to explore potential L1 re-immersion effects in L1 attrition⁷⁴. The bilinguals' length of residence in the L2 environment ranged between 7 and 52 years, their L2 proficiency was rated as 4.75 on average⁷⁵, and their frequency of L1 use increased between testing time 1 and testing time 2 (3.28 vs. 4.98, on a 5-point Likert scale). The stimuli used in a self-paced comprehension task were intrasentential semantically neutral sentences with a main clause introducing a same-gender subject and object antecedent followed by a subordinate clause introduced by *when* or *since* and which contained either a null or an overt ambiguous subject pronoun (see 43 below). After the presentation of each experimental stimulus, participants had to indicate which of the two potential antecedents (i.e., the subject or the object) the ambiguous pronoun in the subordinate clause referred to.

⁷³ The proficiency level was based on the entry criteria for the University of Bologna.

⁷⁴ The two sessions were conducted with a mean interval of 42.5 days on average (range = 21-77 days).

⁷⁵ The L2 proficiency of the bilinguals is measured subjectively through a 5-point Likert scale and no objective measure is provided.

43.

Monica ha discusso molto con Antonella da quando Ø è tornata da Parigi.

‘Monica has discussed a lot with Antonella since Ø came back from Paris’.

Andrea ha conosciuto Jacopo quando lui lavorava in una clinica privata.

‘Andrea met Jacopo when he was working in a private clinic’.

The L1 Italian-L2 Swedish bilinguals appear to clearly distinguish between the interpretation of overt and null pronouns, clearly assigning a subject interpretation to null pronouns and an object interpretation to its overt counterpart in both sessions. Notably, the bilinguals show an even clearer pattern in session 2, that is, after L1 re-immersion (subject-null: session 1 = 74% vs. session 2 = 80%; object-overt: session 1 = 84% vs. session 2 = 87%). Crucially, the difference in selecting an object antecedent for the overt pronoun or a subject antecedent for the null pronoun did not significantly differ between the potential attriters and the control group in session 1, both of which exhibited the predicted patterns hypothesised by the PAS. Moreover, the difference in strength of the object-overt bias was not significantly different in session 2 in the attriter group. Considering the null pronoun, the expected bias towards the subject was significantly stronger after L1 re-immersion. Additionally, the two groups significantly differed in the subject bias, with a stronger one exhibited by the controls in session 2 and the authors then argue that bilinguals show attrition effects with null pronouns. In terms of response times to the comprehension question, these were in line with the preferences described above: attriters took more time to answer mismatching than matching conditions in both overt and null pronoun sentences.

Köpke and Genevska-Hanke (2018) conducted a longitudinal case study to explore the relationship between L1 attrition and language dominance using spontaneous speech data from a near-native L1 Bulgarian-L2 German bilingual speaker who lived in Germany for 17 years, and who was tested at four different points in time in her L1 and L2 environment. The L1 Bulgarian-L2 German late bilingual (age at investigation point 1 = 32) grew up monolingually and was highly proficient in the L2, i.e., C1 from the CEFR. Her length of residence in Germany in investigation point 1 was of 12 years, and at time 2 of 17 years. In each investigation point, she was tested in Germany first and

roughly three weeks after in Bulgaria⁷⁶. Additionally, there was a control group of 10 L1 Bulgarian speakers (mean age = 50; age range = 30-67) who were also recorded while having informal conversations following the same procedure as the one employed with the bilingual speaker. The results from an analysis of production of null and overt subjects⁷⁷, primarily focusing on pronominal subjects, reveal that the late bilingual only differed from monolingual controls when tested in her L2 environment for the first time⁷⁸. The production of overt pronominal subjects was comparable to that of the monolingual group after re-exposure in the L1 environment in time 1 and in the two testing sessions (i.e., Germany and Bulgaria) at time 2. The authors interpret these results as evidence of the temporariness of L1 attrition and contrary to what they expected, they found no divergence of the late bilingual from the controls in overproduction of overt pronouns in time 2, both when the testing session took place in Germany or Bulgaria. This, as they argue, could be due to the change in the patterns of language use after marrying an L1 Bulgarian speaker and hence exhibiting a more balanced use of the L1 and the L2 thereafter. Nevertheless, the finding that the overproduction of overt subjects is not significantly different from the testing in the L2 and L1 environment in investigation point 2 questions the potential effect of re-immersion in the L1 environment in arguably reverting potential attrition effects. As suggested by the authors, the bilingual returned to a more L1-like distribution of null and overt subjects even after 17 years of length of residence in the L2 environment, so no significant change was attested in the production

⁷⁶ It is important to note that between investigation point 1 and 2, the L1 Bulgarian-L2 German late bilingual married a native Bulgarian who moved to Germany and thus, exposure and use of the L1 was much more balanced than it was before (Köpke & Genevskaja-Hanke, 2018, p. 9).

⁷⁷ Even though this is not explicitly mentioned in the paper, it appears that at least 1st and 3rd person subjects were included in the analysis. Notably, the factors constraining the use of 1st and 3rd person pronouns are not the same, and in addition, the authors do not report the rate of production of 1st and 3rd person pronouns at times 1 and 2, which would make the results comparable to those where only 3rd person pronouns were included.

⁷⁸ Köpke and Genevskaja-Hanke (2018, p. 10) state that ‘the rates of overt subjects in topic shift contexts of the bilingual were comparable across recordings so that the difference between overt subject rates originates solely due to an increased use of overt subjects in topic continuity contexts’. Even though this information is essential, very little is explained about the distribution of forms regarding information status and no information in this respect is presented for the L1 Bulgarian controls. Providing this information would have been extremely useful since not all cases of overt subjects in TC can be classified as instances of overproduction, since some might be motivated by additional factors such as the number and gender of potential antecedents, which is explored in this dissertation, as well as others reported in previous studies (Collewaert, 2019; Giannakou & Sitaridou, 2020, 2022; Lozano, 2016; T. Quesada, 2021, among others). In addition, information about the syntactic configuration where null or overt subjects are produced would have been highly valued: as has been found in previous studies, null pronouns are far more likely in contexts of coordination with a coreferential subject when compared to subordinated contexts (Martín-Villena & Lozano, 2020; T. Quesada, 2021) and these could potentially differ from investigation point 1 and 2 and from the controls and the bilingual participant and would then trigger a higher or lower rate of null pronouns, for instance.

of overt and null subjects in the bilingual participant when being re-exposed to her L1 in Bulgaria. This might potentially imply that continued L1 use makes it more difficult for attrition effects to surface, although this needs further empirical support.

Additional evidence on L1 attrition effects in morphosyntax comes from Gürel (2004). In her study, she investigates whether binding properties of null and overt pronouns in L1 Turkish are maintained or changed after prolonged L2 English exposure, predicting that attrition effects will be selective and only those forms that are analogous in the L1 and L2 will potentially undergo attrition due to competition based on the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007) (see section 3.4.3). Thus, whereas the null pronoun and the overt pronoun *kendisi* ‘oneself’ in Turkish are expected to be preserved, the overt pronoun *o* ‘s/he’ will arguably be subject to attrition. A group of 24 L1 Turkish-L2 English near-natives (mean age = 47; range = 29 to 72) who migrated to North America in adulthood (mean age = 25.5 years) and who had lived in the L2 environment for at least 10 years⁷⁹ (mean = 21.5; range = 10-43) participated in the study. Their performance in several tasks was compared to that of a group of native Turkish speakers (mean age = 40; range = 20-70) who had been living in Turkey and had some knowledge of L2 English. All participants completed a written interpretation task, a truth-value judgement task, and a picture identification-listening task. The overall results showed that even though both attriters and controls differentiated between the three types of pronouns, assigning mainly a bound interpretation to the overt pronoun *kendisi* and the null pronoun, and a disjoint interpretation to the overt pronoun *o*, L1 Turkish attriters significantly accepted more bound interpretation readings for the overt pronoun *o* than the L1 Turkish controls. Crucially, a bound interpretation is not grammatically allowed in Turkish, i.e., allowing coindexation of the overt pronoun *o* with the previous subject, but it appears that the attriter group allowed it significantly more than the controls considering this is a grammatical possibility of the overt pronoun in their L2 English, which they might be transferring to their L1. These results are discussed in terms of the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007) in relation to the potential replacement of binding properties of the overt pronoun *o*, which arguably due to its higher activation threshold takes those of L2 English by L1 Turkish attriters. Furthermore, Gürel

⁷⁹ Gürel (2004, p. 60) states that a minimum of 10 years of length of residence was selected based on previous studies claiming that attrition effects emerge after such a considerable time period. However, this dissertation will particularly focus on the earlier stages of L1 attrition to provide evidence of earlier L1 attrition outcomes.

(2004) run an analysis to test whether length of residence modulated performance in pronoun binding and the results did not reveal such a factor as a significant predictor⁸⁰. Nevertheless, this analysis was performed through an ANOVA by clustering participants into groups of length of residence and an analysis performed on such variable considering its continuous nature would potentially reveal more promising results⁸¹.

In another study on attrition effects in a non-null subject language, Gürel (2007) analysed the potential effect of L2 Turkish on L1 English binding properties of pronouns and reflexives using a group of 15 L1 English-L2 Turkish potential attriters (mean age = 48.33) who had lived in Turkey for at least 10 years (mean = 18.6; range = 10 to 35) and who worked in L1-English environments. Hence, the potential attriters maintained L1 contact to a great extent. Regarding their L2 Turkish proficiency, which was not measured objectively, the group contained self-reported near-natives, advanced, and intermediate participants. Their performance was compared to that of a control group of 15 native English speakers from the USA and Canada, who only participated in the written interpretation task and not in a truth-value judgement task since the contextual stories were presented in Turkish. The results from the two tasks reveal that L2 Turkish does not seem to influence interpretation of pronouns and reflexives in L1 English and hence, no attrition effects were found. Nevertheless, Gürel (2007) argues that a bigger sample size and the inclusion of more tasks of different modalities might have been essential to provide more significant results. The results overall seem to be in line with the Activation Threshold Hypothesis since L1 attrition might not have emerged due to the frequent use of the L1 in these participants.

Another study testing L1 morphosyntactic attrition in a non-null subject language is Wilson (2009), who tested whether processing of demonstrative and personal pronouns at the syntax-discourse interface (see 44 below) would be affected in the L1 of L1 German-L2 English bilinguals.

44.

Der Kellner erkennt den Detektiv als das Bier umgekippt wird. Er ist offensichtlich sehr fleißig.

⁸⁰ Interestingly, Gürel (2004, p. 73) also notes that it would be relevant to consider the interaction of length of residence together with L1 contact based on the findings from de Bot et al. (1991), but the design of her study did not allow her to perform such an analysis.

⁸¹ Gürel (2004, p. 74) also claims that the lack of significance of her analysis of length of residence might be due to her limited sample of participants in each length of residence group.

‘The waiter recognises the detective as the beer is tipped over. He is clearly very hard working’.

Der Kellner erkennt den Detektiv als das Bier umgekippt wird. Der ist offensichtlich sehr fleißig.

‘The waiter recognises the detective as the beer is tipped over. He is clearly very hard working’.

Den Kellner erkennt der Detektiv als das Bier umgekippt wird. Er ist offensichtlich sehr fleißig.

‘The waiter is recognised by the detective as the beer is tipped over. He is clearly very hard working’.

Den Kellner erkennt der Detektiv als das Bier umgekippt wird. Der ist offensichtlich sehr fleißig.

‘The waiter is recognised by the detective as the beer is tipped over. He is clearly very hard working’.

The group of participants tested consisted of 24 German native speakers (mean age = 26.9) who had lived in Scotland for a mean of 36.54 months and who used their L1 25.88% of the time on average. The experiment conducted in this study was an adaptation of a standard visual-world paradigm exploring the processing of demonstrative and personal pronouns in German. In addition to the visual-world task, participants were placed under additional processing load in some conditions, where they were presented with a list of digits to remember before the presentation of each experimental item. Their performance was then compared to that where no additional processing load was present. The overall results show that demonstratives are more likely to receive a subject interpretation with longer length of residence in the L2 environment. This could be seen as L2 English influence since they are typically interpreted as referring to the previous object in L1 German. Wilson (2009, p. 199) argues that demonstrative pronouns could be more permeable to input factors. By contrast, the potential effect of L2 English on the processing of personal pronouns, which typically receive a subject interpretation in native German, was less clear, but was also modulated by length of residence. Hence, Wilson (2009) calls for the use of variables such as percentage of L1 use and length of residence in research on L1 attrition. Interestingly, this study addresses potential L1 morphosyntactic attrition effects in early immersed bilinguals who have spent, on average, less than 5 years in an L2 environment, which will also be addressed in this dissertation.

4.2.3 Summary of findings on L1 morphosyntactic attrition

Overall, the studies testing L1 morphosyntactic attrition show that L1 attriters of null-subject languages like Spanish, Greek, Italian, or Bulgarian typically exhibit attrition effects in the production, interpretation, and processing of overt pronouns. In both interpretation and processing tasks, overt pronouns exhibit milder or unclear interpretation biases towards the object of the previous clause following the PAS or are not sensitive to mismatches in online processing. Null pronouns, on the other hand, remain largely unaffected (but see Gargiulo & van de Weijer, 2020). Moreover, apart from L1 attrition affecting online processing of interface structures (Chamorro, Sorace, et al., 2016), there is evidence that L1 attrition has also been found in offline interpretation (e.g., Tsimpli et al., 2004). Another interesting finding is that the evidence from highly advanced bilinguals in a non-immersed setting seems to suggest that they tend to exhibit clearer pronoun interpretation preferences when compared to controls (Miličević & Kraš, 2017). This, contrary to what would be predicted in attrition settings, could arguably be the result of enhanced metalinguistic awareness in the L1 of highly advanced bilinguals (see Chapter 10). To conclude, it is important to mention that most studies have tested relatively long-immersed bilinguals (Chamorro, Sorace, et al., 2016; Gargiulo & van de Weijer, 2020; Gürel, 2004, 2007; Köpke & Genevska-Hanke, 2018; Tsimpli et al., 2004), arguing that attrition effects surface after an extensive and intensive period of L2 exposure. Some studies have established a minimum of 5 years (e.g., Chamorro, Sorace, et al., 2016; Tsimpli et al., 2004) or even 10 years (e.g., Gürel, 2004, 2007). However, there is evidence that attrition effects can emerge before such a prolonged length of residence (Wilson, 2009) and such a variable has been found to modulate them. Thus, this dissertation will fill such a gap and will additionally explore the earlier stages of L1 morphosyntactic attrition (i.e., particularly bilinguals with length of immersion of 1 to 5 years) as well as address the role of length of residence and other variables such as language dominance.

4.3 Studies on native English

This section will present some main findings from studies conducted in native English speakers in the domains investigated within this dissertation to explore the distribution of subject REs in English, which could arguably influence the L1 of our bilingual participants. Differently from Spanish, English almost exclusively requires grammatical

subjects to be explicit across the board (see section 3.1). Therefore, previous studies have primarily focused on the interpretation or processing of ambiguous overt subject pronouns in English and not on the null vs. overt alternation found in Spanish. A brief review of these studies will shed light into the extent to which the interpretation of overt subject pronouns in English and Spanish is similar or differs, potentially exhibiting crosslinguistic differences between the two languages. In addition to presenting data from studies that focused on the population of interest, evidence from studies using English native speakers as a control group will be included.

Whereas overt subject pronouns in Spanish have the tendency to be interpreted and processed as coreferential with the previous object in sentential configurations with two potential antecedents in subject and object position, respectively (see sections 4.1.3 and 4.1.5), overt pronouns in English tend to receive the opposite interpretation. Just like Spanish null subject pronouns, overt subject pronouns in English typically select prominent antecedents, which likely coincide with those found in subject position (Crawley et al., 1990; Cunnings et al., 2017; Gernsbacher & Hargreaves, 1988; Hudson-D’Zmura & Tanenhaus, 1998; Jegerski et al., 2011; Santoro, 2020; Smyth, 1994)⁸². This finding is in line with the tendency of English native speakers to encode TC contexts through the use of overt pronouns, whereas NPs are largely attested in topic shift or motivated by additional factors such as the number of potential antecedents present in discourse (T. Quesada & Lozano, 2020). Overall, current evidence seems to suggest that the interpretation and processing of ambiguous overt subject pronouns differs in English and in Spanish, the former preferably linking them to the previous subject and the latter to the object. These crosslinguistic differences will be important in the discussion of the results.

Having addressed the main findings from the production, interpretation, and processing of subject REs in L1 Spanish, the most relevant results on L1 attrition of the structures investigated within this dissertation, and finally, a brief summary of studies on L1 English, the following chapter will introduce the main research questions and

⁸² It should be noted that additional factors have been shown to play a role in modulating antecedent preferences of English overt subject pronouns: e.g., coherence relations, aspect, thematic roles, or implicit causality, among others (Kehler et al., 2008; Kehler & Rohde, 2019; Rohde & Kehler, 2014; Stevenson et al., 1994).

hypotheses that motivate this research, both specific to each task, and general ones that combine the findings from the three tasks.

CHAPTER 5. Research questions and hypotheses

Considering the theoretical accounts described in section 3.4 and previous studies on the production, interpretation, and processing of null and overt subject referring expressions in advanced bilinguals and Spanish functional monolinguals (see sections 4.1 and 4.2.3), a series of research questions and hypotheses were formulated in order to contribute to a better understanding of existing inconclusive evidence. Moreover, several new factors have been incorporated in this study to provide novel insights that will potentially explain divergence that has not been accounted for to date. Given that this dissertation will compare production, interpretation, and processing data to test L1 morphosyntactic attrition, the research questions and hypotheses presented will be first separated according to task and will then address how the results from the three different tasks combine to tap into more general questions having to do with bilingualism.

5.1 Production (corpus-based) data

The production of 3rd person singular subject REs in TC has been found to be vulnerable in language contact settings, e.g., both in L1 attrition and L2 acquisition (Köpke & Genevska-Hanke, 2018; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021). While Spanish functional monolinguals largely resort to the use of null pronouns to encode the aforementioned contexts, bilinguals, and in particular L1 attriters, generally employ more explicit subject REs in line with the predictions from the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016). In interface structures (e.g., syntax-discourse interface) such as the distribution of null and overt subject REs in discourse, bilinguals are expected to show vulnerability in their L1. Moreover, the PPVH (Lozano, 2016, 2018) also argues that bilinguals tend to be more redundant than ambiguous, which parallels with the expected overproduction hypothesised by the IH.

In addition to the potential increase in overt REs in bilinguals in TC, several language internal factors have been found to trigger the use of more explicit subject REs: the number and gender of potential antecedents, the distance between a given RE and its (textual or cognitive) antecedent, or the context in which the RE is embedded (e.g., coordination vs. different types of subordination). However, the role of some of these factors is still poorly understood, e.g., no previous study has differentiated between explicitly mentioned textual antecedents and cognitive antecedents, which recover a

given referent without necessarily being overtly realised. On a final note, research on production in L1 attrition has only focused on immersed bilinguals but not on L2 instructed bilinguals in the L1 environment, whose performance should lie between that of functional monolinguals and immersed bilinguals considering the claims of recency and frequency of L1 use made by the ATH (see section 3.4.3). Taking the above into consideration, the following RQs and hypotheses were formulated.

RQ1: How do 3rd person singular overt and null subject REs distribute in TC in the oral production of instructed vs. immersed L1 Spanish-L2 English bilinguals compared to Spanish functional monolinguals? Is the distribution similar in the three groups when comparing a task where only one animate character is present (Task 1) and another one where different characters appear (Task 2)?

H1: The three groups under analysis are expected to largely produce null pronouns to encode TC, although the production of overt subject REs in instructed and immersed bilinguals will most likely be significantly higher than that of functional monolinguals given their high(er) L2 use and exposure in line with the predictions from the IH (see section 3.4.1) and the ATH (see section 3.4.3). Moreover, differences will be expected between instructed vs. immersed bilinguals in that the former, who are less exposed to the L2 and use it less frequently, will show attrition effects to a lesser extent.

Arguably, differences in the overall distribution of null and overt subject REs are likely to emerge in the two tasks in that more overt subject REs will be found in Task 2 overall considering its increased cognitive demands required to select the appropriate subject RE in the presence of multiple referents. These increased cognitive demands in this second task will be more pronounced in the two bilingual groups given that some cognitive resources will be necessary to inhibit the language not in use following the IH.

RQ2.1: Which factors constrain the production of null and overt subject REs in TC in instructed vs. immersed L1 Spanish-L2 English bilinguals compared to Spanish functional monolinguals?

H2.1: Following previous results on the factors that modulate subject realisation in production (see section 3.2), we hypothesise that 3rd person singular overt subject REs (i.e., both overt pronouns and NPs) will be triggered by factors such as a longer distance

between a given subject RE and its (textual and cognitive) antecedent, TC contexts that do not involve coreferential coordination, main-subordinate clause configurations, and scenarios with a higher number of potential antecedents. In addition, we also hypothesise several of these factors will indeed interact, e.g., number of potential antecedents and syntactic configuration, and will hence be explored in combination.

Firstly, more explicit subject REs are expected with more distant antecedents considering they are less accessible in working memory and should therefore be retrieved by more explicit material to make them more salient (see section 3.2.2). A distinction will be made between explicitly recovered *textual* antecedents and those *cognitive* antecedents that recover a given referent regardless of its form. Secondly, given that null pronouns are expected in both English and Spanish in coordinated contexts with a coreferential subject (see section 3.2.3), overproduction instances are more likely to be found in non-coordinated scenarios as opposed to those involving coreferential coordination. Thirdly, current evidence on PAS preferences in interpretation and in production in subordinate-main and main-subordinate clause order intrasententially suggests there is a weaker bias or no bias of null pronouns towards subject antecedents in the latter (Bel, García-Alcaraz, et al., 2016; de Rocafiguera & Bel, 2022). Therefore, more overt pronouns could arguably be expected in production in main-subordinate contexts. Fourthly, a higher number of potential antecedents might make a given antecedent less prominent (see section 3.2.2), and hence, less reduced material will be employed in an attempt to avoid ambiguity in line with the predictions of the PPVH (see section 3.4.2). Finally, regarding the interaction of several of these factors, the effect of the number of potential antecedents could be expected to be more pronounced when exploring syntactic configurations that do not involve coreferential coordination considering the arguably high production of null pronouns attested in such contexts. Overall, these effects are likely to become apparent in the three groups under study.

RQ2.2: Which factors constrain the production of different overt subject REs (i.e., overt pronouns and NPs) in TC in instructed and immersed bilinguals and Spanish functional monolinguals?

H2.2: Focusing specifically on the factors that modulate the use of different overt subject REs, i.e., overt pronouns and NPs, overt pronouns will be more likely produced

in contexts where there are several potential antecedents with different gender, and NPs when the potential antecedents have the same gender value (see section 3.2.4). In addition, more NPs are likely to be found than overt pronouns, which are rather infrequent in production as evidenced in previous studies (see section 4.1.1).

RQ3: If instructed and immersed bilinguals are more overexplicit than Spanish functional monolinguals in TC contexts, can this overexplicitness be accounted for by language internal factors such as the number and gender of potential antecedents or distance from the antecedent, among others, or can it be explained simply by crosslinguistic influence from L2 English?

H3: L1 attriters have been found to be overexplicit in their L1 in contexts involving interface structures (see sections 3.4.1 and 4.2) partly based on a representational account. Therefore, crosslinguistic differences between English and Spanish would make it more likely for L1 Spanish-L2 English bilinguals to overextend the use of overt subject REs in L1 Spanish in TC, which are the most natural option in English. If this hypothesis is true, instructed and immersed bilinguals should overuse overt subject REs in TC across the board, with more overproduction instances found in immersed bilinguals due to increased exposure and use of the L2. By contrast, instructed and immersed bilinguals could possibly be more sensitive to pragmatic factors and would be more redundant in their L1 so as to avoid potential ambiguity. This prediction would be in line with the PPVH, by which it could be hypothesised that these bilinguals are more sensitive than Spanish functional monolinguals in production due to enhanced sensitivity to pragmatic principles that constrain the use of overt REs (e.g., number and gender of potential antecedents) to avoid potential ambiguity.

5.2 Interpretation data

The interpretation of null and overt subject pronouns in Spanish has been widely explored in studies testing their scope in PAS structures (see sections 3.3.1, 4.1.3, and 4.2.3). Null pronouns have largely been found to be interpreted as coreferential with subject antecedents (de la Fuente, 2015; Filiaci et al., 2014; Jegerski et al., 2011; Keating et al., 2011), although see Chamorro (2018), or Giannakou (2018) for different findings. The

evidence on the interpretation of overt subject pronouns is, however, rather mixed, with studies both showing a preference towards the object (Chamorro, 2018; Chamorro, Sorace, et al., 2016; Contemori & Di Domenico, 2021) or an unclear one (Alonso-Ovalle et al., 2002; Filiaci et al., 2014; Jegerski et al., 2011). Moreover, variability in interpretation patterns of null and overt subject pronouns has largely been addressed based on factors such as clausal order (Bel, García-Alcaraz, et al., 2016; de Rocafiguera & Bel, 2022). Nevertheless, other variables such as the effect of different subordinating conjunctions, working memory, or language dominance have been under-researched. Furthermore, considering the vulnerability of subject pronouns in L1 attrition, while null pronouns have been found to remain largely unaffected (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015), overt subject pronouns are argued to be more vulnerable and to retrieve more antecedents in subject position in L1 attriters (Chamorro, Sorace, et al., 2016; Chamorro & Sorace, 2019; Giannakou & Sitaridou, 2020, 2022). These predictions are both in line with the IH and the ATH. It is also important to mention that, within the factors that modulate L1 attrition outcomes, the effect of length of residence in morphosyntax in immersed bilinguals has been poorly understood to date, and no study has addressed the effect of length of intensive instructed exposure in instructed bilinguals. The following research questions are then formulated to address the aforementioned gaps.

RQ4: How do instructed vs. immersed L1 Spanish-L2 English bilinguals interpret null and overt subject pronouns in L1 Spanish compared to Spanish functional monolinguals in offline interpretation? Will attrition effects more likely manifest in the interpretation of overt subject pronouns in instructed and immersed bilinguals?

H4: Null pronouns will be interpreted as coreferential with subject antecedents, whereas more variability will be found in the interpretation of overt subject pronouns. Notably, overt subject pronouns will be more susceptible to attrition effects and will be overextended to refer to prominent (subject) antecedents in line with the IH. Moreover, these predictions are also supported by the ATH in that only overt pronouns have a corresponding competing counterpart in L2 English and have an increased activation threshold. Finally, a possible overextension of overt pronouns could be in line with the tendency of bilinguals to be more redundant than ambiguous following the PPVH. Although these predictions are hypothesised to hold for the two bilingual groups, they should be more pronounced in immersed bilinguals in line with the ATH.

RQ5: Is the interpretation of null and overt subject pronouns in the three groups under study modulated by language internal factors such as the subordinating conjunction linking main and subordinate clauses?

H5: Given that different subordinating conjunctions have been shown to trigger different discourse relations between clauses (see section 3.3.3) and thus different tighter or more relaxed links between them, we hypothesise that different bias strengths towards subject and object antecedents will be created for null and overt subject pronouns between clauses linked by different temporal subordinating conjunctions (e.g., *mientras* ‘while’ and *cuando* ‘when’). Despite their similarity in meaning, sentences linked by *mientras* ‘while’ will reinforce a subject association given its simultaneous-only interpretation. In addition, we hypothesise this factor will most likely affect null pronouns contributing to the predictions made by the FSMC approach (see section 3.4.4) in claiming that different types of REs might be sensitive to different factors and to different degrees.

RQ6: Is the interpretation of null and overt subject pronouns in the three groups under study modulated by external factors such as the language dominance?

H6: Given that language dominance, understood as a multi-faceted construct including both proficiency, experiential, and attitudinal measures, has been found to modulate linguistic outcomes in a number of different phenomena (see section 2.2.1), we expect our interpretation results to be affected by such a factor. Particularly, overt pronouns are hypothesised to be sensitive to increased dominance in the L2 and thus exhibit patterns of interpretation that resemble how overt pronouns are comprehended in English, i.e., more subject interpretations will be selected for overt pronouns in those bilinguals that are more L2-dominant. By contrast, null pronouns are unlikely to be influenced by language dominance and subject interpretations will be predicted regardless of more L1- or L2-dominant individual profiles. These hypotheses are partly in line with the predictions from the ATH, given that language use is an essential component of language dominance (see section 2.2.1).

RQ7: Is the interpretation of null and overt subject pronouns in the three groups under study modulated by working memory?

H7: Since working memory has been found to be essential in the underlying processes required to interpret and process ambiguous null and overt subject pronouns (see section 3.3.4), we expect increased working memory capacity to modulate interpretation patterns primarily of null subject pronouns. Following Vogelzang et al. (2021)'s hypothesis that null pronouns are affected by working memory and not overt pronouns, added to the results from Bel, Sagarra, et al. (2016) where they found subject-null interpretation patterns to be stronger in participants with higher working memory, we expect this trend to be replicated in our results.

RQ8a: Is the interpretation of null and overt subject pronouns in naturalistically immersed bilinguals modulated by length of residence in the L2 environment? Will both types of pronouns be affected by length of residence equally?

H8a: Following the ATH, we expect only overt pronouns to select more subject antecedents in bilinguals that have been immersed in the L2 environment for longer. The activation threshold of overt pronouns will be higher in bilinguals with longer immersion periods in a naturalistic setting, who have arguably used the L1 less recently and frequently, making this type of pronoun more vulnerable to attrition effects, additionally considering they have an L2 competing counterpart.

RQ8b: Is the interpretation of null and overt subject pronouns in instructed bilinguals modulated by length of L2 intensive instruction? Will both types of pronouns be affected by length of L2 intensive instruction equally?

H8b: Taking into consideration the scarcity of studies testing potential L2 influence on the L1 of instructed bilinguals, we hypothesise that, if attrition(-like) effects are found in the interpretation of only overt subject pronouns in PAS-like structures (based on the IH and the ATH), they could be modulated by the cumulative exposure to the L2 in an instructed setting. More attrition effects will be found in instructed bilinguals who have been exposed to intensive L2 instruction for longer in that more subject antecedents would be selected for overt pronouns.

5.3 Processing data

Current evidence on the processing of null and overt subject pronouns in Spanish is rather mixed (see section 4.1.5). Whereas some studies attest a clear bias of null pronouns towards subject antecedents in processing (Bel, Sagarra, et al., 2016; Filiaci, 2010; Filiaci et al., 2014; Gelormini-Lezama & Almor, 2011; Keating et al., 2016), others do not report such a clear pattern (Bel & García-Alcaraz, 2018; Chamorro, Sorace, et al., 2016; Schimke et al., 2018). Regarding overt pronouns, there is evidence of a strong association of overt pronouns towards object antecedents in processing (Bel, Sagarra, et al., 2016; Bel & García-Alcaraz, 2018; Chamorro, Sorace, et al., 2016; Gelormini-Lezama & Almor, 2011; Keating et al., 2016; Schimke et al., 2018), although no such bias has also been reported (Filiaci, 2010; Filiaci et al., 2014) (see section 4.1.5). In terms of L1 attrition, overt pronouns have generally been found to exhibit no processing penalty when forced to bias towards the previous subject (Chamorro, Sorace, et al., 2016; Chamorro & Sorace, 2019; Kaltsa et al., 2015; Tsimpli et al., 2004) in line with the IH and the ATH. By contrast, the processing of null pronouns in L1 attriters has remained largely unaffected. Moreover, connected to the previous gaps spotted within the interpretation of null and overt subject pronouns, i.e., the unexplored or inconclusive role played by working memory or language dominance in processing, the following research questions were formulated.

RQ9: How do instructed and immersed bilinguals process null and overt subject pronouns in L1 Spanish compared to Spanish functional monolinguals in online processing? Will attrition effects more likely manifest in the processing of overt subject pronouns in instructed and immersed bilinguals?

H9: We predict that the processing biases of overt pronouns are more likely to be more indeterminate in bilinguals as a result of L1 morphosyntactic attrition, i.e., no processing penalty will be found when forcing overt pronouns to bias towards subject antecedents. This prediction meets the claims from both the IH and the ATH. By contrast, null pronouns are not expected to be affected by attrition and will retain their expected bias towards subject antecedents. Alternatively, null pronouns could also be claimed to exhibit no clear bias in our experiment considering we are using main-subordinate clause configurations, and less clear or no subject-null biases have been attested in such scenarios (e.g., Bel & García-Alcaraz, 2018; Chamorro, 2018; Chamorro, Sorace, et al., 2016; Schimke et al., 2018). Furthermore, a possible overextension in the processing of

overt pronouns could be in line with the tendency of bilinguals to tolerate redundancy over ambiguity following the PPVH. Overall, even though these predictions are likely to hold for the two bilingual groups, they are argued to be more pronounced in immersed bilinguals in line with the ATH.

RQ10: Is the processing of null and overt subject pronouns in the three groups under study modulated by external factors such as language dominance?

H10: Following H6, the same effect of language dominance is expected to be replicated in our processing results. The processing penalty that would arguably surface when biasing an overt pronoun towards a subject interpretation would be more tolerated by participants who are more dominant in L2 English, since this would be the common processing pattern in the L2. The penalty of processing null pronouns as coreferential with the previous subject will not be sensitive to differences in language dominance, if this tendency is to be replicated considering previous research.

RQ11: Is the processing of null and overt subject pronouns in the three groups under study modulated by working memory?

H11: In line with H7, only the processing of null pronouns is argued to be affected by working memory capacity. The processing of null pronouns as coreferential with the previous subject will be more pronounced in bilinguals with higher working memory, since subjects will maintain their prominence for longer, making them easier to be retrieved by null pronouns. Overt pronouns, on the other hand, are not hypothesised to be processed differently considering limitations in working memory capacity.

RQ12a: Is the processing of null and overt subject pronouns in naturalistically immersed bilinguals modulated by length of residence in the L2 environment? Will both types of pronouns be affected by length of residence equally?

H12a: Similarly to the potential L1 attrition effects on the interpretation of null and overt subject pronouns in L1 Spanish as modulated by length of residence in the L2 environment, attrition effects are also hypothesised in the processing of interface

structures following the predictions from the IH and the ATH. In addition, such effects will be predicted to appear in the processing of overt pronouns and not of null pronouns given the claims made above (Chamorro, Sorace, et al., 2016; Chamorro & Sorace, 2019; Kaltsa et al., 2015; Tsimpli et al., 2004) (see section 4.2).

RQ12b: Is the processing of null and overt subject pronouns in bilinguals modulated by length of L2 intensive instruction? Will both types of pronouns be affected by length of L2 intensive instruction equally?

H12b: In line with H8b, similar effects are expected in the processing of interface structures as modulated by length of L2 intensive instruction primarily in the case of overt pronouns.

5.4 General research questions

The following research questions address the results from the three tasks jointly to explore more general questions related to bilingualism and particular theories that make combined claims about vulnerability of different domains in L1 attrition. The first one explores some of the claims made by the IH regarding the nature of L1 attrition in different domains. The second general research question proposed focuses on which of the overall factors explored in each task can better account for variability in production, interpretation, and processing of subject REs and whether the same factors modulate outcomes in different tasks (e.g., in interpretation and processing). Finally, the last overall research question is proposed to account for one of the novelties of the dissertation, that is, whether L1 attrition can equally manifest both in immersed and instructed bilinguals and to address potential differences.

RQ13: Are attrition effects found more in the online processing of interface structures than in offline language components following the predictions from the IH?

H13: Following the IH, attrition effects are more likely to emerge in the processing of interface structures in real time due to the complexity bilinguals, and in this case L1 attriters, experience in integrating multiple sources of information simultaneously. If this is the case, we will be more likely to find attrition effects in tasks

that measure processing of subject REs when compared to those that measure offline components of language.

RQ14: Which are the main overall factors that modulate the production, interpretation, and processing of subject REs in instructed vs. immersed bilinguals and functional monolinguals?

H14: In particular, considering the exploration of similar factors in different tasks, we expect working memory, language dominance, and length of residence in the L2 environment to affect both interpretation and processing similarly.

RQ15: Does L1 attrition emerge exclusively in immersed bilinguals or are similar results attested in the L1 of instructed bilinguals in the production, interpretation, and processing of interface structures?

H15: Following the very limited number of studies that have investigated and found L1 attrition effects in instructed bilinguals previously, we hypothesise L1 attrition effects will replicate in our instructed bilinguals. L1 attrition-like effects are likely to surface following the interaction of the two languages and the subsequent disuse of the L1, whose activation threshold raises making it more vulnerable. However, considering the more frequent and recent L1 use in this type of bilinguals following the ATH, the effects attested in these bilinguals will be milder, being placed between functional monolinguals and immersed bilinguals.

Overall, once the research questions and hypotheses that motivate this research have been proposed, the following chapter will detail the general methodology from this dissertation. This chapter will include the general procedure followed, the description of the background tasks, and finally, an in-depth analysis of the participants included within this dissertation.

CHAPTER 6. General methodology

As illustrated in the previous chapter, the main aim of this thesis is to explore potential differences in production, interpretation, and processing of subject REs between instructed vs. immersed bilinguals compared to functional monolinguals. In particular, one important question that is addressed relates to the potential effect that both intensive and extensive exposure to an L2 in an instruction and in an immersion setting might have on the representation and processing of an L1. The language combination in this case is, already stated, Spanish in contact with English. Thus, three groups of participants were chosen (see Table 2). Firstly, a control group of functional monolinguals was included, i.e., L1 Spanish speakers who have limited L2 English proficiency and who are not exposed to and do not use L2 English regularly. Data were also collected from an advanced instructed and an advanced immersed L1 Spanish-L2 English bilingual group, i.e., instructed and immersed bilinguals for short, to explore whether exposure and use of the L2 in the specified contexts might lead to L1 differences in production, interpretation, and processing, where asymmetries could arguably be found.

Table 2

General profile of functional monolinguals, instructed and immersed bilinguals

	Functional monolinguals	Instructed bilinguals	Immersed bilinguals
Current country of residence	Spain	Spain	UK and Ireland
L1	Spanish	Spanish	Spanish
L2	English	English	English
L2 proficiency ⁸³	A1-A2	C1-C2	C1-C2
L2 exposure	Limited and infrequent	Instruction setting	Immersion setting

Four main tasks were designed to investigate the aforementioned domains. Two corpus-based oral video-retelling tasks were used to investigate the production of 3rd person subject REs considering these have been found to be largely problematic in L2 acquisition and are thus hypothesised to be vulnerable in L1 attrition (Collewaert, 2019; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada & Lozano, 2020) (see section 4.1.1). Moreover, an offline picture selection task and a self-paced reading task aimed at exploring preferences of interpretation and processing of null and overt subject pronouns,

⁸³ The cut-off points used to determine these levels are specified in Table 4.

respectively. Additionally, several background measures, both cognitive (e.g., working memory) and language-related (e.g., language proficiency or language dominance), were gathered to compare the groups. Notably, a main methodological point in this dissertation relates to the fact that the main tasks were completed by the same participants, which adds to the current literature where most of these language domains have primarily been explored separately using different participants. This will make it possible to compare results across domains without adding individual variability that is present when testing different participants across studies.

The aim of this chapter is to offer a comprehensive description of the overall procedure that was followed for data collection in addition to an in-depth account of three background tasks that are relevant to characterise our participants and for the main analyses conducted in this dissertation (e.g., the *Oxford Quick Placement Test* (OQPT), the *Bilingual Language Profile* (BLP) and the working memory task) and finally, a detailed description of the participants included within this dissertation. Specifically, the nature of four main tasks used, their codification, and analysis will be presented in three specific chapters devoted to the corpus-based oral production tasks (Chapter 7), the picture selection task (Chapter 8), and the self-paced reading task (Chapter 9), respectively.

6.1 Procedure

Regarding the sequencing and timing of the tasks, the order was the following:

- 1 OQPT
- 2 Adapted version of the BLP
- 3 Corpus-based oral retellings of Charlie Chaplin video clips: Task 1 and Task 2
- 4 Online self-paced reading task
- 5 Offline picture selection task
- 6 Working memory task
- 7 *LexTALE*

Originally, the data collection was designed to take place in situ between the months of March and May in 2020. However, the outbreak of the COVID-19 pandemic in Europe around March that same year made it impossible to continue as planned and several

adaptations had to be made. Eventually, the data collection had to be postponed for one year and all the tasks had to be adapted to an online format. This section will explain the final procedure and the motivation behind the choices made.

First, it is worth mentioning why the data collection process was planned to take place during spring. As stated above, the main aim of this thesis is to explore the potential L1 attrition effects in L1 Spanish-L2 English instructed and immersed bilinguals in production, interpretation, and processing of subject REs. Concerning the group of immersed bilinguals, given that re-exposure in the L1 environment might revert potential L1 attrition effects (Chamorro, Sorace, et al., 2016), we considered it necessary to start the data collection after a considerable and consistent amount of exposure in the L2 environment. Thus, we tried to avoid collecting data immediately after potential periods of re-exposure such as holidays, where bilinguals living in an L2 environment could have returned to their L1 settings and hence, where increased L1 exposure and use would have been likely. When it comes to the instructed group of bilinguals in Spain, we also aimed at exploring the effect the number of years of intensive instruction could have on those hypothesised L1 changes. Thus, the data had to be collected approximately at the end of the academic year to ensure enough exposure to L2 instructed input throughout, trying to avoid the time immediately following the holiday break in December. To keep it consistent, we decided to collect data around the same months for the three groups. This was made possible since the data were eventually collected in an online format.

Considering the restrictions imposed at the time of data collection in the UK and in Spain, face-to-face communication to reach out all the participants needed was not possible. Therefore, several leaflets were created as calls for participation including information about the requirements to participate, the compensation they would get for their time (15 euros)⁸⁴, and a link to a short questionnaire. This short questionnaire was introduced with a summary page which again contained the detailed requirements to participate, a list of the whole battery of tasks to complete in the study, the compensation received upon completion, and information about the ethical approval of the data collection⁸⁵. Moreover, participants had to fill in several questions to make sure they met

⁸⁴ The funding needed for participant compensation was made possible thanks to the ANACOR project (FFI2016-75106-P), a *Language Learning Dissertation Grant* and a *Language Learning/EuroSLA30 Junior Researcher* grant.

⁸⁵ This study was conducted in accordance with the recommendations of and approved by the research ethics committee at the Universidad de Granada (Registration n. 1212/CEIH/2020). All participants gave informed consent in accordance with the Declaration of Helsinki.

all the criteria to be included in one of the three groups of the study, which are presented in Table 3.

Table 3

Participation requirements by group

Participation requirements		
Functional monolinguals	1. Native Peninsular Spanish speakers	5. Very low L2 English proficiency
	2. Not bilingual from birth	6. Not have attended a bilingual primary/secondary school
	3. No advanced proficiency in an L3	7. Not have spent a year abroad
	4. Be between 18/35 years old	
Instructed bilinguals	1. Native Peninsular Spanish speakers	5. C1 English proficiency or above
	2. Not bilingual from birth	6. Not have attended a bilingual primary/secondary school
	3. No advanced proficiency in an L3	7. Not have spent a year abroad
	4. Be between 18/35 years old	8. Attend L2 lectures daily and interact
Immersed bilinguals	1. Native Peninsular Spanish speakers	5. C1 English proficiency or above
	2. Not bilingual from birth	6. Use English daily
	3. No advanced proficiency in an L3	7. Not have returned to Spain for a week or more in the last month
	4. Be between 18/35 years old	

Given that we decided to only include advanced (i.e., C1-C2 following the Common European Framework of Reference, CEFR) bilinguals⁸⁶ and those with very little proficiency in their L2 (A1-A2 following the CEFR), who would act as a control group, the first task that participants had to complete was the OQPT to measure their L2 English proficiency objectively. The whole questionnaire was implemented in Google Forms, which made it possible to automatically correct each question and it finally provided a score of up to 60 points, which participants were shown upon completion of the task. Prior to starting the placement test, participants had to complete a short questionnaire to make sure they met the required criteria to participate in the study (see Appendix A. Participation requirements), which were included in the call for participation. For all three groups, these questions gathered information about their initials, their age, their gender, and their contact email. Those participants in Spain (functional monolinguals and

⁸⁶ The decision to only include advanced participants was motivated by an attempt to avoid potential additional variability that has been attested in L1 attrition studies considering the proficiency level of participants (Schmid, 2013) and, in turn, focus on the effect of some overlooked variables such as language dominance. In addition, it has also been suggested that attrition effects will become more apparent in highly advanced bilinguals (Tsimpli et al., 2004).

instructed bilinguals) had to provide information about the year they were in within their degree, if applicable, whether they had attended a bilingual school in primary and/or secondary education where most of the courses were taught in their L2 English, whether they were highly proficient in a third language, and whether they were bilingual from birth (i.e., simultaneous bilinguals). If the answer to any of the last three questions was positive, they were then thanked for their participation but were excluded from the study and could not complete the rest of the tasks. Additionally, instructed bilinguals were asked to state whether they attended lectures regularly to make sure they received enough L2 exposure daily. The immersed bilinguals in the UK or Ireland provided information about the number of consecutive years they had spent in the L2 English environment, whether they had returned to Spain for at least a week in the previous month, and whether they were highly proficient in a third language. Similarly, participants who were highly proficient in an L3 and frequently spoke it and those who had been recently re-exposed in the L1 environment were excluded from the study.

Once they completed the English proficiency test, which took from 15 to 20 minutes, those who had a score of 48 points or above for the advanced bilingual groups (immersed and instructed) and 29 or below for the functional monolinguals were further contacted via email with links to complete the adapted version of the BLP (see section 6.2.2), the two oral video-retelling tasks and the self-paced reading task.

The BLP (Birdsong et al., 2012) was adapted using the online version of this instrument, which is freely downloadable from the specified website⁸⁷ and participants completed it at their own pace using their personal devices. The Google Form they were provided accessed to via email contained both the BLP and the two oral retelling corpus-based tasks. Before starting both tasks, which took around 60 minutes to complete, participants were presented with a set of instructions in Spanish which further explained the nature of the tasks they were going to complete and encouraged them to prepare their recording devices for the oral narrations (see Appendix B. Instructions for BLP and oral recordings). Furthermore, before completing the test, they were presented with the informed consent, which explained the type of tasks they would have to complete, the general aim of the data collection process, the type of data that were being gathered, the benefits of participating in the study, and the code of the ethical approval from the ethics

⁸⁷ <https://sites.la.utexas.edu/bilingual/>

committee at the Universidad de Granada. Once they agreed to participate, they completed the language background questionnaire.

Upon completion of the adapted version of the BLP, the participants were presented with the instructions from the production Task 1 in Spanish (see Appendix B. Instructions for BLP and oral recordings). The instructions stated that once they had watched the video, which they could do as many times as they wished, they had to orally narrate in Spanish what they had seen, imagining they were narrating it to somebody who had not watched it⁸⁸. Finally, they read the instructions on how to upload their oral recording. The procedure for Task 2 was identical.

The following step was to complete the self-paced reading task⁸⁹, which was programmed using *OpenSesame* (Mathôt et al., 2012) and then made available online through the OSWeb extension using the online JATOS server (Lange et al., 2015)⁹⁰. Apart from the proper and carefully designed instructions included in the task, participants were reminded in the email with the link to the task that they were advised to use Google Chrome as a browser to avoid compatibility issues, and in addition, to complete the task in a quiet room with no distractions to simulate the conditions in a lab.

After completing the aforementioned tasks, each participant was asked to select a date and time for a one-to-one session with the researcher which would try to mimic the lab setting and where they would have to finish the remaining tasks specified below⁹¹. Moreover, participants completed the picture selection task prior to the one-to-one session. The time between the completion of the self-paced reading task and the last individual session was of at least two weeks to ensure participants could not easily remember the online reading task when completing the picture selection task. One day before the one-to-one session, each participant received an email with a link to the *Google Meet* session as a reminder and another link to the picture selection task, which they had to complete ideally before the online session.

⁸⁸ This was done in order to avoid assumed familiarity with the video clips, which could potentially make participants be less explicit than required (Sorace, 2004).

⁸⁹ Interestingly, the self-paced reading task was done before the offline picture selection task in order to avoid raising participants' awareness about the target of the study (Marsden et al., 2018, p. 873)

⁹⁰ We would like to thank Myrte Vos from UiT people for her assistance with the JATOS server and for providing access to the UiT server.

⁹¹ During that session, an additional verbal fluency task was completed to further test L1 attrition in the lexical domain, although for the sake of consistency to primarily explore the domain of morphosyntax, the results from this task will not be included in this dissertation.

The picture selection task (see Chapter 8) was programmed using *LimeSurvey*, which is a free online survey tool that includes different types of question formats. After filling in some background questions for cross-validity purposes, participants read the instructions of the task, which mostly consisted in selecting one of two pictures which best matched the meaning of each sentence they were presented with. The results were automatically saved upon completion of the task.

Finally, the last tasks were performed in an online session of approximately 20 to 30 minutes via Google Meet where the researcher and the participant virtually met. Both participant and researcher had their camera on to make sure that the tasks were performed following the specified guidelines. In addition, the session was recorded with verbal informed consent from the participant to later code the answers from the working memory task. The session started with the working memory task, which was a sentence reading span task done in Spanish, which will be detailed below. This task was programmed in *OpenSesame* (Mathôt et al., 2012) and made available online via the JATOS server similarly to the self-paced reading task. The researcher shared a link to the task and the participant opened it in a new tab. The display automatically changed to full screen mode to avoid any distractions within their personal devices. The instructions appeared on the screen, and participants were encouraged to ask the researcher any doubts they may come up with at any point before the actual experimental task started, i.e., while reading the instructions and during the three practice trials. Once the participants started the task, they read the sentences aloud, and the researcher made sure the task was being completed as required.

The last task was the *LexTALE*, which participants accessed through a link to the web interface⁹². They read the instructions aloud and asked questions if necessary and then performed the task. They included their email and the researcher's email so as to later receive the score obtained on the test. The *LexTALE* was included given that the score obtained in this task has been used in previous studies as a proxy for L2 proficiency, due to its arguably high correlation with general English proficiency (Lemhöfer & Broersma, 2012). Hence, this would have provided additional information to the background of the bilinguals. Nevertheless, recent findings have contested the reliability

⁹² <http://www.lextale.com/takethetest.html>

of the LexTALE to account for overall L2 proficiency in English (Puig-Mayenco et al., 2023) and therefore, this task, has not been further analysed in this dissertation.

6.2 Background tasks

The following subsections will provide additional information about the three background tasks that have been included in this dissertation: the OQPT, the BLP, and the working memory task. These tasks have both been useful to select participants, classify, and describe them (e.g., OQPT and BLP) but also as predictors included in the main analyses of both the picture selection and the self-paced reading tasks (e.g., BLP and working memory task).

6.2.1 Oxford Quick Placement Test

L2 English proficiency of the bilinguals was assessed using the OQPT (see Appendix C. Oxford Quick Placement Test) in order to only select highly-advanced and lower-level bilinguals. The OQPT is a standardised English proficiency test, which has been widely used in previous research as a reliable tool to measure L2 English general proficiency (Llanes et al., 2016; Yaghoubi & Farrokh, 2022). This test was also selected given that it is used within the data collection procedure of the COREFL corpus⁹³ (Lozano et al., 2021), which is a parallel L2 English corpus to CEDEL2, where the oral production data from this thesis will be later incorporated for public use. Having the same instrument for proficiency assessment will enable more reliable comparisons of results.

In particular, the OQPT consists of 60 multiple-choice questions with three or four answers that tap into both grammatical and vocabulary knowledge. The first five questions include three-answers multiple-choice questions where participants need to match a given sign with the appropriate context where they would be found, e.g., a sign with information about leaving the room key at reception, which would be found at a hotel and not in a taxi or in a shop. These are followed by 15 gaps embedded within three texts (five gaps each) where an appropriate answer from three (in the first text) or four (in the second and third text) must be selected. The following section contains 20 items where a word or phrase that best completes each sentence must be selected from four different

⁹³ <http://corefl.learnercorpora.com/>

options. Subsequently, two texts with five items each and four different options are presented. The test finishes with 10 four-options multiple-choice questions where the best word or phrase must be selected. The questions within the test are graded in terms of difficulty based on the proficiency levels established by the CEFR and the score thus ranges from 0 to 60 (see Table 4). The scores obtained are taken to be good indicators of different levels within the CEFR.

Table 4

OQPT test scores and correspondence with CEFR levels

	CEFR	Test score
Lower beginner	A1	0-17
Upper beginner	A2	18-29
Lower intermediate	B1	30-39
Upper intermediate	B2	40-47
Lower advanced	C1	48-54
Upper advanced	C2	55-60

In this thesis, the scores obtained in the OQPT were used as an inclusion criterion. Participants from both advanced groups had to score at least 48 in the test, which would mean that they were classified as advanced L2 English learners, either C1 or C2. The functionally monolingual group was also chosen according to their score in the OQPT and thus, their proficiency level was objectively measured; however, their score had to be lower than 29, which would correspond to A1 or A2 level.

6.2.2 Bilingual Language Profile

Apart from classifying participants according to their proficiency level, an additional instrument was used to gauge variability in individual bilingualism profiles. Interestingly, participants with the same proficiency level can vary to different degrees in different dimensions (see section 2.2.1). Bilinguals with the same proficiency level might differ in language dominance in either their first or second language (Gertken et al., 2014, p. 209) and this may be the result of the interaction of different variables. Dominance, as already discussed, is an essential, multi-faceted and gradient concept in bilingualism and SLA. Despite its complexity to be measured, there are available instruments that have attempted

to do so. For instance, the BLP is an easy-to-use online⁹⁴ language profile instrument which contains 19 self-report items with multiple-choice scalar responses, and which are subdivided into four dimensions of bilingual experience: language history, language use, language proficiency, and language attitudes. Each of these four dimensions include several questions about the two languages of a bilingual as shown in Appendix D. Bilingual Language Profile. These main four modules are equally weighted⁹⁵ to calculate an overall score. The maximum value that can be assigned to each module is 54.5 per language component. Hence, after the scores from each module have been added by language (maximum of 218, i.e., 54.5x4), the total score from the L2 is subtracted from the L1 score, providing a continuous dominance score which ranges from -218 to +218. As illustrated in Table 5 below, a score closer to the negative side of the scale (e.g., immersed bilingual participant) would indicate a more L2-dominant bilingual, whereas a positive score would be interpreted as a more L1-dominant bilingual (e.g., instructed bilingual and functional monolingual participant).

Table 5

Illustration of BLP scores and profile by group

	Functional monolingual		Instructed bilingual		Immersed bilingual	
	FSG		MAC		POF	
	L1 Spanish	L2 English	L1 Spanish	L2 English	L1 Spanish	L2 English
History	44.04	13.17	43.13	14.53	49.94	21.79
Use	54.50	0	29.43	18.53	9.81	44.69
Proficiency	47.67	9.08	54.48	54.48	49.94	54.48
Attitudes	54.48	4.54	27.24	29.51	45.40	54.48
Span vs. Eng	200.69	26.79	154.28	117.05	155.09	175.44
Overall	173.9		37.23		-20.35	

It is important to mention that these overall scores have additionally been used in the main analyses of this dissertation in order to explore the effect of bilingualism as a continuum on the measures of interest (see sections 8.2.2 and 9.2). Apart from the four modules and

⁹⁴ Even though the BLP can also be implemented through a pen-and-paper version, there is also an online version available through Google Docs, and which automatically calculates a dominance score (see Table 5 for an illustration). The user-friendliness of this questionnaire and the direct calculation of a dominance score it offers, as opposed to other instruments such as the *Language Experience and Proficiency Questionnaire* (LEAP-Q) (Marian et al., 2007), were central in the decision to include this instrument over others. In addition, the BLP has also been argued to be a useful tool when doing research on attrition, both in situ or in immigrant contexts (Gertken et al., 2014, p. 221).

⁹⁵ This contrasts with other existing dominance assessment instruments such as the *Bilingual Dominance Scale* (A. L. Dunn & Fox Tree, 2009).

the overall score provided, the BLP includes a general biographical information section, which can be adapted by the researcher to fit the purpose of their study. Thus, to gather essential information that was not offered in this questionnaire, but which would be essential for the purpose of our study, we decided to include several additional questions, which will be developed in the following sections.

6.2.2.1 Additions to the BLP

This section will detail the additions that were made to the BLP to better understand the profile of our participants and, more importantly, to get a more complete picture of the advanced instructed and immersed bilinguals included in this study. It is worth mentioning that these new questions were not incorporated in the calculation of the dominance score that has been described above and that is automatically provided by the validated questionnaire for comparability purposes. However, these questions would add invaluable supplementary information about variables that have been shown to play a role in the development of the two languages of the bilinguals in question. The questions added (or slightly modified) to each of the sections are described below and can be found in Appendix D. Bilingual Language Profile.

6.2.2.1.1 Biographical information

Firstly, the name was changed for the initials to better maintain anonymity of responses. Secondly, an additional question that was included here asked participants to state the number of years and months they had spent in the country where they were currently living. In relation to this question, another one was included so that participants could specify whether they had left that country for over two weeks in the previous 12 months. This would be useful in identifying whether the instructed bilinguals had had prolonged periods of L2 immersion or whether the immersed bilinguals had been re-exposed to their L1 environment. The inclusion of this question was thought to be crucial for both groups. On the one hand, since one of the aims of the study was to explore the role that exposure to L2 instruction might play on potential L1 variability, this question made it possible to exclude participants who had been immersed in an L2 environment for a prolonged period of time, which could obscure the results obtained within the instructed group.

Interestingly, this is the reason why instructed bilinguals who had had some L2 English experiences abroad were excluded from the study. On the other hand, re-exposure in the L1 environment for L1 potential attriters has been shown to play a role in shaping their L1 (Chamorro, Sorace, et al., 2016). Hence, this information proved to be crucial as an inclusion criterion for participants belonging to this group. Finally, participants had to additionally indicate their current occupation, and if they were students, they had to state their degree and the year they were in.

6.2.2.1.2 Language history

For the first new question, participants had to indicate their first language, and whether they were bilingual from birth. If the latter was the case, they had to indicate the languages they learnt as children. Another question that was included gathered information about whether they had acquired their L1 and L2 through instruction or via immersion, or whether both would apply. Moreover, they also had to indicate whether they had had combined instruction in both Spanish and English and if the answer was positive, they had to further include a rough percentage of time that was devoted to each language and the number of years that this context lasted for. For instance, if they had been enrolled in a bilingual programme in secondary education where half of the modules were taught in English and half in Spanish, they would indicate the following: 4 years, 50% English-50% Spanish. This would provide additional information about the immersed bilinguals and served as an exclusion criterion for the functional monolinguals and the advanced instructed bilinguals. Specifically, the instructed group was required not to have had intensive exposure to their L2 in an instructed setting prior to the beginning of their degree, e.g., attending a bilingual programme in either primary or secondary education. The reason to do this was that one of the variables that will be explored is whether length of instruction modulates L1 variability in instructed contexts. Apart from the information included in the BLP about current L1 and L2 use at work, including another question about whether the participants had been in a work environment where both their L1 Spanish and L2 English were used, how long it lasted for, and which language(s) they used in that context were deemed necessary. The last question added to this section had to do with the language that bilinguals considered themselves dominant in at the time of completion of the questionnaire, but also when they started the extensive exposure period. This second question would apply exclusively to the advanced bilingual groups to explore

potential perceived dominant language shifts comparing the current situation with the moment they either started their L2-instructed university degree or their L2 immersion period.

6.2.2.1.3 Language use

As for language use, even if each participant had to state the percentage of time they speak their L1 and their L2 in three different settings (with friends, at home, and at work/university), it was deemed necessary for them to specify an approximation of the time they spent in each of the three contexts in an average week. They had to choose their answer from 0 to 100% and had to split the maximum percentage within the three so that the sum would equal the total amount of time within a week. The way the scores are calculated within the BLP gives equal weighting to each context regardless of the time each bilingual roughly spends in each of them. Given that these values could be different for every bilingual, this measure would provide a relatively direct measure of this variable. Nevertheless, it is important to note that these scores did not interfere in the overall calculation of the BLP score that is automatically provided both for consistency and for comparability purposes. Furthermore, participants were asked whether their friends and co-workers were L1 or L2 speakers of Spanish and English, and the number of people they roughly interacted with who were L1 English native speakers or L1 Spanish native speakers. This information would be valuable to have an approximate idea of the L1 and L2 variability they might be exposed to on a weekly basis. The last question tried to look deeper into the potential code-switching behaviour of our participants to gather information about the participants' perceived interconnectedness of their languages. They had to state with which frequency (i.e., never, sometimes, often) they inserted Spanish words or expressions when using English and vice versa. This would add qualitative information about how flexible their interaction patterns were and whether they consciously felt their two languages interacted.

6.2.2.1.4 Language proficiency

Regarding language proficiency, participants needed to also include their self-reported proficiency on their speaking, understanding, reading, and writing abilities at the start of

the extensive exposure to the L2, be it in an immersion or an instruction context, respectively. This would then coincide with the beginning of the immersion for the bilinguals abroad and with the start of the degree for the bilinguals in Spain. These were, in line with the answers to the questions included in the BLP, also measured on a scale from 1 to 6.

6.2.3 Working memory task: sentence reading span

A working memory task has typically been used in combination with self-paced reading methodologies (Marsden et al., 2018, p. 873). Moreover, different models have tried to address the potential relationship between working memory and pronoun interpretation and processing (Almor, 1999; Bel, Sagarra, et al., 2016; Sorace, 2011; Vogelzang et al., 2021). Crucially, encoding, storage, and retrieval of information from memory are key in sentence and discourse comprehension (Cunnings, 2017).

The task that was used to measure working memory capacity in the participants' L1 Spanish (see Appendix F. Working memory task) was the Spanish version of the reading span test⁹⁶ (Elosúa et al., 1996), which was further adapted from the original English test (Daneman & Carpenter, 1980). In this task, participants are presented with three blocks of semantically and structurally unrelated sentences which contain 2, 3, 4, 5, and 6 sentences⁹⁷. Each group of 2 to 6 sentences corresponds to an experimental item. Thus, the level of difficulty increases gradually. Each sentence must be read aloud at the participants' own pace, and they must remember the last word of each sentence, which is always a highly frequent word containing two or three syllables. These words are semantically unrelated to avoid associations between them. The participants' task is to recall every last word of the sentences presented in each block in the order in which they are read.

In terms of presentation, the instructions (see Appendix E. Instructions working memory task) were first presented on the screen in Spanish and participants read them aloud and asked questions to the researcher if needed. The sentences were displayed in the middle of the screen and participants moved along the sentences by pressing the space

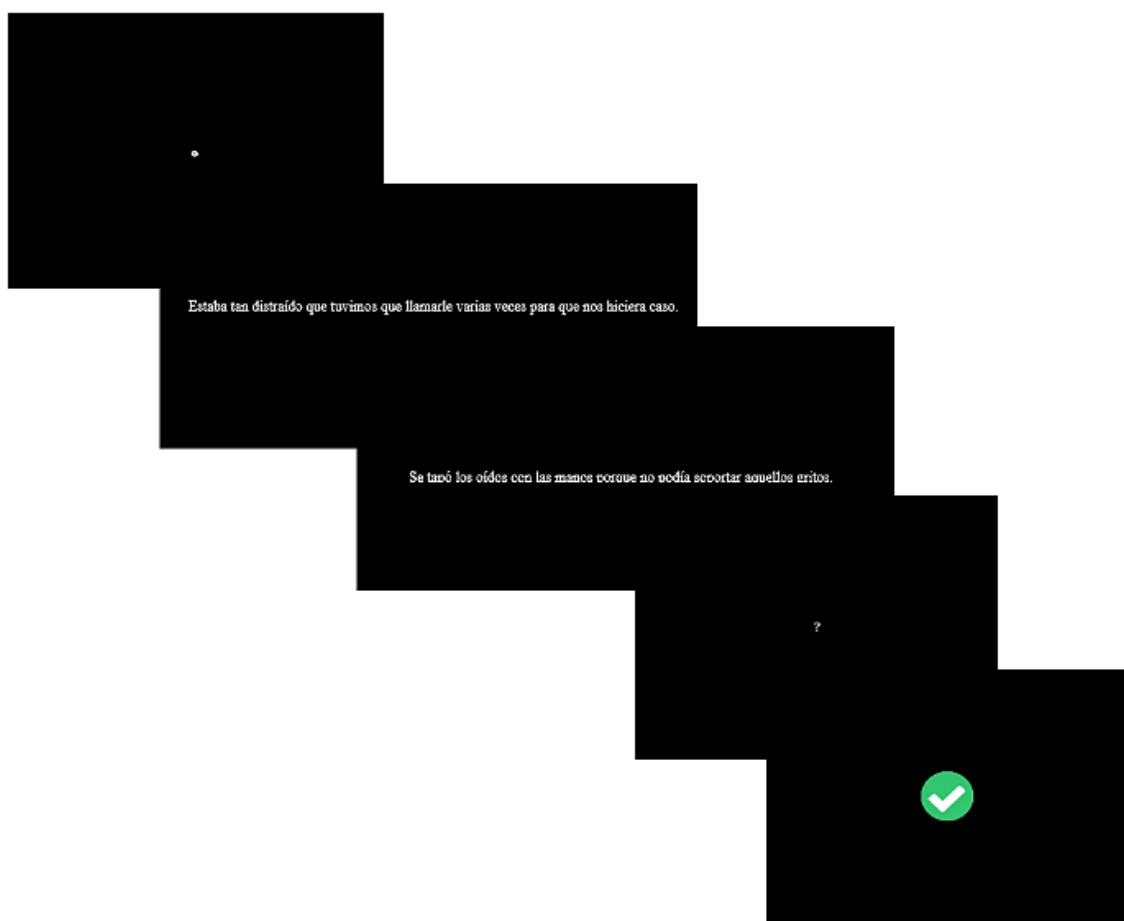
⁹⁶ A reading span task was selected since it has already been used with pronominal reference (Daneman & Carpenter, 1980) and it has been claimed to be a reliable predictor in linguistic tasks such as reading and listening comprehension (Conway et al., 2005; Daneman & Carpenter, 1983)

⁹⁷ The total number of sentences to be read are 60, which contain from 12 to 14 words (Elosúa et al., 1996).

bar. At the end of each block, a question mark ('?') appeared in the middle of the screen and participants had to recall the words in order and say them aloud (see Figure 3). In case they could not remember the words in the order in which they appeared, participants were instructed to mention them in the order they remembered them, but trying to avoid mentioning the last word they had read first. Prior to starting the main experiment, three practice blocks of two sentences were presented and feedback was provided by the researcher.

Figure 3

Illustration of working memory instructions and trial



This task was implemented in OpenSesame and participants accessed it through a link that made the task available online using the JATOS server during the individual online session between the researcher and the participant.

6.2.3.1 Working memory task: analysis

The scoring procedure of the reading span task was done following the seminal work by Conway et al. (2005), where it is argued that the administration and scoring of working memory tasks has been rather inconsistent. Hence, considering the problems associated with absolute scores, i.e., providing a more restricted score from 2 to 6 (e.g., less sensitivity of the measure of working memory or their inappropriateness for individual differences research), a partial-credit scoring was selected, where credit is given even if all elements are not recalled or whether they are not recalled in the correct serial position. Additionally, load weighting (i.e., giving higher weights to items with a higher load) has been most frequently used as a method for span measures and no substantial differences have been found when compared to unit scoring (i.e., proportions of correctly recalled elements are computed per item). Thus, partial-credit load scoring was followed, and it represents the proportion of elements correctly recalled from all items⁹⁸, regardless of whether those items were perfectly recalled or not (Conway et al., 2005, p. 775; Cunnings & Felser, 2013; Friedman & Miyake, 2005). Moreover, this scoring method has received empirical support of its appropriateness over all-or-nothing scoring (Conway et al., 2005). Hence, the total number of correct words recalled were summed and divided by the total number of words to be recalled, which amounted to 60 in total as illustrated in Table 6. The total score used for this task then ranged from 0 to 1, e.g., a participant with 48 correct items would receive a score of .8.

Table 6

Illustration of working memory scoring

Block of 2			Block of 3			Block of 4			Block of 5			Block of 6			Total
2	2	2	1	3	3	4	2	4	5	5	3	5	4	3	48/60 = .8

Note. Each cell represents the number of correctly recalled elements for that item.

6.3 Participants

This section will describe the profile of the participants included in this dissertation, which, as stated above, completed the whole battery of tasks, which will allow for the reliable comparison of production, interpretation, and processing of subject REs within the same bilinguals, which has been rather infrequent in previous studies. Three main

⁹⁸ An item refers to each block of 2 to 6 sentences included in the working memory task.

groups were selected for this study: L1 Spanish functional monolinguals, who would act as a control group, advanced L1 Spanish-L2 English instructed bilinguals, and advanced L1 Spanish-L2 English immersed bilinguals. The first two groups were recruited from Spain, where they had lived throughout their lives and where they had learnt English via formal instruction. The group of immersed bilinguals was recruited from both the UK and Ireland, where they were living at the time of testing, and where they had lived from 1 up to 15 years.

This section will be devoted to describing the profile of each group of participants in detail. In particular, the information provided in the BLP will be summarised, as well as the scores obtained in the reading span task, and the OQPT.

6.3.1 Functional monolinguals

Given that one of the main aims of this thesis is to explore the potential role that the use and exposure to the L2 may have on the production, interpretation, and processing of subject REs in the participants' L1, the group of functional monolinguals⁹⁹ was selected as a baseline (see Table 7 for a summary). In terms of age, the range of the 33 participants (20 females) within this group was between 18 and 26, with a mean of 21.2 ($SD = 2.07$). These participants were all undergraduate or postgraduate university students who were majoring in degrees which were unrelated to language. Twenty-eight of them were currently studying a degree, 3 of them already completed their degree, and 2 of them had also completed an MA degree. They were all Peninsular Spanish speakers who were monolingually raised and who lived in a monolingual environment, i.e., Granada. All the participants in this group considered Spanish to be their dominant language. Additionally, they had not spent time abroad during their primary, secondary, or university studies, and thus, exposure to L2 English was minimal and restricted to instructed settings, with a mean of age of onset to L2 English of 5.82 ($SD = 1.81$) and 11.6 years of length of instruction ($SD = 1.69$)¹⁰⁰. In addition, they had not attended a bilingual school in either

⁹⁹ It is worth noting that there is not a strictly-speaking 'monolingual' control group of participants since all young adults receiving formal education in Spain are obliged to learn English as an L2 within the Spanish education system. Hence, they have received L2 English instruction for at least 10 years. Additionally, most of them get some, although very limited, L2 exposure (e.g., social media). For these reasons, a label such as functional monolinguals was preferred.

¹⁰⁰ Note that the minimum number of years of L2 English instruction for those attending university in Spain is of 12 years: i.e., 6 years in primary education and 6 years in secondary obligatory and post-obligatory education.

primary or secondary education. Crucially, their mean L2 English proficiency as objectively measured by the OQPT was 22.2 (SD = 3.47) out of 60, ranging from 15 to 29¹⁰¹. Following the guidelines of scoring of the test, these correspond to the A1-A2 levels from the CEFR. Hence, the proficiency level of this group of participants was considerably low.

Table 7

Functional monolinguals' profile

Functional monolinguals (N = 33)	
Age	18-26 (21.2, SD = 2.07)
L1	(Peninsular) Spanish
L2	English
Age of onset to L2 English	5.82 (SD = 1.81)
Length of instruction in the L2 (number of years)	11.6 (SD = 1.69)
L2 English proficiency (OQPT), scale (0-60)	22.2 (SD = 3.47) (A1-A2)
Self-reported dominant language	Spanish
Frequency of L2 exposure (reading), scale (1-5)	2.03 (SD = 1.21)
Frequency of L2 use (writing), scale (1-5)	1.52 (SD = .71)
Frequency of L1 exposure (reading), scale (1-5)	4.91 (SD = .29)
Frequency of L1 use (writing), scale (1-5)	4.88 (SD = .42)
Percentage of overall L2 daily use	3.97 (SD = 4.87)

Notably, they also reported low levels of frequency of L2 exposure and use both in reading and in writing on a 5-point Likert scale: 2.03 (SD = 1.21) and 1.52 (SD = .71), respectively. These figures contrast very clearly with their reported L1 patterns: reading (mean = 4.91; SD = 0.29) and writing (mean = 4.88; SD = .42). These participants also reported using their L2 daily with a mean of 3.97% (SD = 4.87). In terms of their self-reported code-switching behaviour¹⁰², several participants reported including English words or phrases when speaking Spanish sometimes (N = 24), others considered they did it usually (N = 6), and 3 of them thought they never did it. As for the opposite direction, 15 of them thought they inserted Spanish words or phrases when speaking English, 7 of

¹⁰¹ In terms of self-reported proficiency following the CEFR standards: 13 participants considered their L2 English proficiency level corresponded to B1, 7 of them considered theirs corresponded to A2, and only one self-reported their L2 proficiency level as B2. The rest of them did not consider they were competent in L2 English and did not report their proficiency in terms of CEFR standards. It appears then that most of the self-reports were far from accurate.

¹⁰² For this question, participants indicated how often they inserted Spanish words or expressions when speaking English and vice versa.

them usually did so, and that was never the case for 11 of the participants in the sample. Finally, the knowledge of other languages was extremely limited, and none of the participants reported using the L3 with friends or at university/work, and only one participant reported limited and very occasional L3 use. Among the L3s reported, most of the participants reported some knowledge of French ($N = 22$) and only one participant reported knowing some German.

6.3.2 Advanced L1 Spanish-L2 English instructed and immersed bilinguals

In order to explore the potential effect that L2 exposure and use might have on L1 morphosyntax, two groups of advanced bilingual participants were selected. These participants were similar in terms of L2 English proficiency, for instance, but differed in the nature of L2 exposure (i.e., instruction vs. immersion), as well as in other domains both quantitatively and qualitatively. The next section is devoted to describing the profile of these two groups of participants in detail.

6.3.2.1 Advanced L1 Spanish-L2 English instructed bilinguals

A group of 80 (64 females) instructed bilinguals participated in the study (see Table 8 for a summary). Their ages ranged from 18 to 26 (mean = 20.4; $SD = 1.77$). Similarly to the control group, they had all been raised monolingually and were on average first exposed to L2 English at the age of 5.21 years ($SD = 1.98$). Their mean length of instruction to L2 English was 15 years ($SD = 1.89$). These bilinguals were all undergraduate university students completing a degree in English Studies¹⁰³ at different universities in Spain¹⁰⁴ and none of them had completed any higher qualifications. The universities selected were in

¹⁰³ It is worth mentioning that these participants, given that they are language students, might possess above average metalinguistic knowledge (Roehr, 2008), and this could in fact affect their performance in the tasks under analysis. Nevertheless, to include a group comparable to the immersed group in terms of L2 proficiency level and continued L2 exposure although in an L1 setting, this compromise had to be made. This will be addressed in the discussion section.

¹⁰⁴ The universities selected included the following: Universidad de Granada, Universidad de Málaga, Universidad de Sevilla, Universidad de Extremadura, Universidad Complutense de Madrid, Universidad Autónoma de Madrid, Universidad de Castilla La Mancha, Universidad de Zaragoza, Universidad de Salamanca and Universidad de Valladolid. We would like to thank all the colleagues who kindly shared the call for participation with their students as well as the students who took part in the study.

regions where mostly Spanish was spoken outside of the university context and no other co-official languages such as Catalan or Galician were regularly used.

Essentially, the degree in English Studies typically lasts for 4 years and the distribution of the selected participants across years is rather even: there were 18 first-year, 23 second-year, 20 third-year, and 19 fourth-year students. Importantly, the contents in this degree are mostly delivered in L2 English with some minor exceptions in, for instance, some general linguistics or literature courses, which are taught in Spanish. Hence, in most of the courses students take, they are exposed to the L2 and are expected to interact using the L2 in a largely consistent L2 English mode throughout. The university system in Spain requires an average of 20 weekly hours of attendance to lectures and additional hours of autonomous work. Thus, participants studying a degree in English Studies receive at least 20 hours of intensive exposure to L2 English a week. Importantly, only participants who reported attending lectures regularly and actively participating were included in the study to control for high L2 exposure in an instructed setting. In addition, exposure to L2 English in an immersion setting was controlled. Participants who had spent a year or a semester abroad in an English-speaking country were not selected to participate in the study¹⁰⁵.

In terms of their proficiency level (see Table 8), they were all highly advanced L2 English learners, with a mean score of 52.4 on the OQPT (SD = 3.59, range = 48-60), corresponding to C1-C2 levels within the CEFR. Their self-reported proficiency was rather accurate overall: three of them reported B2, 62 of them C1, and 15 of them C2. Considering their self-reported dominant language, participants were asked to select their dominant language (Spanish or English) both at the start of their degree and at the time of testing. Prior to starting their university studies, 70 participants reported Spanish as their dominant language and 10 of them selected English. Notably, at the time of testing, 29 participants considered English to be their dominant language and 51 of them still indicated Spanish as their dominant language. It is interesting to note that, even within an instruction setting, some participants' perception of their dominant language had changed.

¹⁰⁵ Only one participant reported spending two months abroad in Poland. The limited amount of exposure in a different immersion setting and the fact that L2 English was not the dominant language were essential in considering the inclusion of this participant.

Table 8*Instructed bilinguals' profile*

Instructed bilinguals (N = 80)	
Age	18-26 (20.4, SD = 1.77)
L1	(Peninsular) Spanish
L2	English
Age of onset to L2 English	5.21 (SD = 1.98)
Length of instruction in the L2 (number of years)	15 (SD = 1.89)
L2 English proficiency (OQPT), scale (0-60)	52.4 (SD = 3.59) (C1-C2)
Self-reported dominant language (beginning degree)	Spanish (N = 70), English (N = 10)
Self-reported dominant language (time of testing)	Spanish (N = 51), English (N = 29)
Frequency of L2 exposure (reading), scale (1-5)	4.39 (SD = .8)
Frequency of L2 use (writing), scale (1-5)	4.29 (SD = .85)
Frequency of L1 exposure (reading), scale (1-5)	4.11 (SD = 1.15)
Frequency of L1 use (writing), scale (1-5)	4.28 (SD = 1.06)
Percentage of overall L2 daily use	25.5 (SD = 11.3)

Concerning their L2 English daily use, participants reported a mean of 25.5% (SD = 11.3). This use was mostly restricted to the L2 instruction setting. However, half of the participants additionally reported using the L2 with friends outside of lectures or for social media and entertainment (e.g., reading or writing). Hence, these participants registered high levels of both L2 exposure and use on a 5-point Likert scale: reading (mean = 4.39, SD = .8) and writing (mean = 4.29; SD = .85). These values were rather similar to their L1 habits: reading (mean = 4.11, SD = 1.15) and writing (mean = 4.28; SD = 1.06).

Regarding patterns of code-switching when speaking the L1, most of the participants reported this was usually the case (N = 60) and 20 of them did so but less frequently when using their L1 Spanish. Considering the opposite scenario, 12 of the immersed bilinguals usually inserted Spanish words or phrases in English, 43 of them did it sometimes, and that was never the case for 25 of them. It appears then that the languages of these bilinguals are in constant interaction in their brains and are actively co-activated as self-reported by the bilinguals themselves.

Finally, as for the knowledge and use of languages other than English and Spanish, it is worth mentioning that an L3 is typically included in the curriculum of the degree in English Studies in most universities in Spain, and it is certainly the case in the universities included in our sample. Most of these courses are typically taught from an elementary

level and it is the first contact with such L3 for most students. Nevertheless, these courses are almost exclusively included during the first and second year within the curriculum. In our sample, 33 of them reported French as their L3, 14 selected Italian, 13 German, and the rest of the participants reported other languages such as Arabic, Greek, Korean, or Portuguese. Importantly, only those participants who reported a very low L3 proficiency level and very little to no use were included in the study.

6.3.2.2 Advanced L1 Spanish-L2 English immersed bilinguals

The second group of bilinguals included 94 (69 females) advanced L1 Spanish-L2 English bilinguals who were immersed in the L2 environment and thus, used and were exposed to the L2 daily. This group of participants was slightly older than the other two groups (mean age = 26.6; SD = 3.7; range = 19-34)¹⁰⁶. The participants in this group were initially exposed to L2 English at an average age of 6.2 years (SD = 2.36) and their mean length of instruction in L2 English was 13.9 years (SD = 2.58) and had largely been received in Spain. The group of immersed bilinguals was composed of monolingually-raised Peninsular Spanish speakers who were either working and/or studying in the UK or Ireland. In terms of their age of onset to L2 immersion, most of them moved after the age of 18 (90), and only 4 of them moved to the L2 context below such age (1 = 15, 2 = 16, 1 = 17). Hence, all of them moved after puberty, when the L1 property under investigation had arguably been fully acquired (Shin & Smith Cairns, 2009).

Considering their higher levels of education, 10 of them were completing an undergraduate degree, 35 had already completed it, there were also 46 participants who had an MA, and there were 3 participants with a PhD. One important consideration about the participants in this group is that re-exposure in the L1 environment was controlled. Considering intensive re-exposure to the L1 might potentially revert observed L2 effects in the L1 (Chamorro, Sorace, et al., 2016), all participants in this group had not returned to their L1 environment for a week or more during the month prior to testing.

¹⁰⁶ Even if all groups were initially restricted to an age range between 18 to 30 years, after experiencing some difficulty finding participants who would commit to completing the whole battery of tests, especially in the immersed group, a decision to include participants of up to 35 years of age was made. In principle, this decision was based on potential working memory differences due to aging. However, considering both age and working memory were measured, these variables would then be included in the subsequent analysis to explore their potential role in the dependent variables under analysis to control for their effect, the analyses of which will be presented in the results sections.

In addition, they reported using the L2 daily (mean = 64.5%; SD = 18.3) (see Table 9). In terms of reported L1 and L2 reading and writing patterns, the picture emerged is different to the other two groups under analysis: reading (L1 – mean = 3.55; SD = 1.32 vs. L2 – mean = 4.62; SD = .62) and writing (L1 – mean = 3.67; SD = 1.15 vs. L2 – mean = 4.54; SD = .73). Therefore, their use and exposure to the L2 was significantly higher on average than that of the L1.

Table 9

Immersed bilinguals' profile

Instructed bilinguals (N = 94)	
Age	19-34 (26.6, SD = 3.7)
L1	(Peninsular) Spanish
L2	English
Age of onset to L2 English	6.2 (SD = 2.36)
Length of instruction in the L2 (number of years)	13.9 (SD = 2.58)
L2 English proficiency (OQPT), scale (0-60)	52.7 (SD = 3.1) (C1-C2)
Self-reported dominant language (before immersion)	Spanish (N = 87), English (N = 7)
Self-reported dominant language (time of testing)	Spanish (N = 54), English (N = 40)
Frequency of L2 exposure (reading), scale (1-5)	4.62 (SD = .62)
Frequency of L2 use (writing), scale (1-5)	4.54 (SD = .73)
Frequency of L1 exposure (reading), scale (1-5)	3.55 (SD = 1.32)
Frequency of L1 use (writing), scale (1-5)	3.67 (SD = 1.15)
Percentage of overall L2 daily use	64.5 (SD = 18.3)

As for their length of residence in the L2 environment, most studies investigating L1 attriters have exclusively included bilinguals who have been both intensive and extensively exposed to the L2 for a minimum period of 5, 6 or even 10 years (Chamorro, Sorace, et al., 2016; Gürel, 2004, 2007; Tsimpli et al., 2004). Nevertheless, one of the aims of this thesis is to additionally explore the early stages of L1 morphosyntactic attrition and participants with length of instruction shorter than 5 years were also selected. Notably, some authors have argued that attrition might start from the onset of immersion (Schmid & Köpke, 2017a), but no previous studies in L1 morphosyntax have addressed this in detail (but see Wilson, 2009). There were 16 participants who had spent a year in the L2 setting, 16 of them had spent two years, 20 of them three years, 17 four years, and 25 of them had spent five years or more. Having a somewhat balanced sample in terms of length of immersion in the L2 environment would enable an analysis of the independent continuous variable of length of residence in the L2 environment.

Apart from living in an L2 immersion context, they were all highly advanced L2 English bilinguals as measured by the OQPT (mean = 52.7; SD = 3.1; range = 48-60). This coincided with C1 and C2 levels from the CEFR, which nicely correlated with their self-reported proficiency level (B2 = 3, C1 = 49, and C2 = 42). Paying attention to their reported dominant languages, whereas only seven of them stated English was their dominant language prior to L2 immersion, this figure increased to 40 at the time of testing. The rest of the participants still considered Spanish to be their dominant language, both before and after immersion.

Concerning their code-switching patterns, most of them (N = 70) believed they usually inserted English words and phrases when speaking Spanish, while 22 of them did so sometimes, and 2 of them did not register this pattern. The use of Spanish words or structures in English was less frequent and was restricted to conversational exchanges with other L1 Spanish speakers (15 usually, 55 sometimes, and 24 never). Again, this shows how interconnected the two languages of the bilinguals were.

Finally, in terms of knowledge of an L3, 56 of them reported they did not have knowledge of an L3. Of those who did, 21 indicated French, 5 Italian, and 4 German as their L3, and the rest reported other languages such as Chinese or Korean. These languages were very little or not used at all by these bilingual participants.

6.3.3 Further comparison between the three groups

Having described an overall picture of the profile of the three groups of participants, this section will be devoted to comparing different variables of interest and the scores obtained in some sections from the BLP as well as the working memory test (see sections 6.2.2 and 6.2.3 below for a detailed description of each task) in order to establish further comparisons between participants.

Firstly, the focus will be on different components of the BLP, i.e., language use, language proficiency, and language attitudes. Considering language use, the means for each group and question are presented in Table 10. Notably, functional monolinguals mostly use Spanish regardless of the context. As for instructed bilinguals, while they largely use Spanish with their friends, their family, and when counting, they mostly use the L2 when they are at university. Moreover, they use the L2 considerably when talking

to themselves (i.e., 36.5%). Concerning the group of immersed bilinguals, the use of the L2 increases substantially in the following contexts: when talking to friends, at work or university, and when they talk to themselves. Nevertheless, these bilinguals mostly use L1 Spanish when talking to their family and when counting, although noticeably less than the other two groups.

Table 10

Language use (percentage and SD)

	Functional monolinguals			Instructed bilinguals			Immersed bilinguals		
	L1 Spa	L2 Eng	L3	L1 Spa	L2 Eng	L3	L1 Spa	L2 Eng	L3
Friends	97 (5.3)	3 (5.3)	0 (0)	85.9 (13.2)	12.2 (11.5)	1.88 (7)	43.6 (26.4)	55.2 (26.3)	1.17 (4.1)
Family	99.1 (2.92)	.6 (2.4)	.3 (1.74)	97.8 (4.8)	1.62 (3.71)	.6 (3.32)	86.8 (24.8)	12.9 (24.8)	.3 (1.8)
School/work	97.3 (4.52)	2.73 (4.52)	0 (0)	21.9 (14.3)	73.2 (18.8)	4.9 (7.3)	12.6 (18.4)	85.1 (20.9)	2.34 (8.5)
Yourself	94.8 (6.7)	4.6 (5.6)	.6 (2.4)	61.6 (20.8)	36.5 (20.4)	1.9 (3.9)	58.4 (18.2)	40.3 (17.8)	1.3 (4.2)
Count	99.4 (2.4)	.6 (2.4)	0 (0)	86.5 (16.6)	12.4 (14.8)	1.1 (4.2)	74 (21.3)	25.5 (21)	.04 (2)

Overall, the contexts in which the three groups mainly differ are when they talk to their friends, for which both functional monolinguals and instructed bilinguals use the L1 predominantly, when they are at work or university, where the two bilingual groups primarily use the L2 and functional monolinguals employ the L1, and when they talk to themselves, where the percentage of use of the L2 in both bilingual groups is similar and differs remarkably from that of functional monolinguals.

The second dimension that was explored was self-reported language proficiency in the L1, the L2, and potential L3s in four different domains, i.e., speaking, understanding, reading, and writing (see Table 11). In general, at the time of testing, functional monolinguals rated their four skills in the L1 as very high and the L2 and L3s received very low scores on a 6-points Likert scale. By contrast, the pattern exhibited by both bilingual groups is comparatively different to the functional monolinguals in that both groups rate their L1 and L2 as high, although immersed bilinguals rate their L2 slightly higher than the instructed bilinguals. It is worth mentioning that, as already anticipated, L3s receive very low scores overall, except for the group of instructed

bilinguals given that they receive instruction in their L3(s) during the first two years of the degree.

Table 11

Language proficiency (scale from 1 to 6)

	Functional monolinguals			Instructed bilinguals			Immersed bilinguals		
	L1Spa	L2Eng	L3	L1Spa	L2Eng	L3	L1Spa	L2Eng	L3
Speaking	5.61 (.56)	2.09 (1.21)	1.03 (1.13)	5.84 (.4)	5.05 (.78)	1.91 (1.31)	5.37 (1.02)	5.24 (.68)	.94 (1.48)
Understanding	5.94 (.24)	2.76 (1.15)	1.48 (1.54)	5.91 (.33)	5.54 (.55)	2.48 (1.57)	5.93 (.26)	5.54 (.62)	1.34 (2)
Reading	5.85 (.36)	2.91 (1.23)	1.73 (1.64)	5.84 (.46)	5.44 (.76)	2.49 (1.53)	5.87 (.39)	5.59 (.61)	1.35 (1.98)
Writing	5.67 (.65)	2.18 (1.18)	1.18 (1.4)	5.68 (.63)	5.28 (.73)	1.95 (1.44)	5.33 (.99)	5.38 (.69)	.95 (1.49)

In addition to the self-reported proficiency level in the four skills reported, it is worth noting that we additionally collected data from the two bilingual groups' self-perceived proficiency at the beginning of immersion for immersed bilinguals or at the beginning of the intensive instructed exposure for the instructed group of bilinguals. As Table 12 illustrates, all values for the L1 and the L2 increase from the onset of the intensive instruction exposure to the time of testing in instructed bilinguals, although considerably and expectedly more for the L2 than for the L1. Secondly, while the same pattern is largely repeated in the analysis of the immersed bilinguals, it is remarkable that they perceive their L1 to be weaker in both speaking and writing at the time of testing when compared to the beginning of the immersion period. This is a very relevant finding in that they seem to perceive how their L1 has become weakened due to, perhaps, the improvement of their L2 proficiency and their daily contact with the L2 followed by L1 disuse.

Table 12

Language proficiency in bilinguals before and after immersion/intensive exposure (scale from 1 to 6)

	Instructed bilinguals				Immersed bilinguals			
	L1Spa	L1Spa	L2Eng	L2Eng	L1Spa	L1Spa	L2Eng	L2Eng
Speaking	5.26 (1.45)	5.84 (.4)	3.25 (1.54)	5.05 (.78)	5.77 (.63)	5.37 (1.02)	3.05 (1.45)	5.24 (.68)
Understanding	5.45 (1.32)	5.91 (.33)	3.88 (1.7)	5.54 (.55)	5.86 (.56)	5.93 (.26)	3.11 (1.61)	5.54 (.62)
Reading	5.1 (1.61)	5.84 (.46)	3.86 (1.7)	5.44 (.76)	5.77 (.73)	5.87 (.39)	3.8 (1.7)	5.59 (.61)
Writing	4.88 (1.66)	5.68 (.63)	3.56 (1.57)	5.28 (.73)	5.63 (.87)	5.33 (.99)	3.37 (1.57)	5.38 (.69)

Considering the dimension of language attitudes that is targeted in the BLP (see Table 13), it appears that all groups provide high scores for the L1 in terms of whether they feel like themselves when they speak Spanish, whether they identify with an L1 culture, whether they consider it important to speak the L1 as a native speaker, and whether they want others to think they are native speakers of Spanish. Regarding the L2 patterns, it is noteworthy that the scores from functional monolinguals are noticeably lower in all domains, although this difference is not that pronounced when exploring the dimension of whether they aim to use the L2 as native speakers of English. On another note, while the scores from the two bilingual groups are relatively and similarly high, it might seem somewhat striking that those from the instructed bilinguals are higher than those from the immersed bilinguals. Importantly, this finding could be explained in terms of the potential intrinsic motivation for English instructed bilinguals have considering their decision to pursue a degree in English Studies.

Table 13

Language attitudes (scale from 1 to 6)

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	L1 Spa	L2 Eng	L1 Spa	L2 Eng	L1 Spa	L2 Eng
Feel myself	5.94 (.24)	1.91 (1.23)	5.81 (.51)	5.25 (.96)	5.71 (.67)	4.91 (1.15)
Identify culture	5.91 (.38)	1.03 (1.31)	5.52 (1.03)	3.32 (1.67)	5.46 (1.05)	3.02 (1.67)
Use L as natives	5.82 (.77)	4.39 (1.69)	5.76 (.9)	5.61 (.99)	5.73 (.86)	5.3 (1.16)
Think native	5.61 (1.25)	2.94 (2.18)	5.5 (1.4)	4.64 (1.89)	5.51 (1.35)	4.16 (1.8)

Taking into consideration the overall scores from the components of the BLP, very clear differences emerge between the three groups (see Table 14). In terms of language history, although all groups receive very similar scores in the component of language history for their L1, there is a very evident increasing trend when exploring the L2 in favour of instructed bilinguals. When analysing use, two mirror-image patterns can be appreciated: while L1 use is considerably higher in functional monolinguals and decreases in the two bilingual groups, the highest score concerning L2 use is found in immersed bilinguals. On another note, regarding L1 and L2 self-reported proficiency overall, the two bilingual groups score very similarly in both the L1 and the L2, a pattern which clearly contrasts with the significantly lower L2 score in functional monolinguals. The last dimension presented in Table 14 relates to language attitudes. Whereas the L1 scores are not strikingly different in the three groups, attitudes towards the L2 are more favourable in the two bilingual groups and slightly more in instructed bilinguals.

Table 14

BLP language-specific and total scores

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	L1 Spa	L2 Eng	L1 Spa	L2 Eng	L1 Spa	L2 Eng
History	44 (2.47)	12.2 (1.55)	43 (1.9)	16.5 (2.81)	45.1 (3.38)	19.6 (4.38)
Use	53.1 (1.36)	1.26 (1.19)	38.5 (4.81)	14.8 (4.65)	30 (6.49)	23.9 (6.65)
Proficiency	52.3 (3.31)	22.6 (8.83)	52.8 (3.27)	48.4 (5.06)	51.1 (4.84)	49.4 (5.09)
Attitudes	52.8 (4.48)	23.3 (11.4)	51.3 (6.27)	42.7 (8.66)	50.9 (6.74)	39.5 (9.5)
Spa vs. Eng	202 (6.5)	59.4 (17)	186 (9.45)	122 (14)	177 (13.1)	132 (16.4)
Overall	143 (17.9)		63.3 (16.7)		44.7 (24.5)	

Finally, considering overall patterns attested, it becomes evident that the overall scores for L1 and L2 are relatively imbalanced in functional monolinguals in favour of the L1, a tendency that becomes less pronounced in the two bilingual groups, and that is even less emphasised in the immersed bilingual group.

The final point of comparison between the three groups concerns their working memory capacity (see Table 15). The data reveal that both bilingual groups score significantly higher in the working memory test than functional monolinguals. There are no significant differences between the two advanced bilingual groups, although their score is significantly higher than that of functional monolinguals. This difference in

working memory will become relevant when discussing the results from the interpretation and processing tasks (see Chapter 8 and Chapter 9).

Table 15

Working memory

	Funct. monolinguals	Instructed bilinguals	Immersed bilinguals
Working memory score	37.8 (6.38)	43 (6.67)	43 (6.98)
Working memory prop.	.63 (.11)	.72 (.11)	.72 (.12)

6.3.4 Summary of the participants' profile

The aim of this section was to both illustrate the procedure that was followed over the data collection period as well as the justification for each of the main decisions made throughout. Moreover, this section has detailed the differences in the profiles of the three groups that were included within this dissertation. For instance, the overall use of the L2 is considerably higher in the two bilingual groups when compared to the functional monolinguals. Furthermore, when looking at their profile in a more holistic way paying attention to language dominance as measured by the BLP, there is an apparent gradience in the dominance profiles of the three groups: functional monolinguals are the most L1-dominant speakers in a continuum where instructed bilinguals would be placed in the middle, and where we would then find immersed bilinguals on the other extreme, as the most L2-dominant speakers. In terms of self-reported proficiency, which adds to the objective measure obtained from the OQPT, all bilinguals rate their L1 as high, and only the two bilingual groups report their L2 to also be relatively high. Notably, it is worth highlighting the perceived decrease in L1 proficiency that is only attested in immersed bilinguals at the time of testing compared to their L1 proficiency at the beginning of the immersion period. By contrast, instructed bilinguals provide higher scores to their L1 after the period of intensive instruction. On another note, whereas attitudes towards the L1 appear to be rather similar in all three groups, both instructed and immersed bilinguals exhibit more positive attitudes towards the L2 overall and instructed bilinguals even more strikingly. Finally, concerning working memory capacity, both bilingual groups have been found to outperform the functional monolingual group in their working memory span.

6.4 Triangulation of results

After the description of the background tasks as well as the profile of the three groups of participants included in this dissertation, a note should be made on the decision to include three different tasks to test the domain of L1 morphosyntax by concentrating on the production, interpretation, and processing of subject REs, which will be addressed in the following three chapters. In the first place, whereas differences have been attested in the production, interpretation, and processing of subject REs both in L2 acquisition and L1 attrition, very few studies have addressed all three domains using the same participants systematically. Nevertheless, some studies have indeed explored two of these domains within the same participants (Chamorro, Sorace, et al., 2016; Contemori & Di Domenico, 2021; Giannakou & Sitaridou, 2020, among others). Thus, using different methodologies will allow for the triangulation of results across domains, a methodological point that has been emphasised by several authors (Mendikoetxea & Lozano, 2018). Arguably, although triangulation does not necessarily require the use of the same participants throughout, it is worth emphasising that, by including the same participants within this dissertation, clearer conclusions will be obtained as to the relationship between these 3 domains, given that individual variability that is expected within participants in production, interpretation, and processing of subject REs will be carefully controlled.

Another reason why choosing different tasks to test the same phenomenon within the same participants relates to the decision to address the claims from the Interface Hypothesis (Chamorro & Sorace, 2019) for L1 attrition. Notably, one of these claims relates to the assumption that L1 attrition is more likely to be manifested in processing rather than at the level of representation. For this reason, an online processing measure was included (i.e., the self-paced reading task), which will be contrasted with the interpretation (i.e., picture selection task) task. The corpus-based production task will additionally be useful in uncovering the effect of some of the variables on the overproduction of subject REs arguably used by L1 attriters in TC as the result of L2 exposure.

Overall, the main focus of the production task will be the exploration of the overt or null subject REs used in TC, which are the contexts where differences are likely to emerge between functional monolinguals and potential L1 attriters in that more explicit subject forms are likely to be produced by the latter. Additionally, by specifically focusing on the PAS in both the interpretation and the processing task, it will be possible to

investigate to what extent L1 attriters interpret null and overt pronouns as referring back to either the previous subject or object. Crucially, it might be argued that a stronger association of overt pronouns with subject antecedents might be related to a higher production of overt forms in TC, arguably given that overt forms may lose their specification for topic shift scenarios, or it might be weakened. Both an overproduction of overt forms in TC and an increased likelihood of interpreting overt pronouns as coreferential with subject antecedents are likely to be the result of the interconnectedness of the two languages of the bilinguals under scrutiny.

Having justified the inclusion of the three main tasks to be analysed, the following chapters will be devoted to describing their implementation and main methodological points in detail. In addition, the results from these tasks will be presented along with an interim discussion containing the main findings from each task.

CHAPTER 7. Corpus-based oral video-retelling production tasks

7.1 Methodology

To investigate the production of anaphoric REs in subject position, participants completed two narrative tasks orally¹⁰⁷, which presented instances of different Charlie Chaplin video clips. This film-retelling format seems appropriate and valid given that it has been previously employed in studies analysing the production of subject REs both in written (T. Quesada, 2021) and oral format (Blackwell & Quesada, 2012; M. L. Quesada & Blackwell, 2009; Ryan, 2016). Whereas the first video¹⁰⁸ was purposefully selected to test the predictions from this thesis (see section 5.1), the second video-retelling is part of the battery of tasks included in the two parallel learner corpora CEDEL2¹⁰⁹ (<http://cedel2.learnercorpora.com/>) and COREFL (<http://corefl.learnercorpora.com/>). Given that one of the research questions guiding this study dealt with exploring the role of the number and gender of potential antecedents in the production of fuller subject REs, the two clips were selected to be able to address this question. Having two videos with different configurations of antecedents, one with no additional antecedents (Task 1) apart from the main character (i.e., Charles Chaplin), and another one with several antecedents with same and different gender (Task 2), would allow us to explore the potential effect of the number of activated or intervening antecedents more clearly. These tasks would trigger the semi-spontaneous production and later analyses of third-person singular animate subject REs in TC, considering these contexts have been found to be largely problematic for L2 acquisition and arguably vulnerable for L1 attrition (García-Alcaraz & Bel, 2019; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021).

Both short black and white clips, which were approximately two (Task 1) and four minutes long (Task 2), respectively, presented actions performed by different characters. Nonetheless, the main character was kept constant in the two videos in order to avoid a

¹⁰⁷ Oral production was chosen given that the Interface Hypothesis (Sorace, 2011, 2012) claims that attrition changes will become more visible in processing tasks and those requiring the integration of resources simultaneously. We thus considered this would be more likely to play a role in oral than in written production. The written format would allow for corrections and changes after the writing piece has been produced and would not allow for the exploration of the subject REs used when taxed with the simultaneous integration of information that is evidenced in oral production.

¹⁰⁸ Links to the videos: Task 1, <https://www.youtube.com/watch?v=7xgUdqT6m5A> and Task 2, <https://www.youtube.com/watch?v=4QkTNJFhu-g>.

¹⁰⁹ The data collected as part of this study will be included in the CEDEL2 corpus to make it open to the research community.

potential character effect or, at least, to control for its effect (T. Quesada, 2021; T. Quesada & Lozano, 2020). The first clip (Task 1) only contained actions performed by the main character, Charles Chaplin, and there were no other animate characters intervening throughout. Thus, this video would elicit (almost) exclusively TC contexts where reference to the main character is maintained across clauses¹¹⁰. This makes it possible to explore the subject REs produced in complete absence of other intervening/activated antecedents, since the only character that is present takes an agentive role throughout. The second video clip (Task 2) is an excerpt from the film *The kid* by Charles Chaplin and up to six characters which differ in gender appear. The characters in this video are Charles Chaplin, a baby, a policeman, a woman and her baby, and an old man. Most of them take an active role in different scenes and hence, this task enables to explore the selection of subject REs used when different competing antecedents/intervening are present in the narration. Interestingly, even though it would make sense to think that the presence of multiple characters in the narration would prompt more topic shift scenarios, the video clip includes scenes where several concatenated actions are performed by the same character and therefore, the presence of TC contexts is favoured (see T. Quesada, 2021; T. Quesada & Lozano, 2020) and is further corroborated in our data.

Regarding the data collection, certain methodological considerations were made. Firstly, participants, which were detailed in section 6.3 and who also completed the interpretation and processing tasks, were instructed to record themselves in a quiet environment to avoid distractions and to maintain the good quality of the recording. Secondly, given that the recordings were done by the participants individually, clear instructions were provided as to how to perform the task correctly (see Appendix B. Instructions for BLP and oral recordings). Participants were instructed to narrate the story of the clip in Spanish to somebody who had not watched the video. This would minimise assumptions of shared knowledge with the potential addressee (Liceras et al., 2010), which is crucial in tasks of this kind, since this could arguably affect the choice of REs (Sorace, 2004). Additionally, participants were reminded of our interest in natural and spontaneous language use. Another interesting methodological consideration was that

¹¹⁰ The selection of the task was carried out from a range of publicly available Charlie Chaplin videos.

participants were allowed to watch the video as many times as they wished, which could in turn reduce working memory limitations.

7.1.1 Oral video-retellings: analysis

The data from the two oral video-retelling tasks were analysed using the *UAM Corpus Tool*¹¹¹ (O'Donnell, 2009), which is a stand-off XML annotation software which allows for the analysis of both whole documents and segments within a text (e.g., words, phrases, or clauses). It is possible to create fine-grained annotation schemes or tagsets with different levels of specificity and detail with which the units of analysis will be annotated. This software and type of analysis have been largely used by the research group where this dissertation has been conducted (Collewaert, 2019; Georgopoulos, 2017; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada & Lozano, 2020) at the Universidad de Granada. Additionally, the software also provides the results from chi-square statistical tests and provides both the χ^2 value, the significance level and the effect size. Thus, this enables the comparison of the frequency distribution of the annotated units (both segments or texts) or the desired multiple combinations which are relevant to address different research questions of interest. Interestingly, several specific queries can also be made using criteria which are purposefully designed by the user. It is possible to create different layers of analysis, which can then be subdivided in systems, which in turn can consist of more embedded systems of features. Each tag must be labelled for all the systems, but only one feature within a given system can be selected. For instance, within the system of *character* explained below (Figure 5), only one possible feature corresponding to all the possible characters can be selected. However, a given subject can be tagged for the system *character*, but also for *anaphor form* (Figure 6) or *syntactic configuration* (Figure 7), among all the classifications that will be explained below.

7.1.2 Tagset

For this study, all 3rd person singular subject REs found in topic continuity¹¹² appearing with finite verbs were included in the analysis and annotated (see Figure 4). In particular,

¹¹¹ For more information, see <http://www.corpustool.com/>

¹¹² It is worth mentioning that first person verb forms such as comments from the participants or existential forms (e.g., *hay una ventana* – there is a window) are not considered to break topic continuity.

only 3rd person singular animate subject pronouns were tagged based on the findings from Lozano (2009), which showed that deficits at the syntax-discourse interface were selective, since they did not affect the whole pronominal paradigm (see section 4.1.1). Additionally, 3rd person singular pronouns were found to be particularly problematic for L1 Spanish-L2 English learners in TC scenarios (Martín-Villena & Lozano, 2020) and are thus argued to be problematic for L1 Spanish attriters. Apart from these reasons, a potential L2 English effect in the REs used in L1 Spanish in the groups investigated would most likely show up in TC scenarios, where null pronouns are expected in L1 Spanish and overt forms in L1 English instead. By contrast, overt REs are typically employed in topic shift contexts in both Spanish and English (Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021; T. Quesada & Lozano, 2020).

Figure 4

Tagset



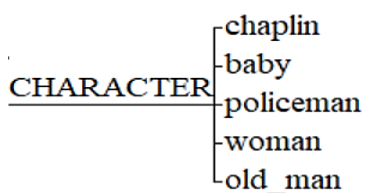
For each subject analysed, different tags were added from the linguistically-informed fine-grained tagset which was created for this study and which followed Lozano (2009, 2016), Martín-Villena and Lozano (2020), Quesada and Lozano (2020) and Quesada (2021). The following sections expand on the properties added to all the subject REs that were eventually analysed as well as their motivation to be included.

7.1.2.1 Character

Given that the two tasks analysed were, as already explained, short clips from Charlie Chaplin films, the number of characters that appeared in each of them was controlled. Task 1 only included the main character, Charlie Chaplin (as illustrated in example 45), while the second task included more intervening characters. As shown in Figure 5, apart from Charlie Chaplin, these were an abandoned baby (46), a policeman (47), a woman (48) who was carrying a baby in a pram¹¹³, and an old man (49). An example of each character has been included in examples 45 to 49 below. Thus, the character label coded which participant in the two tasks the annotated subject RE referred to. This would allow for the possibility to explore whether more or less explicit subject REs were used depending on the character¹¹⁴.

Figure 5

Characters in Charles Chaplin videoclips



45. *Charles Chaplin*_i¹¹⁵ *se va corriendo*. [ES_SP_21_14_AAM] (Instructed bilingual)

‘Charles Chaplin runs away’.

46. *El bebé*_i *está cubierto con sábanas o con mantas*. [ES_SP_21_14_AP] (Immersed bilingual)

¹¹³ Given that the woman’s baby does not actively participate in any of the described actions in the oral retellings, this label was eliminated.

¹¹⁴ Although initially tagged, this factor was not eventually included in the analysis given that it was outside the scope of this dissertation.

¹¹⁵ Indices are used throughout to mark different referents.

‘The baby is covered with sheets or blankets’.

47. *El policía_i obviamente le_j dice que no.* [ES_SP_19_14_ER] (Instructed bilingual)

‘The policeman obviously says no’.

48. *La señora_i entra a una tienda.* [ES_SP_22_14_ARS] (Functional monolingual)

‘The woman walks into a shop’.

49. *El señor mayor_i encuentra el carrito de bebé_j.* [ES_SP_21_14_MBG] (Instructed bilingual)

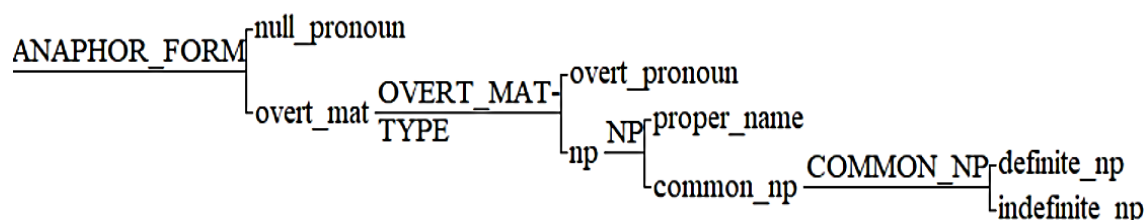
‘The old man finds the baby’s pram’.

7.1.2.2 Anaphoric form

The anaphoric subjects analysed were classified according to their form (see Figure 6). Thus, subjects were tagged as being instances of a null pronoun (50), an overt pronoun (51), or a Noun Phrase (NP), which could in turn be classified as a proper name (52) or a common NP (53), which was also subdivided according to its definiteness, i.e., definite or indefinite¹¹⁶ NPs. The two latter forms were also tagged as instances of overt material, which will be relevant to address several research questions (see section 5.1). Most experimental studies on anaphora resolution have widely explored the interpretation of null and overt pronouns (Bel & García-Alcaraz, 2018; Chamorro, 2018; Clements & Domínguez, 2017; de Rocafiguera & Bel, 2022; Keating et al., 2011, 2016). Additionally, some studies have also included NPs in their experimental analyses focusing on Spanish natives (Gelormini-Lezama & Almor, 2011) and some corpus studies have also explored their distribution in written production for both L1 and L2 Spanish speakers (Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021).

Figure 6

Form of the referring expression



¹¹⁶ No instances of indefinite NPs were attested.

50. \emptyset_i *Se vuelve a resbalar con las alfombras hasta que \emptyset_i vuelve a caer al suelo.*
[ES_SP_20_15_JFM] (Functional monolingual)

‘He slips again with the rugs until he falls back on the floor’.

51. *Él_i no quiere coger el bebé_j.* [ES_SP_20_14_AMP] (Immersed bilingual)

‘He does not want to get the baby’.

52. *Charlie_i no sabe qué hacer.* [ES_SP_19_14_CMJ] (Functional monolingual)

‘Charlie does not know what to do’.

53. *El hombre_i tiene que llevárselo_j.* [ES_SP_19_14_JAA] (Functional monolingual)

‘The man has to take him’.

7.1.2.3 Syntactic configuration

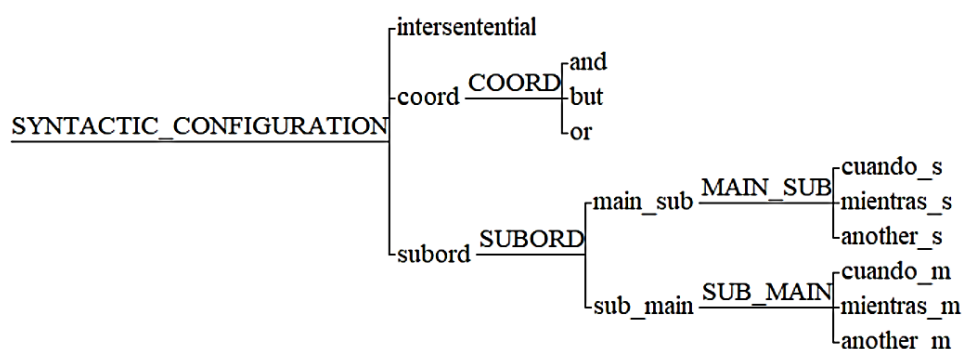
To investigate the potential role of the syntactic configuration where subject REs appeared, the following tags were added (see Figure 7). The initial tag divided syntactic scenarios into intersentential (54), subordinated (55), or coordinated contexts (56). These contexts have been the focus of both corpus-based (García-Alcaraz & Bel, 2019; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021) and experimental (Bel & García-Alcaraz, 2018; de Rocafiguera & Bel, 2022; Gelormini-Lezama & Almor, 2011; T. Quesada, 2021) studies investigating the production, interpretation, and processing of subject REs in both L1 and L2 Spanish. Additionally, the type of coordinating conjunction was tagged, distinguishing between *and/or/but*. Regarding subordination, this tag was then subdivided into two parts, whether the subject RE was found in the subordinate (57) or in the main (58) clause. Finally, in order to establish potential comparisons with the offline picture selection task addressed in Chapter 8, we further coded whether the subordinate clause was introduced by *cuando* ‘when’ (57) or *mientras* ‘while’ (58), or whether it corresponded to another type of scenario (59). Although these results would shed light on the effect different subordinating conjunctions have in triggering different patterns of production of REs, considering the low frequencies attested, no further analysis was included in this task according to this factor¹¹⁷. We also specified whether the main clause followed or was preceded by a subordinate clause of the aforementioned types. In particular, some studies have actually investigated whether

¹¹⁷ The role of subordinating conjunctions in modulating interpretation preferences will be addressed in Chapter 8.

differences in the production and interpretation of subject REs in Spanish might be attributed to the syntactic context in which they were inserted (Bel & García-Alcaraz, 2018; de Rocafiguera & Bel, 2022). In addition, the analysis of coordinated contexts as opposed to other contexts has yielded interesting results in the acquisition of L1 English-L2 Spanish learners (Martín-Villena & Lozano, 2020; T. Quesada, 2021) and deserves further attention in this dissertation.

Figure 7

Syntactic configuration



54. \emptyset_i *No encuentra las llaves.*¹¹⁸ *Entonces \emptyset_i empieza a buscarlas por todos lados.*

[ES_SP_22_15_AMBP] (Functional monolingual)

‘He cannot find the keys. Then he starts looking for it everywhere’.

55. \emptyset_i *Se da cuenta de que \emptyset_i tiene la llave en el bolsillo.* [ES_SP_26_15_AMD]

(Immersed bilingual)

‘He realises he has got the key in his pocket’.

56. \emptyset_i *Busca debajo del felpudo y \emptyset_i no la encuentra.* [ES_SP_19_15_BCA]

(Instructed bilingual)

‘He looks for it under the mat and cannot find it’.

57. \emptyset_i *Vuelve a resbalar cuando \emptyset_i se levanta.* [ES_SP_20_15_AGD] (Instructed bilingual)

‘He slips back when he stands up’.

58. *Mientras \emptyset_i está intentando entrar \emptyset_i mete la pierna dentro de una pecera.*

[ES_SP_21_14_IMS] (Instructed bilingual)

‘While he is trying to get in, he puts his leg in a fish tank’.

¹¹⁸ The features that are tagged are underlined and the subject RE for which they were tagged is highlighted in bold in all examples.

59. \emptyset_i Tiene dificultades para cerrar la puerta porque \emptyset_i se resbala continuamente.

[ES_SP_21_14_JMV] (Instructed bilingual)

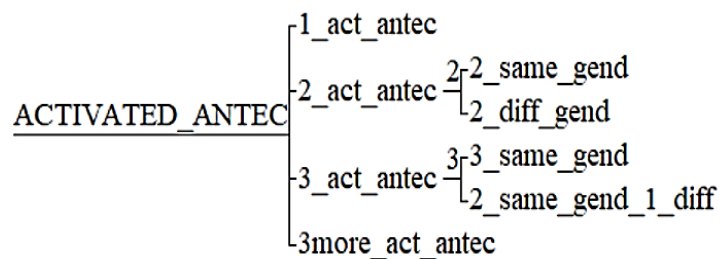
‘He struggles to close the door because he keeps slipping’.

7.1.2.4 Antecedent

Regarding the potential antecedents of a given subject RE, different tags were included in the analysis considering the relevance this factor has been shown to have in previous studies (Collewaert, 2019; Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021; T. Quesada & Lozano, 2020). Activated antecedents¹¹⁹ (see Figure 8) were considered those that were active in up to four (finite or non-finite) clauses prior to the tagged subject RE. First, we coded the number of potential antecedents preceding each subject. There were instances where there was just one activated antecedent, which coincided with the annotated subject (60), which was mostly the case in Task 1. When two (61) or three (62) potential antecedents were found, they were additionally tagged considering whether they matched in gender with the subject (63) or whether their gender feature was different (examples 61 and 62) given the relevance of gender similarities or differences when selecting different overt subject REs (e.g., Lozano, 2016; Martín-Villena & Lozano, 2020). Moreover, we included one final label to encompass all the subjects which were preceded by more than three potential antecedents¹²⁰.

Figure 8

Activated antecedents



¹¹⁹ Antecedents could be activated by the full mention of that particular referent (e.g., *la señora* ‘the woman’) or through pronouns, which could be both explicit and null.

¹²⁰ Note that considering the tasks employed in the study, the number of activated antecedents could only reach up to six activated antecedents and only in Task 2.

60. \emptyset_i Intenta abrir la casa pero \emptyset_i no puede. \emptyset_i Busca por todos lados y \emptyset_i no encuentra la llave. (Only one antecedent, Chaplin, as indicated by indices) [ES_SP_19_15_CMJ] (Functional monolingual)

‘He tries to open the house but he can’t. He searches everywhere but cannot find the key’.

61. La señora_i [...] parece que discute con él_j y que \emptyset_i le_j dice que \emptyset_j se lleve al niño. (Two antecedents, the woman and Chaplin, as indicated by indices) [ES_SP_27_14_AM] (Immersed bilingual)

‘It looks like the woman is arguing with it and she tells him to take the baby’.

62. [Chaplin] \emptyset_i Se vuelve a cruzar con el carro que se ha cruzado el otro hombre_j y esta vez, la mujer_k está fuera, y al reconocerle_i, pues \emptyset_k va detrás de él_i. (Three antecedents, Chaplin, the other man, and the woman, as indicated by indices) [ES_SP_20_14_AGD] (Instructed bilingual)

‘[Chaplin] He comes across the pram again that the other man has come across, and this time, the woman is outside, and as she recognises him, she goes after him’.

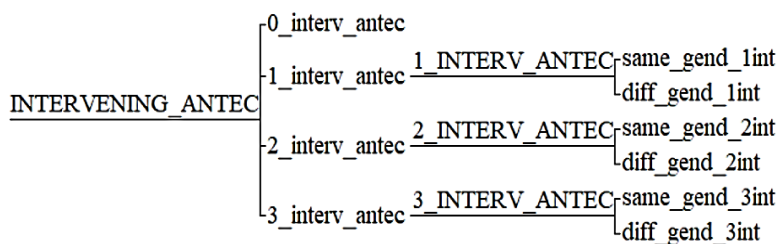
63. \emptyset_i Decide quedarse con el niño_j y \emptyset_i se va al final contento con el niño_j. [ES_SP_21_14_AJDC] (Instructed bilingual)

‘He decides to keep the baby and he finally leaves happily with the baby’.

Secondly, another tag was added to investigate the potential role of intervening antecedents (see Figure 9) between a given RE and its last activation (be it through an explicit or null form), which has been considered in previous research (T. Quesada, 2021). Hence, we annotated contexts where there were no intervening antecedents (64), but also where there were one (65), two (66), or three (67) intervening antecedents, and whether they differed in gender (66) with the annotated subject or not (65).¹²¹

Figure 9

Intervening antecedents



¹²¹ The maximum number of intervening antecedents, which are underlined in the examples, was three.

64. *Cuando \emptyset_i está dentro, \emptyset_i vuelve a buscar las llaves.* [ES_SP_18_15_LGM]
(Functional monolingual)

‘When he is inside, he looks for the keys again’.

65. *Chaplin_i coge al bebé_j y \emptyset_i se va.* [ES_SP_31_14_EA] (Immersed bilingual)

‘Chaplin takes the baby and leaves’.

66. *\emptyset_i Ve una señora_j con su carrito y un bebé_k. \emptyset_i Piensa que a lo mejor \emptyset_k puede ser de esta_j.* [ES_SP_25_14_JM] (Immersed bilingual)

‘Chaplin sees a woman with her pram and a baby. Chaplin thinks the baby might be hers’.

67. *Cuando la mujer_i se da cuenta de que ahora \emptyset_i tiene dos niños_{j/k} en el carrito de bebé, pues le_i \emptyset_i empieza a gritar a Charles Chaplin_i.* [ES_SP_19_14_BCA]
(Instructed bilingual)

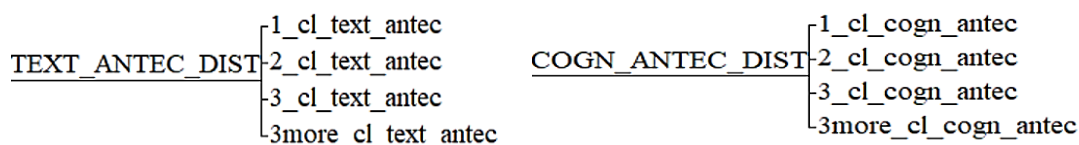
‘When the woman realises she has got two babies in her pram, she starts shouting at Charles Chaplin’.

Finally, the last tags added within the category of the antecedent were the distance between the subject RE and its antecedent given that this has been found to be relevant in the selection of anaphoric forms (García-Tejada, 2022; Givón, 1983; Lozano, 2016; Zulaica-Hernández, 2016) taking into consideration the degree of accessibility of a given RE in addition to processing efforts required to retrieve a closer or more distant referent from working memory. In this case, we considered both the *textual* and the *cognitive* antecedent and added two tags accordingly (see Figure 10), which have not been addressed separately in previous research. The former was understood as any explicit mention to a given referent primarily through an NP (both proper names and lexical NPs) which could be uniquely identified with that referent in the absence of additional context. The latter included any mention which would activate a given referent regardless of its form: see instances with null or overt material (overt or possessive pronouns or NPs)¹²².

¹²² Note that when a given subject RE was preceded by a NP which could uniquely identify it, the textual and the cognitive antecedent coincided and thus, the distance was considered to be the same.

Figure 10

Textual and cognitive antecedent distance



68. *La mujer_i se enfada y Ø_i le_j hace llevarse al bebé_k.* [ES_SP_31_14_CP] (Immersed bilingual)

‘The woman gets mad and Ø makes him take the baby’.

69. *Charlie_i va caminando y Ø_i sale de su escondite y Ø_i se encuentra con la misma señora_j.* [ES_SP_29_14_RGM] (Immersed bilingual)

‘Charlie is walking and leaves his hiding place and finds the same woman’.

70. *Cuando Ø_i entra por la puerta con las llaves pues hay una serie de alfombras y demás y cada vez que Ø_i pisa una alfombra [...].* [ES_SP_24_15_CCC] (Functional monolingual)

‘When he enters through the door with the keys, there are some rugs and the like and every time he steps on a rug [...]’.

71. *Chaplin_i intenta entrar en su casa pero Ø_i no encuentra dónde Ø_i tiene la llave.* [ES_SP_25_15_TIL] (Immersed bilingual)

‘Chaplin tries to enter his house but cannot find where he has the key’.

72. *Ø_i Los tira y el vídeo pretende ser cómico porque no hay voces ni sonidos, solo una música de fondo y entonces mientras Ø_i está fumando [...]* [ES_SP_21_14_CSI] (Immersed bilingual)

‘He throws them away and the video tries to be comical because there are no voices or sounds, only background music and then while he is smoking [...]’.

73. *Va Chaplin_i paseando mientras fuma. Ø_i Lleva un bastón. Le caen escombros encima de alguna ventana y él_i como que busca de dónde viene.* [ES_SP_21_14_CVR] (Functional monolingual)

‘Chaplin is walking while smoking. He is carrying a cane. Debris falls on him and he tries to find where they come from’.

74. *Aparece Chaplin_i delante de un portal donde hay unas macetas y pone que es la una de la mañana y que no Ø_i encuentra las llaves.* [ES_SP_19_15_AAPL] (Instructed bilingual)

‘Chaplin appears in front of a doorway where there are some pots and it says it’s one o’clock in the morning and that he cannot find his keys’.

In example 69, the *textual* antecedent of the second null pronoun (*Ø se encuentra*) would be *Charlie*, whether the *cognitive* antecedent would be the preceding null pronoun, which activates the referent (*Charlie Chaplin*) again. The distance between the subject RE and its antecedent was measured in number of clauses, considering both finite and non-finite clauses and included the tags for one (example 68 for both textual and cognitive antecedent), two (example for textual antecedent 69 and 70 for cognitive antecedent¹²³), three (example 71 for textual antecedent and 72 for cognitive antecedent) or more than three (example 73 for textual antecedent and 74 for cognitive antecedent) clauses apart.

7.2 Results

The aim of this section is to report the findings from the two oral corpus-based retelling tasks that have been described above together with their coding and analysis. Following a brief presentation of the main descriptive results from the analysis (e.g., tasks analysed and final subjects tagged), the results from the inferential statistics performed will be shown in order to address each of the research questions formulated in section 5.1.

7.2.1 Descriptive results

As shown in Table 16, a total of 9225 subject REs was analysed (functional monolinguals = 1396, instructed bilinguals = 3387, and immersed bilinguals = 4442). Despite the differences in the raw total amount of subjects tagged per group, the ratio of tagged subjects by total number of words produced in each group appears to be rather similar (functional monolinguals = 8.46%, instructed bilinguals = 8.18%, and immersed bilinguals = 7.44%), which means that the overall ratio of subject REs analysed was comparable in the three groups.

¹²³ The existential verb (‘hay’ – there is) does not break topic continuity.

Table 16

Number of words, total referring expressions tags and ratio of tagged referring expressions by the total number of words

	Words	REs tagged	Ratio
Functional monolinguals	16506	1396	8.46
Instructed bilinguals	41393	3387	8.18
Immersed bilinguals	59679	4442	7.44
TOTAL	117578	9225	7.85

Overall, considering the tags assigned to every subject RE, the number of terminal tags amounted to 120886 after annotating 412 oral narrations as illustrated in Table 17 (functional monolinguals = 66 oral texts (Task 1: 33 vs. Task 2: 33), instructed bilinguals = 159 texts (Task 1: 78 vs. Task 2: 81), and immersed bilinguals = 187 texts (Task 1: 94 vs. Task 2: 93).

Table 17

Number of oral texts tagged by group and task

	Task 1: Chaplin alone	Task 2: Chaplin and other characters
Functional monolinguals	33	33
Instructed bilinguals	78	81
Immersed bilinguals	94	93

The imbalance in the two groups of advanced bilinguals is due to the fact that the quality of the recordings from some participants was not adequate enough to be correctly transcribed or due to the fact that some of them misunderstood the task instructions and completed them in English instead of in Spanish. Nevertheless, given that the analysis was performed by group and not considering individual participants across tasks, these differences did not prove to be a considerable limitation. After having provided general information about the subject REs tagged in each group and the number of corpus-based oral narrations analysed, the following sections will present the results by research question presented in section 5.1. The analyses performed will be based on chi-square statistical comparisons of frequency distribution of the specific annotated units where both the χ^2 value, the significance level, and the effect size will be provided.

7.2.2 RQ1: Overall distribution of subject referring expressions

To address the first research question on the distribution of subject REs in the three groups under scrutiny (i.e., functional monolinguals, instructed bilinguals, and immersed bilinguals), this section will present data from their overall production, first by merging the results from tasks 1 and 2, which involved either Chaplin alone or himself intervening with other characters, respectively, and then the results will be separated by task. Furthermore, potential differences in distribution across the two tasks will be additionally examined by group independently.

Figure 11 and Table 18 show that the preferred option to encode TC in the three groups are null pronouns (functional monolinguals = 96.7%, instructed bilinguals = 95.1%, and immersed bilinguals = 92.9%). NPs and overt pronouns follow null pronouns, although both forms are very scarcely produced (NPs/overt pronouns: functional monolinguals = 2.4%/0.9%, instructed bilinguals = 3.1%/1.8%, and immersed bilinguals = 5%/2.1%).

Figure 11

Overall production of subject referring expressions in Tasks 1 and 2

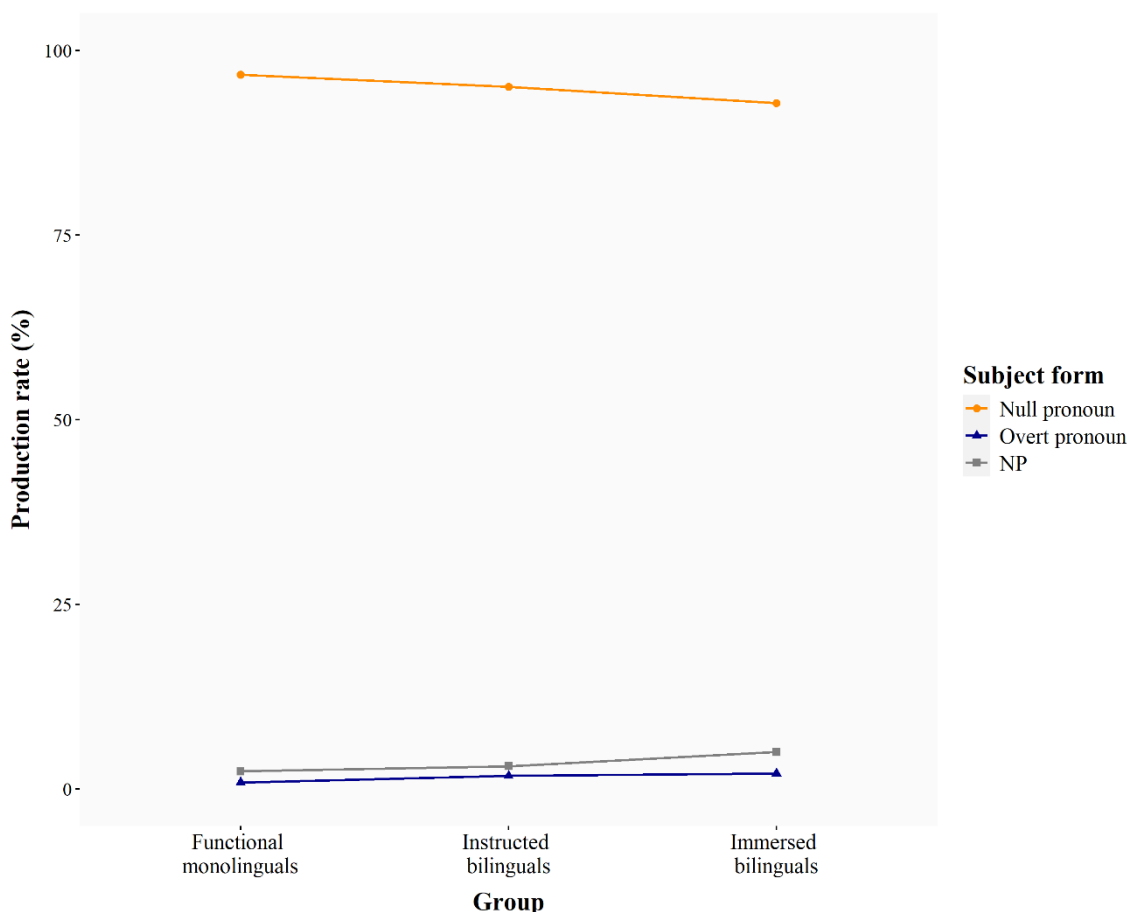


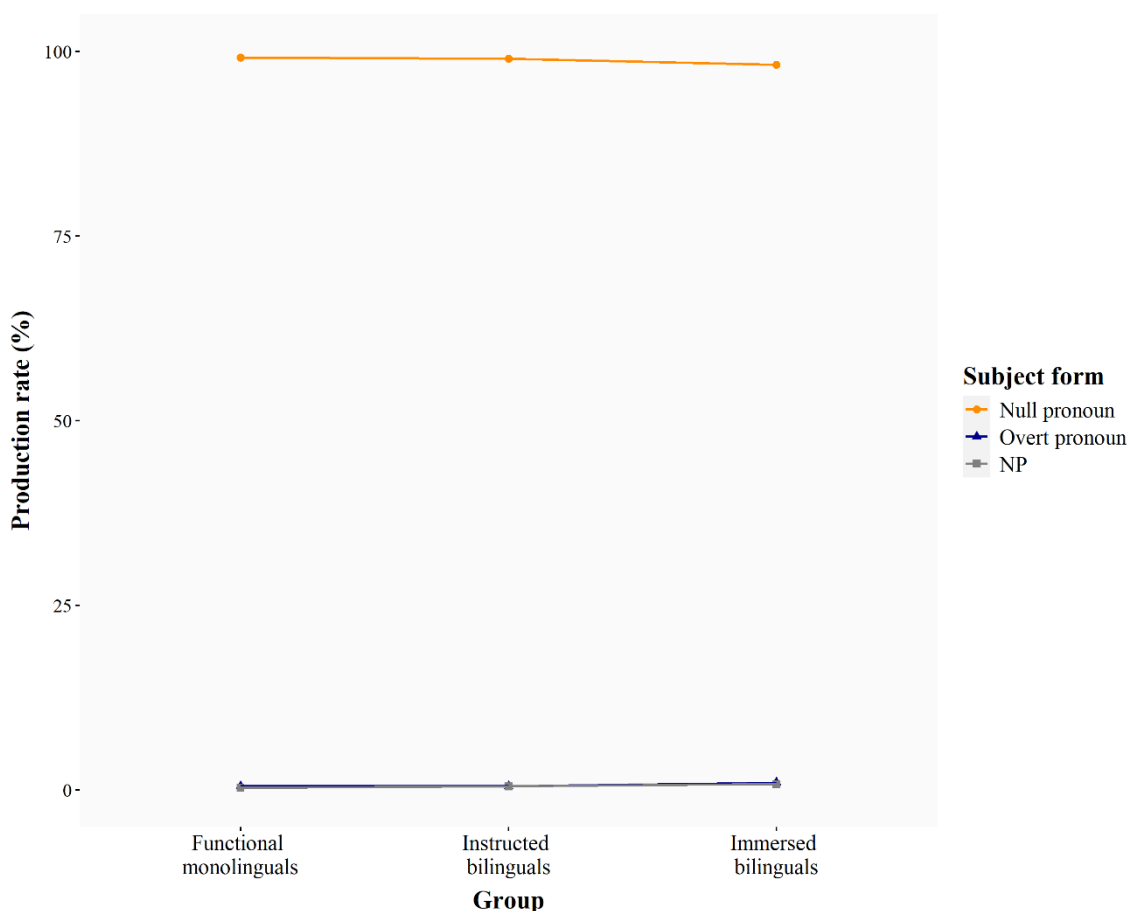
Table 18*Overall production of subject referring expressions in Tasks 1 and 2*

	Functional monolinguals	Instructed bilinguals	Immersed bilinguals
Null pronoun	96.7 (1350)	95.1 (3219)	92.9 (4125)
Overt pronoun	0.9 (13)	1.8 (62)	2.1 (93)
NP	2.4 (33)	3.1 (106)	5 (224)

Note. The percentage of production is followed by the raw frequency in brackets.

As can be observed, the form that is most predominantly produced are null pronouns and it is noteworthy that the production of overt forms in the three groups appears to be rather similar and largely negligible. Despite the similarity in the production patterns of the functional monolinguals and the two advanced bilingual groups, a slight and significant decrease in the production of null pronouns and a consequent increase in the use of more explicit forms can be detected. In fact, the production of null pronouns is significantly different across all groups: functional monolinguals vs. instructed bilinguals ($\chi^2 = 6.412$, $p = .01$, $h = .08$), functional monolingual vs. immersed bilinguals ($\chi^2 = 26.878$, $p < .001$, $h = .18$), and instructed vs. immersed bilinguals ($\chi^2 = 15.662$, $p < .001$, $h = .09$). Regarding overt forms, significant differences are only found in the production of overt pronouns between functional monolinguals and instructed bilinguals ($\chi^2 = 5.180$, $p = .02$, $h = .08$) and functional monolinguals vs. immersed bilinguals ($\chi^2 = 8.051$, $p = .005$, $h = .1$), and NPs in functional monolinguals vs. immersed bilinguals ($\chi^2 = 18.113$, $p < .001$, $h = .14$) and instructed vs. immersed bilinguals ($\chi^2 = 17.421$, $p < .001$, $h = .1$). Overall, although all groups prefer null pronouns to mark TC (over almost 93% of the forms used), the two bilingual groups significantly differ from functional monolinguals in the production of more explicit material, a finding to which we will return in the following sections.

If we consider the results from the two tasks separately, nevertheless, two clearly differentiated patterns emerge. The distribution of subject REs in Task 1 with Chaplin alone (see Figure 12 and Table 19) in the three groups proves to be strikingly similar.

Figure 12*Production of subject referring expressions in Task 1 (Chaplin alone)***Table 19***Production of subject referring expressions in Task 1 (Chaplin alone)*

	Functional monolinguals	Instructed bilinguals	Immersed bilinguals
Null pronoun	99.2 (636)	99 (1599)	98.2 (1958)
Overt pronoun	0.5 (3)	0.5 (8)	1 (19)
NP	0.3 (2)	0.5 (9)	0.8 (17)

Both functional monolinguals and the two advanced bilingual groups almost exclusively produce null pronouns (99.2%, 99%, and 98.2%, respectively) and the production of overt pronouns and NPs seems to be rather marginal, with merely 5, 17, or 36 explicit REs out of the total of 4251 tagged subjects in this task. After performing inferential statistics, none of the groups significantly differs in any of the conditions since all p values are above .05. Hence, all three groups are found to exhibit comparable distribution patterns of subject REs used in Task 1.

By contrast, their performance in Task 2, where Chaplin appears interacting with other characters with the same or different gender, proves to be somewhat dissimilar. In this task, as we can observe in Figure 13 and Table 20, TC is also largely marked through the use of null pronouns (functional monolinguals = 94.6%, instructed bilinguals = 91.5%, and immersed bilinguals = 88.5%). Null pronouns are followed by NPs in the three groups (4.1%, 5.5%, and 8.5%, respectively) and overt pronouns (1.3%, 3%, and 3%), whose production is unsurprisingly very limited following previous studies (Lozano, 2009; Martín-Villena & Lozano, 2020; Montrul & Rodríguez-Louro, 2006; T. Quesada, 2021).

Figure 13

Production of subject referring expressions in Task 2 (Chaplin & intervening characters)

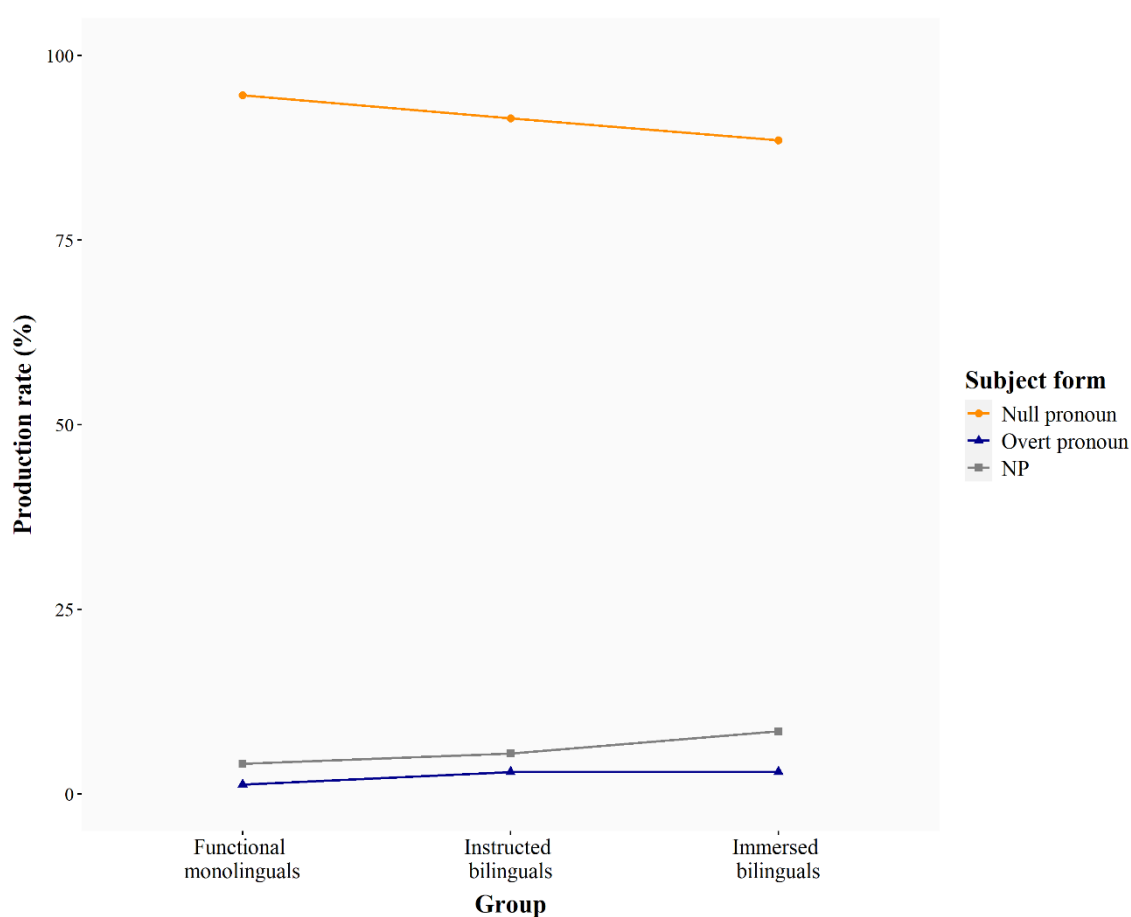


Table 20

Production of subject referring expressions in Task 2 (Chaplin & intervening characters)

	Functional monolinguals	Instructed bilinguals	Immersed bilinguals
Null pronoun	94.6 (714)	91.5 (1620)	88.5 (2167)
Overt pronoun	1.3 (10)	3 (54)	3 (74)
NP	4.1 (31)	5.5 (97)	8.5 (207)

Similarly to the pattern observed in Figure 11, there is a significant decrease in the production of null subject pronouns when comparing Task 2 across groups (functional monolinguals vs. instructed bilinguals ($\chi^2 = 7.223, p = .007, h = .12$), functional monolinguals vs. immersed bilinguals ($\chi^2 = 23.344, p < .001, h = .22$), and instructed vs. immersed bilinguals ($\chi^2 = 9.746, p = .002, h = .1$)) accompanied by a significant increase in the production of NPs (functional monolinguals vs. immersed bilinguals ($\chi^2 = 15.874, p < .001, h = .18$), and instructed vs. immersed bilinguals ($\chi^2 = 13.636, p < .001, h = .12$)) and overt pronouns (functional monolinguals vs. instructed bilinguals ($\chi^2 = 6.376, p = .01, h = .12$), and functional monolinguals vs. immersed bilinguals ($\chi^2 = 6.518, p < .001, h = .12$)).

As Figure 14 and Table 21 illustrate, the production of functional monolinguals and advanced bilinguals significantly differs in the two tasks analysed. Notably, there is a significant decrease in the production of null subject pronouns from Task 1 to Task 2 in all groups: functional monolinguals ($\chi^2 = 23.528, p < .001, h = .29$), instructed bilinguals ($\chi^2 = 100.134, p < .001, h = .39$), and immersed bilinguals ($\chi^2 = 155.162, p < .001, h = .42$). By contrast, more explicit forms are produced in Task 2 compared to Task 1 in all three groups, except for the production of overt pronouns in functional monolinguals, which does not significantly differ from task 1 to task 2 (functional monolinguals' NPs ($\chi^2 = 21.620, p < .001, h = .30$), instructed bilinguals' overt pronouns ($\chi^2 = 30.673, p < .001, h = .21$) and NPs ($\chi^2 = 67.473, p < .001, h = .32$), and immersed bilinguals' overt pronouns ($\chi^2 = 22.972, p < .001, h = .15$) and NPs ($\chi^2 = 132.668, p < .001, h = .41$)). Remember that Task 1 includes only one main character, which is Charlie Chaplin. Task 2 combines actions performed by both Charlie Chaplin himself and other intervening characters which match or do not match with Chaplin's gender features. Therefore, Task 2 is shown to mostly trigger the use of more explicit forms. Even though this could be hypothesised to be the result of the second task being more cognitively demanding due to the interaction of several intervening and activated participants throughout the video which require additional processing demands to avoid potential ambiguity, the factor of the number and gender of potential antecedents will be scrutinised in detail in the following sections (see section 7.2.3) and we will return to this finding in the discussion of the results.

Figure 14

Production of subject referring expressions in functional monolinguals, instructed bilinguals and immersed bilinguals in Tasks 1 and 2

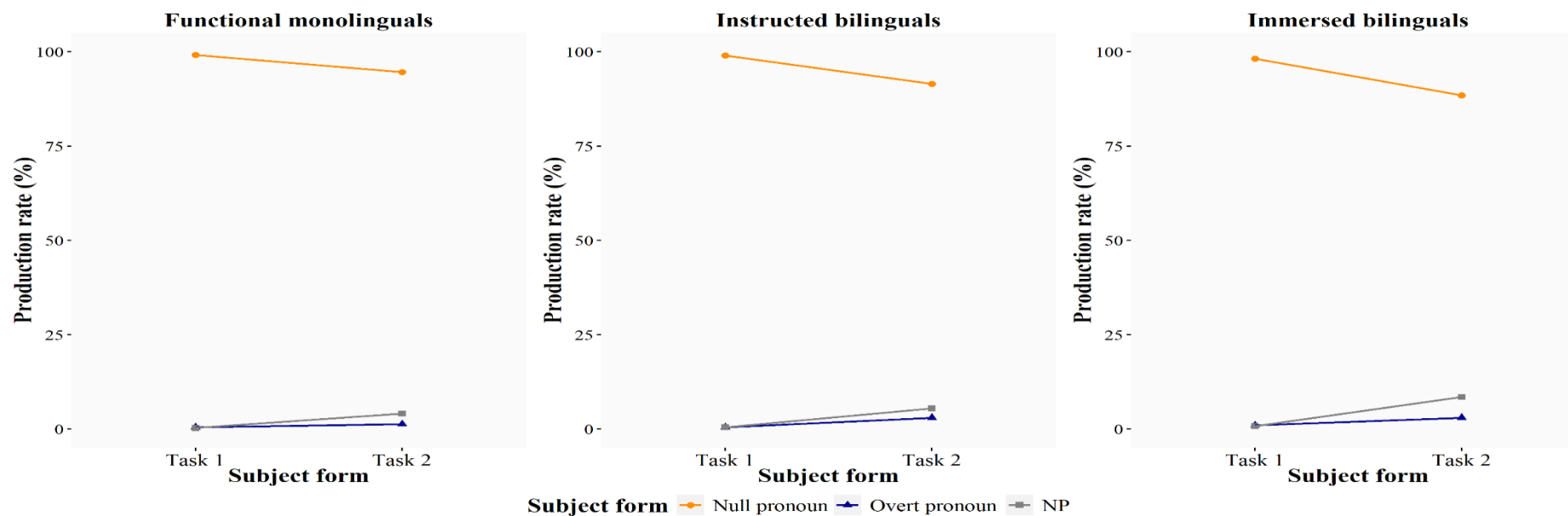


Table 21

Production of subject referring expressions in functional monolinguals, instructed bilinguals and immersed bilinguals in Tasks 1 and 2

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Task 1	Task 2	Task 1	Task 2	Task 1	Task 2
Null pronoun	99.2 (636)	94.6 (714)	99 (1599)	91.5 (1620)	98.2 (1958)	88.5 (2167)
Overt pronoun	0.5 (3)	1.3 (10)	0.5 (8)	3 (54)	1 (19)	3 (74)
NP	0.3 (2)	4.1 (31)	0.5 (9)	5.5 (97)	0.8 (17)	8.5 (207)

7.2.3 RQ2 and RQ3: Factors conditioning the use of more explicit REs

Regarding RQ2, there are several factors that are hypothesised to affect the distribution of null and overt subject REs. A broader RQ3 addressed whether a potential overexplicitness found in the production of the two bilingual groups can be accounted for by these factors or by potential crosslinguistic influence from English. Therefore, considering these two research questions are related, the results will be presented jointly. Hence, in this section, we are going to report the findings from the effect of certain variables (e.g., distance between the anaphor and its antecedent, syntactic configuration where the anaphor is embedded, or the number of potential antecedents) on the increase in the use of overt REs in the three groups under study. Even though topic continuity contexts are largely encoded via null pronouns in both functional monolinguals and advanced bilinguals, although to a lesser extent in the latter, the overall distribution of subject REs shows a considerable use of overt REs, which will now be further scrutinised.

7.2.3.1 Antecedent distance

Firstly, it was hypothesised that the distance between a given RE and its antecedent would in part determine the forms used in TC. Retrieving a distant antecedent would arguably require the production of more explicit REs since the referent's activation would have decreased in working memory. To explore this phenomenon, two types of antecedents, which have not been addressed separately to date, were tagged and explored: *textual* and *cognitive* antecedents. As addressed in section 7.1.2.4, *textual* antecedents were understood as those that would be uniquely identified with a given referent in an explicit way. This means that the form used, even if taken out of the context in which it is embedded, would trigger a representation and activation of a given referent. For instance, examples of textual antecedents could be *Chaplin, the woman, the baby*, or any explicit mention to any of the characters included in the video, both via proper names and lexical NPs. In addition, we considered the distance between a given RE and its *cognitive* antecedent. Cognitive antecedents were considered those that would activate a given referent at a given point in discourse, so a mental representation of such referent would be triggered, even if not fully realised via explicit material. In this case, cognitive antecedents could take the form of both more explicit forms (*Chaplin, the old man*) or less explicit ones (a clitic pronoun, an overt pronoun, or even a null pronoun). In this case,

we considered whether a longer distance of a given cognitive antecedent, understood as any activation of a given referent in any form, and a given RE would also trigger the use of overt material, that is, either overt pronouns or NPs.

7.2.3.1.1 Textual antecedent distance

As can be seen in Figure 15 and Table 22, in contexts where the textual antecedent was found either 1, 2, 3 or more than 3 clauses¹²⁴ away from a given RE, all groups largely produce null pronouns. When comparing the production of overt forms¹²⁵ between groups across contexts with more or less distant antecedents, no significant differences are found between the three groups in scenarios where the textual antecedent is either 1 or 2 clauses away, which are illustrated in example 75 below. However, immersed bilinguals are found to produce significantly more overt forms than functional monolinguals in contexts where the antecedent is either 3 clauses ($\chi^2 = 7.282, p < .007, h = .45$) or more than 3 clauses away ($\chi^2 = 19.938, p < .001, h = .17$). Moreover, instructed bilinguals additionally differ from immersed bilinguals but only in the latter ($\chi^2 = 14.420, p < .001, h = .1$). It appears then that, even though all groups produce comparable forms in contexts with closer textual antecedents (1 or 2 clauses apart), immersed bilinguals resort to the use of significantly more overt forms compared to the other two groups when the textual antecedent is further away from the subject RE, and this is particularly the case in the most distant context (i.e., more than 3 clauses away), where they significantly differ from the other two groups.

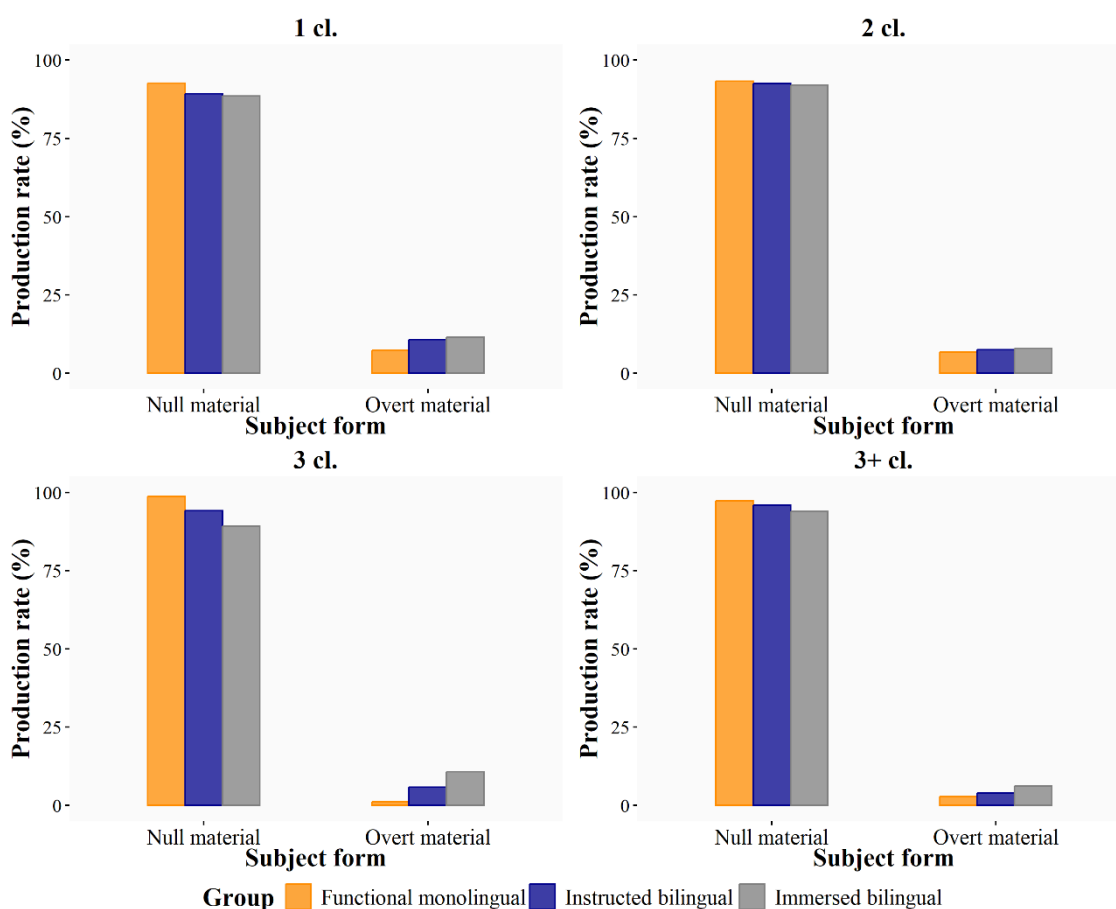
75. *Chaplin_i (textual antecedent) coge al bebé_j y Ø_i (1 clause) lo_j lleva donde Ø_i (2 clauses) lo_j había encontrado.* [ES_SP_18_15_ASO] (Functional monolingual)
'Chaplin takes the baby and takes him to where he had found him'.

¹²⁴ Remember that both finite and non-finite clauses were considered when counting the distance between a given RE and its antecedent.

¹²⁵ Considering the limited production of overt pronouns, the following results will collapse both the production of overt pronouns and NPs as overt material.

Figure 15

Production of null and overt subject referring expressions by distance of textual antecedent in Tasks 1 and 2

**Table 22**

Production of null and overt subject referring expressions by distance of textual antecedent in Tasks 1 and 2

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Null mat.	Overt mat.	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	92.7 (137)	7.3 (10)	89.3 (293)	10.7 (293)	88.5 (402)	11.5 (52)
2 cl.	93.3 (84)	6.7 (6)	92.5 (211)	7.5 (17)	92.1 (327)	7.9 (28)
3 cl.	98.8 (80)	1.2 (1)	94.2 (193)	5.8 (12)	89.2 (256)	10.8 (31)
3+ cl.	97.3 (1059)	2.7 (29)	96 (2522)	4 (104)	93.9 (3140)	6.2 (206)

Given that the analysis above includes data from Tasks 1 and 2, and since Task 1 only included Charlie Chaplin, who is explicitly mentioned at the beginning of the oral retelling and is essentially further recovered using less explicit material throughout the remaining of the narration, we decided to run a second analysis focusing exclusively on Task 2, where the effect of the textual antecedent distance would hypothetically become more visible. This was done to verify whether the findings would replicate by excluding

a potential overrepresentation of contexts where the textual antecedent was either 3 or more clauses apart, which was mostly the scenario attested in Task 1. As shown in Figure 16 and Table 23, even though the production of overt REs increases in this analysis when compared to the first analysis (see Figure 15), this is not surprising since the production of overt forms was higher in Task 2, as addressed in section 7.2.2.

Figure 16

Production of null and overt subject referring expressions by distance of textual antecedent in Task 2

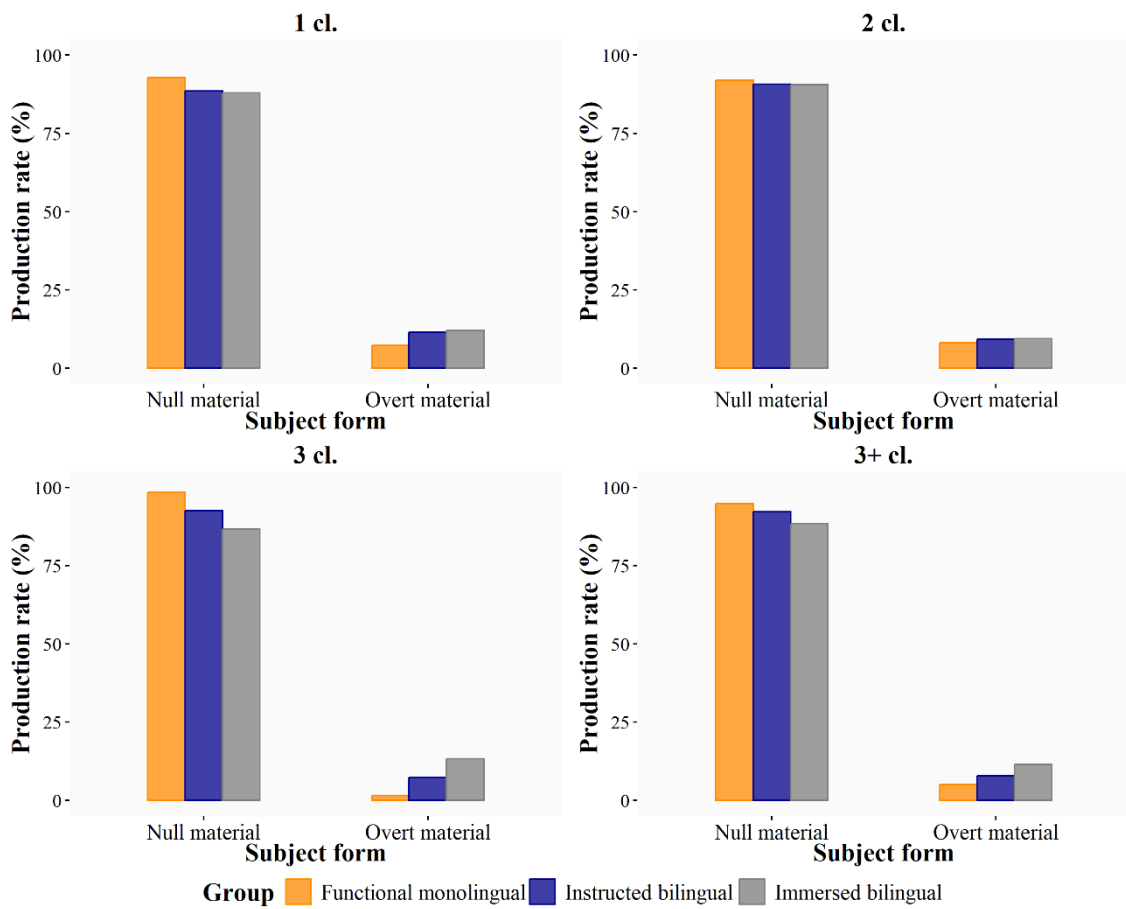


Table 23

Production of null and overt subject referring expressions by distance of textual antecedent in Task 2

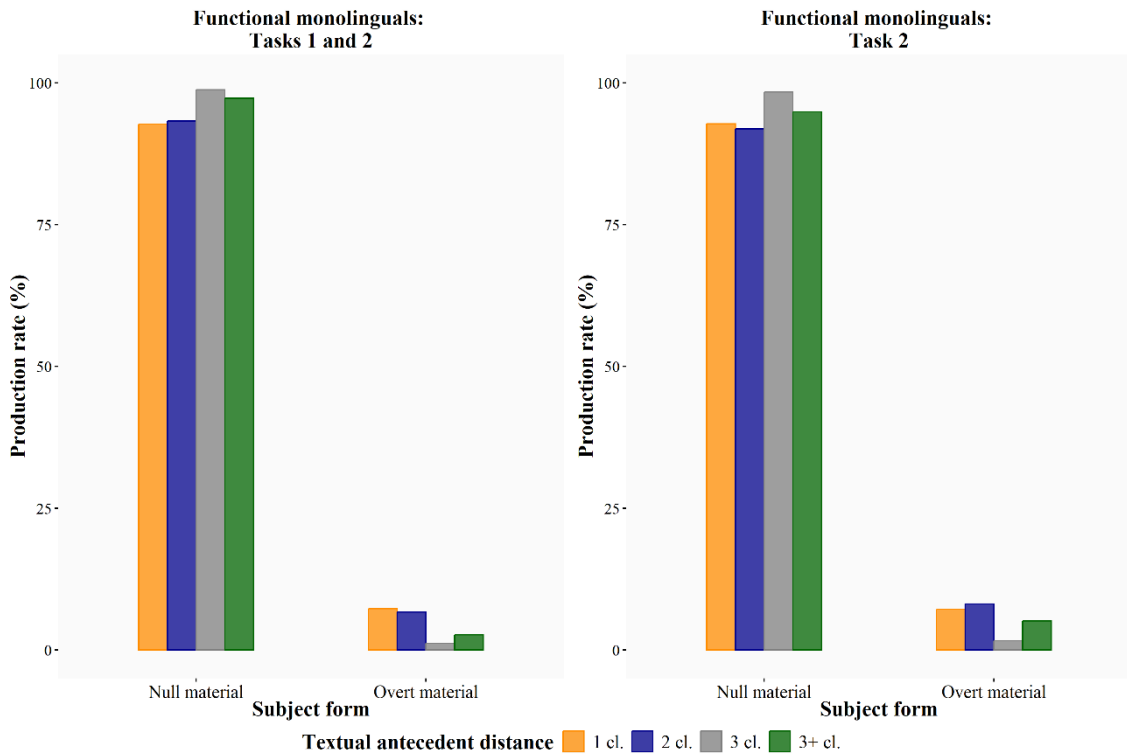
	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Null mat.	Overt mat.	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	92.8 (116)	7.2 (9)	88.5 (262)	11.5 (34)	87.9 (377)	12.1 (52)
2 cl.	91.9 (68)	8.1 (6)	90.7 (165)	9.3 (17)	90.6 (271)	9.4 (28)
3 cl.	98.4 (61)	1.6 (1)	92.6 (137)	7.4 (11)	86.7 (183)	13.3 (28)
3+ cl.	94.9 (469)	5.1 (25)	92.2 (1056)	7.8 (89)	88.5 (1336)	11.5 (173)

Nevertheless, significant differences are again not found in the first two scenarios, that is, when antecedents are separated from a given subject REs by either 1 or 2 clauses. Following the pattern presented above, significant differences are indeed attested between functional monolinguals and immersed bilinguals in the third context ($\chi^2 = 6.859, p = .009, h = .49$), and between functional monolinguals and immersed bilinguals ($\chi^2 = 17.133, p < .001, h = .24$) and instructed and immersed bilinguals ($\chi^2 = 9.972, p = .002, h = .13$) in the fourth context. Furthermore, functional monolinguals exhibit significant differences in the production of overt forms when compared to instructed bilinguals in contexts with the most distant textual antecedent ($\chi^2 = 3.923, p = .048, h = .11$). Overall, considering the results conflating both tasks and those specifically addressing the distribution of forms in Task 2, it appears that bilinguals, and particularly immersed bilinguals, tend to use more explicit material than the other two groups when the textual antecedent is more distant from a given subject RE.

Following the general comparison between groups in each of the contexts illustrated above, we now set out to explore differences within each specific group (i.e., functional monolinguals, instructed bilinguals, and immersed bilinguals) in the production of more explicit forms in contexts where the antecedent is more or less distant from the subject RE that recovers it. Once again, the results are both presented using the two tasks together and subsequently focusing on Task 2 alone. As we can see in Figure 17 and Table 24, functional monolinguals do not seem to produce more overt forms when the textual antecedent is located further away from a given subject RE. In fact, a counterintuitive significant increase in the use of less explicit material is found when conflating the results from both tasks. In the inferential statistical analysis performed, functional monolinguals exhibit an unexpected significant increase in the use of null pronouns with more distant antecedents when compared to those contexts where the antecedent is closer (1 clause away): i.e., 3 clauses away ($\chi^2 = 3.908, p = 0.048, h = .32$) or more than 3 clauses away ($\chi^2 = 8.476, p = 0.004, h = .22$). By contrast, when Task 2 is considered in isolation, no significant differences are found between any of the conditions explored and thus, the production of overt forms is comparable in all four contexts considered.

Figure 17

Production of null and overt subject referring expressions by distance of textual antecedent in both tasks and Task 2 separately in functional monolinguals

**Table 24**

Production of null and overt subject referring expressions by distance of textual antecedent in both tasks and Task 2 separately in functional monolinguals

	Both tasks		Task 2	
	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	92.7 (137)	7.3 (10)	92.8 (116)	7.2 (9)
2 cl.	93.3 (84)	6.7 (6)	91.9 (68)	8.1 (6)
3 cl.	98.8 (80)	1.2 (1)	98.4 (61)	1.6 (1)
3+ cl.	97.3 (1059)	2.7 (29)	94.9 (469)	5.1 (25)

Similarly to the pattern displayed above, Figure 18 and Table 26 show the distribution of subject REs by textual antecedent distance in instructed bilinguals. In this group, the only significant difference that is attested is kept in the analysis of both tasks and when Task 2 is analysed in isolation: less explicit forms are used in the most distant compared to the least distant scenarios (both tasks: $\chi^2 = 29.280$, $p < .001$, $h = .27$; task 2: $\chi^2 = 4.155$, $p = .042$, $h = .13$). This pattern, as has been already stated, does not support the prediction articulated in section 5.1, given that it seems that more null subject pronouns are used

when the textual antecedent is further away, a finding to which we will return in the discussion section.

Figure 18

Production of null and overt subject referring expressions by distance of textual antecedent in both tasks and Task 2 separately in instructed bilinguals

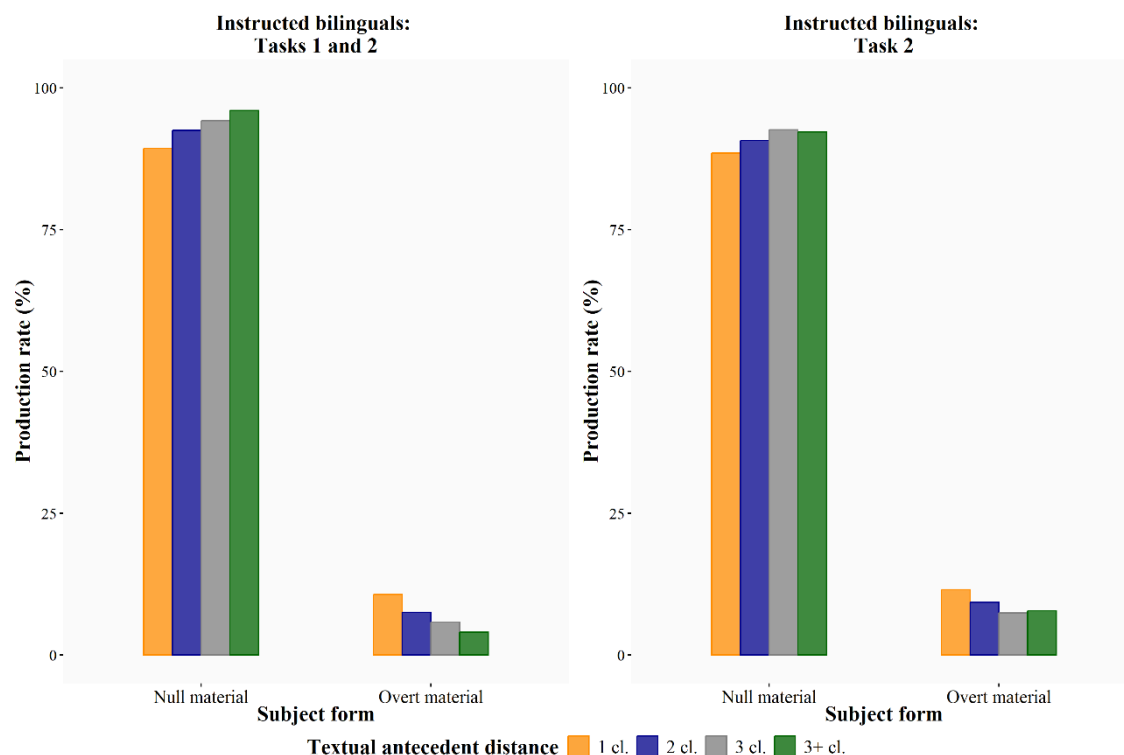


Table 25

Production of null and overt subject referring expressions by distance of textual antecedent in both tasks and Task 2 separately in instructed bilinguals

	Both tasks		Task 2	
	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	89.3 (293)	10.7 (293)	88.5 (262)	11.5 (34)
2 cl.	92.5 (211)	7.5 (17)	90.7 (165)	9.3 (17)
3 cl.	94.2 (193)	5.8 (12)	92.6 (137)	7.4 (11)
3+ cl.	96 (2522)	4 (104)	92.2 (1056)	7.8 (89)

Finally, Figure 19 and Table 26 present the production of null and overt material in immersed bilinguals considering how distant the textual antecedent is from the subject RE that recovers it. When considering both tasks, overt material is shown to be significantly more predominant with distant textual antecedents (more than 3 clauses apart) compared against close (i.e., 1 clause apart) textual antecedents ($\chi^2 = 17.725, p <$

.001, $h = .19$) or those that are 3 clauses apart ($\chi^2 = 9.352$, $p < .002$, $h = .17$). No differences are manifested when analysing the results from Task 2 alone.

Figure 19

Production of null and overt subject referring expressions by distance of textual antecedent in both tasks and Task 2 separately in immersed bilinguals

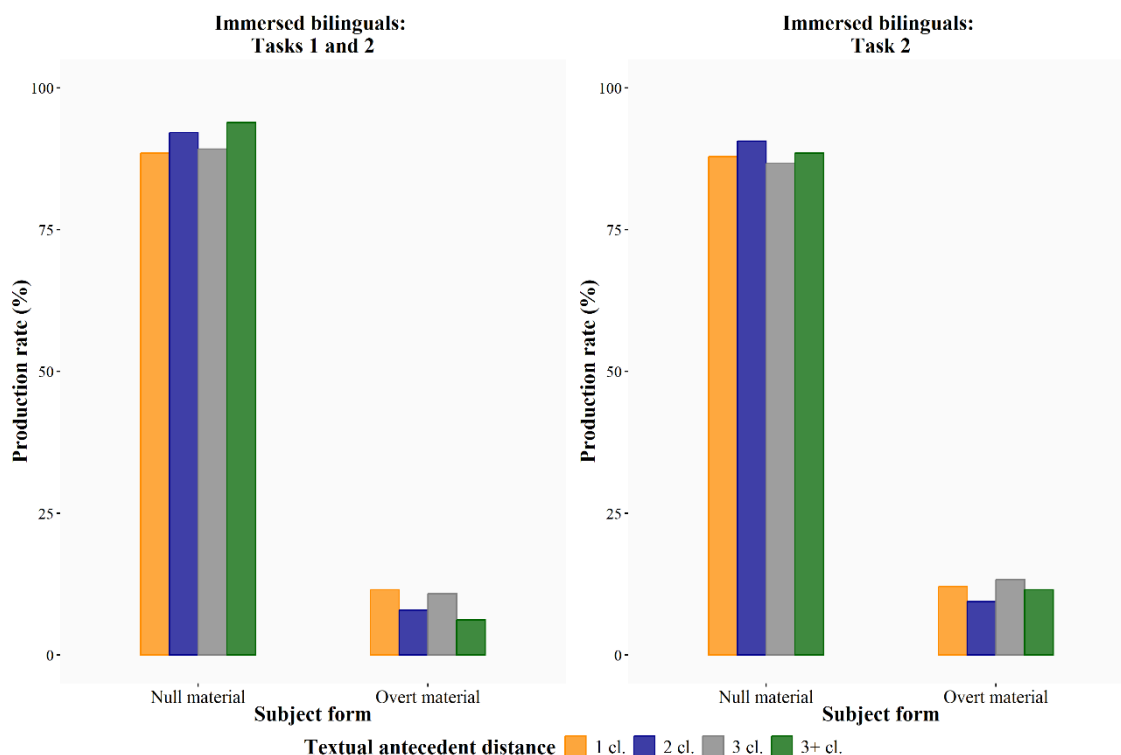


Table 26

Production of null and overt subject referring expressions by distance of textual antecedent in both tasks and Task 2 separately in immersed bilinguals

	Both tasks		Task 2	
	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	88.5 (402)	11.5 (52)	87.9 (377)	12.1 (52)
2 cl.	92.1 (327)	7.9 (28)	90.6 (271)	9.4 (28)
3 cl.	89.2 (256)	10.8 (31)	86.7 (183)	13.3 (28)
3+ cl.	93.9 (3140)	6.2 (206)	88.5 (1336)	11.5 (173)

As an interim summary, the results presented on the role played by textual antecedent distance seem to be in the opposite direction of what was originally predicted. In general, less overt forms are used with more distant textual antecedents. However, these significant differences are largely found when the results from tasks 1 and 2 are conflated, which means that contexts where the textual antecedent is more than 3 clauses away are

overrepresented, arguably leading to the differences that are exhibited. When analysing Task 2 separately, most of these significant differences disappear, which seems to suggest that the distance from the textual antecedent does not seem to be very relevant in the selection of null or overt subject REs in TC.

7.2.3.1.2 Cognitive antecedent distance

Having explored how the distribution of more or less explicit forms is (not) modulated by a factor such as textual antecedent distance, we will now present the results from the hypothetically modulating effect of a related variable such as *cognitive* antecedent distance. Since the results from the analysis of textual antecedent distance have proved not to be very relevant for RE selection, it could be argued that a more salient factor would be how far an antecedent has been activated regardless of how explicitly or implicitly it has been encoded. Thus, Figure 20 and Table 27 show how null and overt subject REs are distributed by groups in each of the contexts that differ in how separated the cognitive antecedent is from a given subject RE, and an example of a close cognitive antecedent (1 clause away) can be found in example 76 below. Visual inspection of the results seems to suggest that bilinguals, both instructed and immersed, produce more overt forms than functional monolinguals in the four contexts analysed. Additionally, immersed bilinguals exhibit the highest production of overt pronouns and NPs in all contexts. Interestingly, the differences in the production of overt material only reach significance in the following contexts: 1 clause away for functional monolinguals vs. immersed bilinguals ($\chi^2 = 13.385$, $p < .001$, $h = .13$) and instructed vs. immersed bilinguals ($\chi^2 = 7.110$, $p = .008$, $h = .06$), 2 clauses away for functional monolinguals vs. immersed bilinguals ($\chi^2 = 8.843$, $p < .002$, $h = .44$), and more than 3 clauses away for instructed vs. immersed bilinguals ($\chi^2 = 8.033$, $p = .005$, $h = .71$). It should be noted that the production of subject REs in functional monolinguals in contexts where the cognitive antecedent is 3 clauses apart from a given RE are rather limited ($N = 10$), which might possibly explain the absence of significant differences.

76. (Chaplin) \emptyset_1 (cognitive antecedent) Finalmente entra. \emptyset_1 (1 clause) Encuentra las llaves. [ES_SP_22_15_CMA] (Functional monolingual)

‘He finally gets in. He finds the keys’.

Figure 20

Production of null and overt subject referring expressions by distance of cognitive antecedent in Tasks 1 and 2

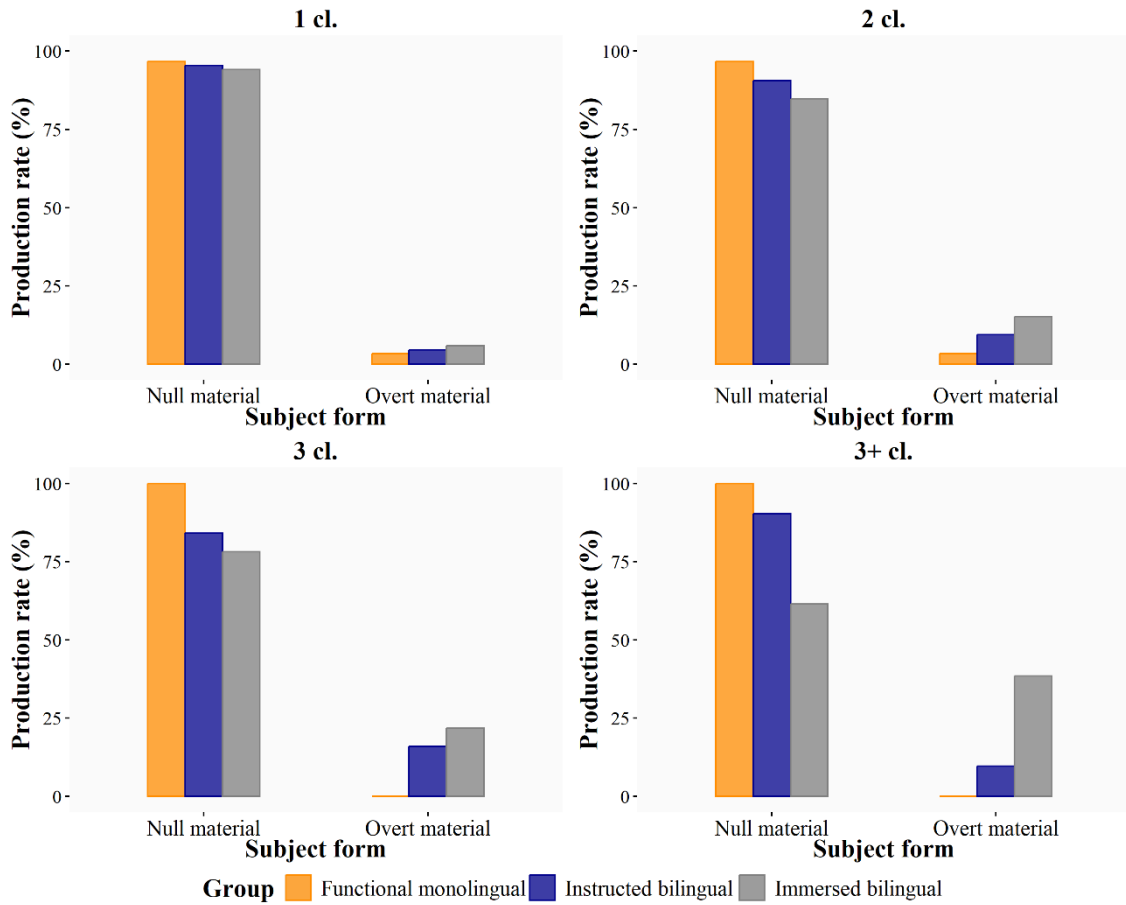


Table 27

Production of null and overt subject referring expressions by distance of cognitive antecedent in Tasks 1 and 2

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Null mat.	Overt mat.	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	96.7 (1251)	3.3 (43)	95.5 (3000)	4.5 (142)	94.1 (3815)	5.9 (241)
2 cl.	96.7 (87)	3.3 (3)	90.6 (154)	9.4 (16)	84.8 (217)	15.2 (39)
3 cl.	100 (10)	0 (0)	84.1 (37)	15.9 (7)	78.2 (61)	21.8 (17)
3+ cl.	100 (2)	0 (0)	90.3 (28)	9.7 (3)	61.5 (32)	38.5 (20)

When isolating the results from task 2 (see Figure 21 and Table 28), a very similar pattern is attested. Several of the aforementioned significant differences are maintained, i.e., between functional monolinguals and immersed bilinguals in the first scenario ($\chi^2 = 13.770, p < .001, h = .17$), and between instructed and immersed bilinguals ($\chi^2 = 5.037,$

$p = .025$, $h = .07$) and between functional monolinguals and immersed bilinguals in the second scenario ($\chi^2 = 7.919$, $p < .005$, $h = .54$).

Figure 21

Production of null and overt subject referring expressions by distance of cognitive antecedent in Task 2

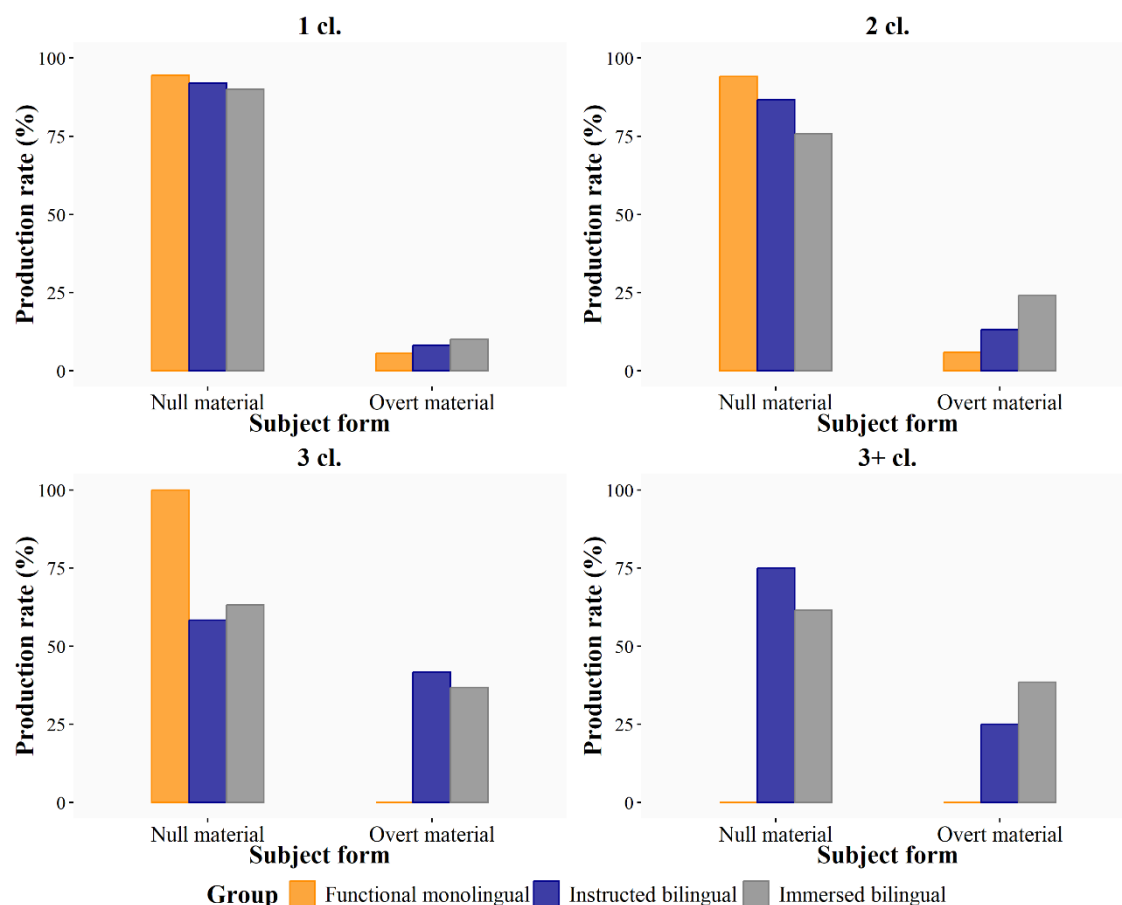


Table 28

Production of null and overt subject referring expressions by distance of cognitive antecedent in Task 2

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Null mat.	Overt mat.	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	94.5 (659)	5.5 (38)	92 (1528)	8 (132)	90 (2033)	10 (227)
2 cl.	94.1 (48)	5.9 (3)	86.8 (79)	13.2 (12)	75.8 (94)	24.2 (30)
3 cl.	100 (7)	0 (0)	58.3 (7)	41.7 (5)	63.2 (24)	36.8 (14)
3+ cl.	0 (0)	0 (0)	75 (8)	25 (2)	61.5 (16)	38.5 (10)

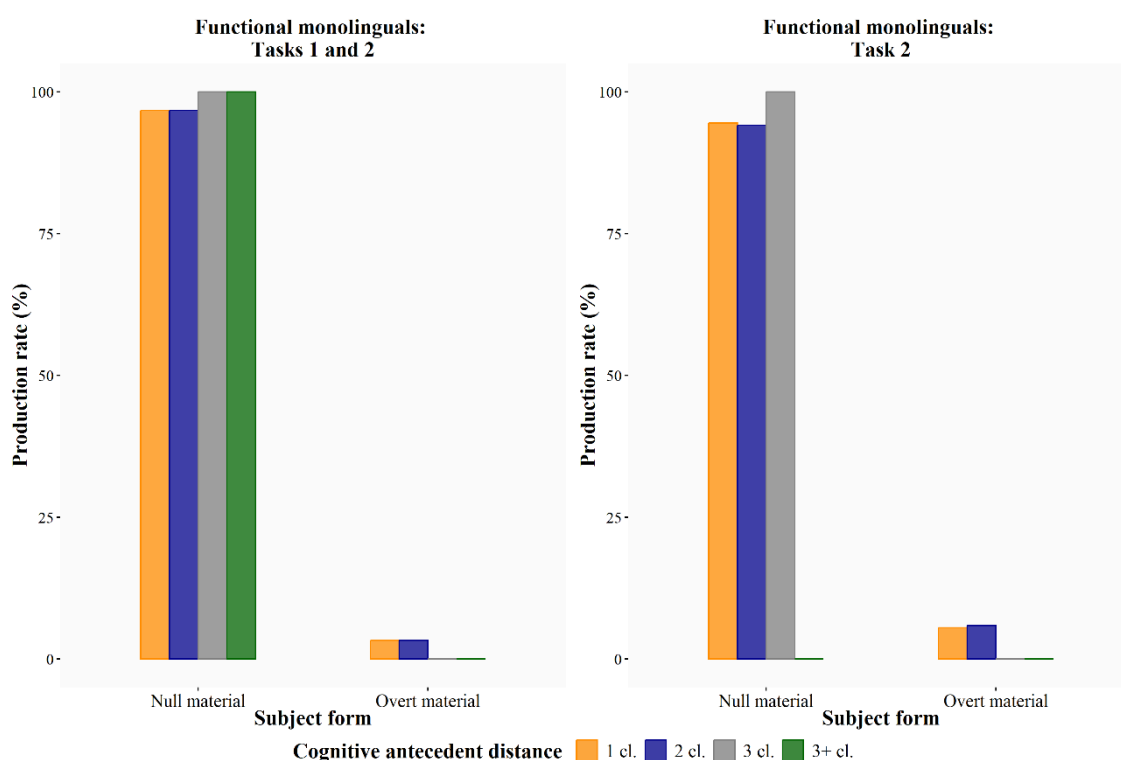
Nevertheless, in this second analysis, functional monolinguals are found to produce less overt forms than instructed bilinguals in contexts with close cognitive antecedents (1

clause away) ($\chi^2 = 4.584$, $p < .03$, $h = .1$). Moreover, instructed bilinguals exhibit significantly lower percentages of production of overt forms when compared to immersed bilinguals in contexts when the cognitive antecedent is 2 clauses away ($\chi^2 = 4.045$, $p = .04$, $h = .29$). Another significant difference is found between the distribution of overt and null material when comparing functional monolinguals and instructed bilinguals when the cognitive antecedent is 3 clauses apart ($\chi^2 = 3.958$, $p = .047$, $h = 1.4$), although the frequencies from functional monolinguals in this context are very scarce ($N = 7$) and this difference should be interpreted with caution. In general, bilinguals tend to resort to the use of more explicit subject REs largely with close cognitive antecedents when compared to functional monolinguals, a finding to which we will return in section 7.3.

Following the comparison across groups in each context, the following figures illustrate the patterns of production of null and overt subject REs by each group separately by cognitive antecedent distance. Firstly, as can be observed in Figure 22 and Table 29, functional monolinguals do not seem to produce more overt material with more distant cognitive antecedents. In fact, there are no significant differences between any of the conditions in the analysis with the two tasks and with Task 2 alone. It is important to mention that the frequencies of production of subject REs in contexts where the cognitive antecedent is 3 or more clauses apart are very limited ($N = 10$ and $N = 2$, respectively). However, no significant differences are observed between contexts in which the antecedent is 1 or 2 clauses apart.

Figure 22

Production of null and overt subject referring expressions by distance of cognitive antecedent in both tasks and Task 2 separately in functional monolinguals

**Table 29**

Production of null and overt subject referring expressions by distance of cognitive antecedent in both tasks and Task 2 separately in functional monolinguals

	Both tasks		Task 2	
	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	96.7 (1251)	3.3 (43)	94.5 (659)	5.5 (38)
2 cl.	96.7 (87)	3.3 (3)	94.1 (48)	5.9 (3)
3 cl.	100 (10)	0 (0)	100 (7)	0 (0)
3+ cl.	100 (2)	0 (0)	0 (0)	0 (0)

Regarding the patterns found in the oral production of instructed bilinguals (see Figure 23 and Table 30), observable differences emerge. A decrease in the production of null subject pronouns and a consequent increase in the use of overt forms can be appreciated as the cognitive antecedent becomes more distant. Crucially, instructed bilinguals produce significantly less overt forms in contexts when the cognitive antecedent is 1 clause apart compared to those where it is 2 clauses ($\chi^2 = 8.497, p = .003, h = .2$) or 3 clauses away ($\chi^2 = 12.627, p < .001, h = .39$). Furthermore, no significant difference was found between the production of overt material in contexts with distant cognitive

antecedents (3 vs. more than 3 clauses away). The results from task 2 are very similar although percentages of overproduction are higher, except for the fact that no significant difference is found between the first and second scenarios (1 vs. 2 clauses apart), although the difference approaches significance ($\chi^2 = 3.133, p < .08, h = .17$) and a further significant difference is exhibited between cognitive antecedents that are 2 vs. 3 clauses apart ($\chi^2 = 6.240, p = .01, h = .66$). Instructed bilinguals appear then to be sensitive to the distance between the cognitive antecedent and a subject RE in that they largely employ more overt material with more distant cognitive antecedents as originally hypothesised.

Figure 23

Production of null and overt subject referring expressions by distance of cognitive antecedent in both tasks and Task 2 separately in instructed bilinguals

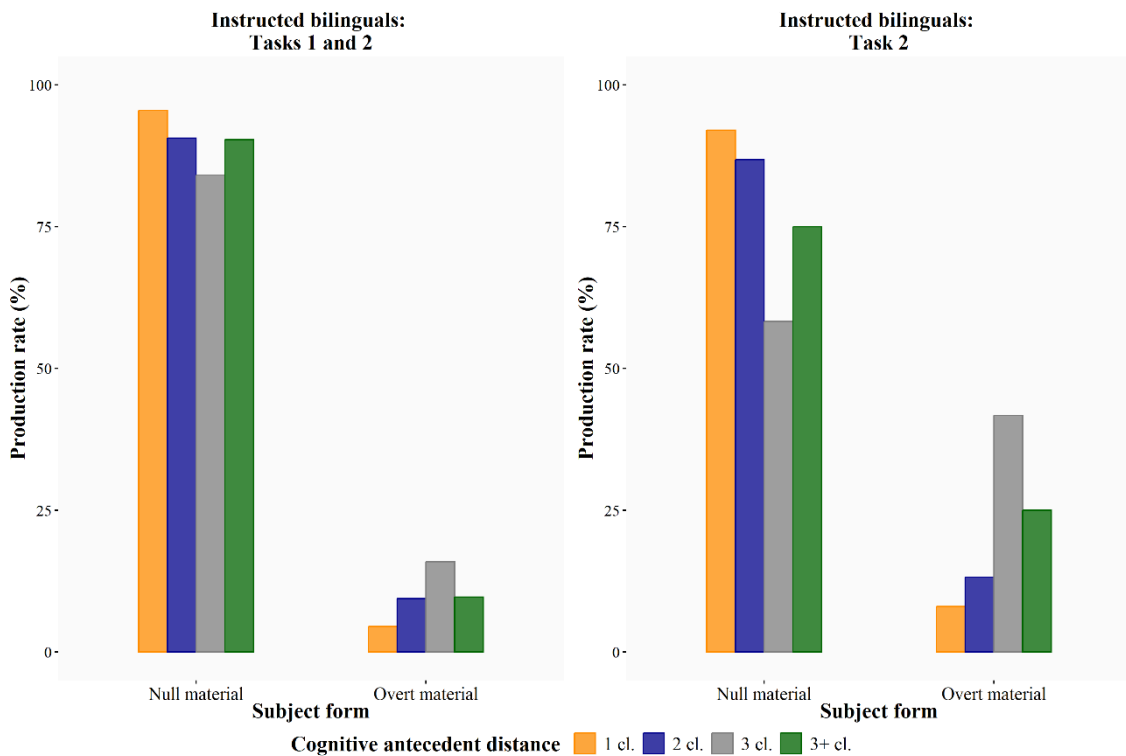


Table 30

Production of null and overt subject referring expressions by distance of cognitive antecedent in both tasks and Task 2 separately in instructed bilinguals

	Both tasks		Task 2	
	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	95.5 (3000)	4.5 (142)	92 (1528)	8 (132)
2 cl.	90.6 (154)	9.4 (16)	86.8 (79)	13.2 (12)
3 cl.	84.1 (37)	15.9 (7)	58.3 (7)	41.7 (5)
3+ cl.	90.3 (28)	9.7 (3)	75 (8)	25 (2)

Finally, the distribution patterns shown in Figure 24 and Table 31 are in line with the predictions formulated for the role played by cognitive antecedent distance. The production of overt REs increases when the cognitive antecedent is located further away from the subject RE that recovers it in immersed bilinguals.

Figure 24

Production of null and overt subject referring expressions by distance of cognitive antecedent in both tasks and Task 2 separately in immersed bilinguals

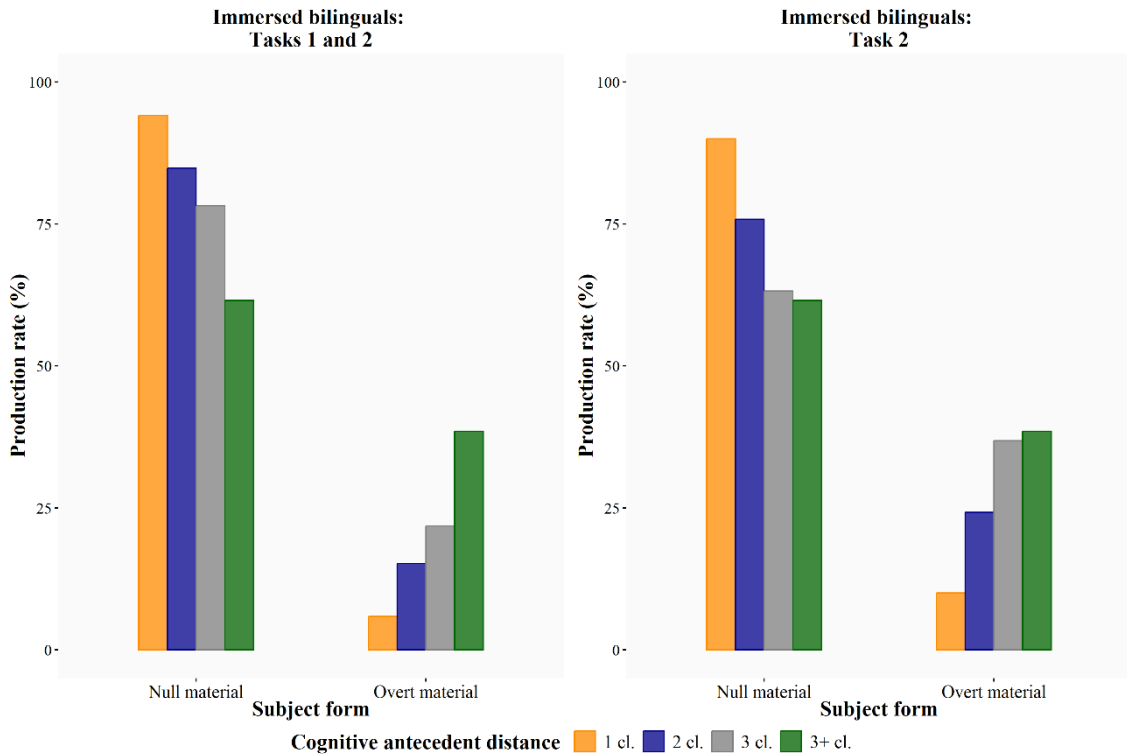


Table 31

Production of null and overt subject referring expressions by distance of cognitive antecedent in both tasks and Task 2 separately in immersed bilinguals

	Both tasks		Task 2	
	Null mat.	Overt mat.	Null mat.	Overt mat.
1 cl.	94.1 (3815)	5.9 (241)	90 (2033)	10 (227)
2 cl.	84.8 (217)	15.2 (39)	75.8 (94)	24.2 (30)
3 cl.	78.2 (61)	21.8 (17)	63.2 (24)	36.8 (14)
3+ cl.	61.5 (32)	38.5 (20)	61.5 (16)	38.5 (10)

Importantly, the production of overt REs increases as the distance between the RE and the cognitive antecedent becomes higher: 1 vs. 2 ($\chi^2 = 34.246, p < .001, h = .31$), 1 vs. 3 ($\chi^2 = 32.869, p < .001, h = .48$), or 1 vs. more than 3 clauses apart ($\chi^2 = 91.256, p < .001$,

$h = .85$). In addition, a significant increase in the production of overt subject REs is also found when comparing contexts with distant cognitive antecedents, i.e., 3 vs. more than 3 ($\chi^2 = 4.257, p = .04, h = .37$). When focusing on the results from Task 2 alone, the only one of the aforementioned contrasts that does not reach significance is the latter. Hence, the production of explicit subject REs in immersed bilinguals is shown to be highly influenced by the distance between the cognitive antecedent and a given subject RE.

Taken together, the findings from a variable such as cognitive antecedent distance appear to point in the direction that this proves to be a highly constraining factor in the selection of subject RE, and primarily, in the oral production of advanced bilinguals, both instructed and immersed. It is also worth mentioning that when comparing the use of more explicit subject REs by group, instructed and immersed bilinguals are shown to produce more explicit REs than functional monolinguals even when the cognitive antecedent is located either 1 or 2 clauses away from its corresponding RE. This might indicate that bilinguals are generally more explicit in some contexts when compared to functional monolinguals, a finding to which we will return in section 7.3.

7.2.3.2 Syntactic configuration

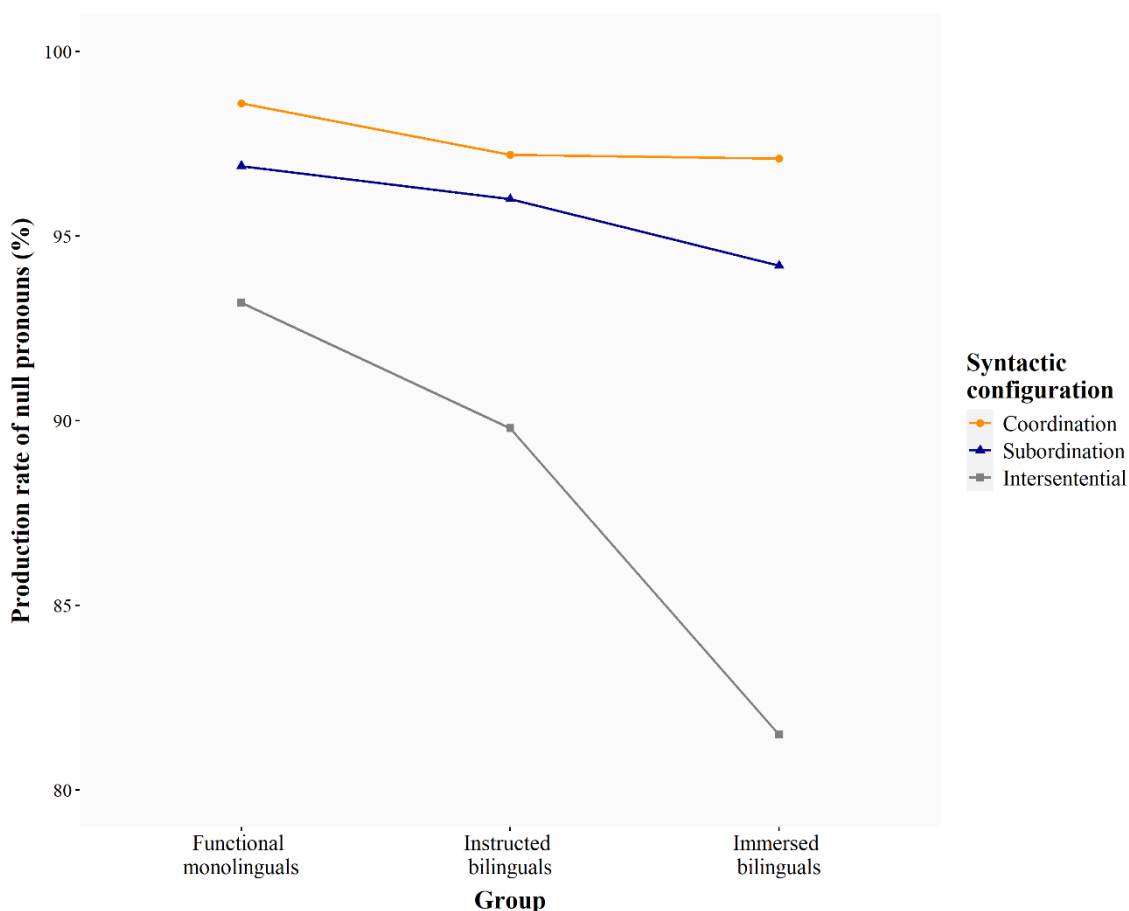
The second part of RQ2 addressed whether differences in the selection of either null or overt subject REs would be motivated by the specific syntactic configuration in which the RE is embedded. Contexts involving coreferential coordination have been found to be rather analogous in Spanish and in English in that the use of overt forms is largely unattested and null subject REs are predominantly employed (see section 3.2.3). This pattern is not found elsewhere in English considering the use of 3rd person singular REs. Thus, different syntactic contexts were tagged to investigate whether less overt material and thus more null subject pronouns would be encoded in coreferential coordination as opposed to other contexts such as subordination or intersentential contexts, excluding coordination in the latter. As illustrated in Figure 25 and Table 32, null pronouns are mainly produced in scenarios involving coreferential coordination in all three groups (functional monolinguals = 98.6%, instructed bilinguals = 97.2%, and immersed bilinguals = 97.1%), as illustrated in example 77.

77. *La mujer vuelve al carrito y Ø ve al segundo bebé.* [ES_SP_28_14_AFU]
(Immersed bilingual)

‘The woman goes back to her pram and sees the second baby’.

Figure 25

Production of subject referring expressions by syntactic configuration across groups



Note. The y axis represents values from 80-100 for ease of visualisation.

Table 32

Production of subject referring expressions by syntactic configuration across groups

	Functional monolinguals	Instructed bilinguals	Immersed bilinguals
Coordination	98.6 (615)	97.2 (1426)	97.1 (2018)
Subordination	96.9 (408)	96 (1074)	94.2 (1334)
Intersentential	93.2 (327)	89.8 (719)	81.5 (773)

The following context where more null subject pronouns are used are subordination scenarios (96.9%, 96%, and 94.2%, respectively). Intersentential syntactic configurations, illustrated in example 78, are typically characterised as being the context of the three analysed where less null material and thus more overt material is employed in TC (93.2%, 89.8%, and 81.5%, respectively), and where larger differences are indeed found between the three groups.

78. *Aparece un policía. Entonces el policía*i* piensa que [...].* [ES_SP_24_14_JMJC]
(Instructed bilingual)

‘A policeman appears. Then the policeman thinks that [...].

Focusing on group differences, functional monolinguals and instructed bilinguals are not shown to differ in any of the three scenarios investigated. When comparing the former with immersed bilinguals, significant differences emerge in coordinated ($\chi^2 = 4.027, p = .04, h = .1$), intersentential ($\chi^2 = 26.672, p < .001, h = .36$), and subordination contexts ($\chi^2 = 4.835, p < .05, h = .13$). Moreover, a comparison of the two bilingual groups also yields significant differences in two of such contexts, i.e., intersentential ($\chi^2 = 23.418, p < .001, h = .24$) and subordination scenarios ($\chi^2 = 4.113, p = .04, h = .08$).

Finally, it is worth mentioning that a final analysis explored whether differences between the null subject pronouns used in the three syntactic configurations analyses surfaced by each specific group. Firstly, the null subject pronouns produced by functional monolinguals differed significantly when comparing contexts involving coreferential coordination and intersentential ones ($\chi^2 = 19.997, p < .001, h = .29$), and the latter and subordination contexts ($\chi^2 = 5.898, p = .02, h = .18$). These same significant differences were found in instructed bilinguals: coreferential coordination vs. intersentential contexts ($\chi^2 = 55.950, p < .001, h = .32$), and intersentential vs. subordination contexts ($\chi^2 = 29.199, p < .001, h = .25$). In the group of immersed bilinguals, the production of null subjects in TC in the three syntactic scenarios analysed differed significantly: coreferential coordination vs. subordination contexts ($\chi^2 = 18.210, p < .001, h = .15$), coreferential coordination vs. intersentential contexts ($\chi^2 = 220.401, p < .001, h = .55$), and intersentential vs. subordination contexts ($\chi^2 = 94.060, p < .001, h = .4$). As a summary, it becomes clear that the context that triggers a higher production of more explicit REs in TC are intersentential contexts and this holds for the three groups.

On another note, following previous studies that have investigated different types of subordination scenarios, i.e., subordinated clauses where the subject RE is found in the main or the subordinate clause, it is worth further scrutinising them. Importantly, in relation to the PAS, several authors have investigated whether clearer subject-null and object-overt associations are found in main-subordinate or subordinate-main configurations (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015, 2018; de Rocafiguera & Bel, 2022). Therefore, in terms of production, this would mean that one of the two contexts would trigger the use of more null subject pronouns in TC, which are

the contexts analysed in this dissertation in the production task. However, given that the accumulated evidence to date is still inconclusive in relation to the role played by clause order, we present data on the production of null subject pronouns in the two types of subordinated configurations analysed as Figure 26 and Table 33 illustrate to further contribute to this question. Along these lines, all groups are shown to produce null subject pronouns more predominantly in contexts where a given subject RE appears in the main clause (functional monolinguals = 98.3%, instructed bilinguals = 98.2%, and immersed bilinguals = 97.8%), as illustrated in example 79, compared to scenarios where it appears in its subordinate counterpart (functional monolinguals = 96.4%, instructed bilinguals = 95%, and immersed bilinguals = 92.9%). Crucially, when the three groups are evaluated in the two conditions, the only significant difference surfaces between functional monolinguals and immersed bilinguals when the subject RE appears in the subordinate clause ($\chi^2 = 4.880$, $p < 0.05$, $h = .1$), which means that the latter use significantly more explicit REs.

79. *Cuando Chaplin_i se va a meter en la casa, Ø_i mete el pie en la pecera.*
[ES_SP_19_14_AAPL] (Instructed bilingual)

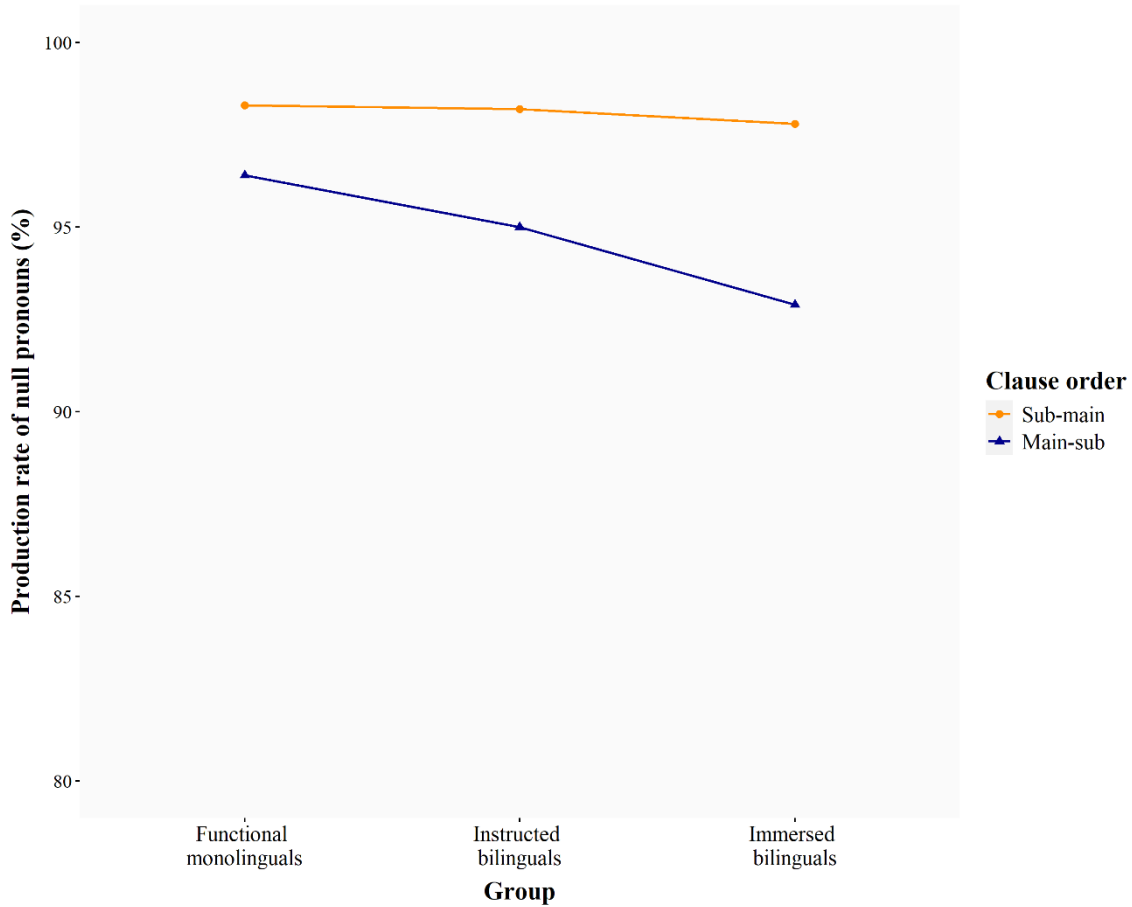
‘When Chaplin is going to enter the house, he puts his foot in the fish tank’.

On a final note, another interesting finding shown in Figure 26 relates to the potential significant differences found in the use of null pronouns in the two types of subordinated contexts¹²⁶ explored in each of the groups separately. While there are no significant differences in the two contexts in the group of functional monolinguals, the two bilingual groups produce significantly more null pronouns when the subject RE is inserted in the main clause: instructed bilinguals ($\chi^2 = 5.996$, $p = .01$, $h = .18$) and immersed bilinguals ($\chi^2 = 12.173$, $p < .001$, $h = .24$). Overall, the findings point in the direction that null pronouns are more frequently employed when they are inserted in main clauses as opposed to subordinate ones, a finding that we will further address in section 7.3.

¹²⁶ Given that the frequencies of *cuando* ‘when’ and *mientras* ‘while’ sentences were not very high and rather imbalanced, a decision was made not to further analyse this factor within this dissertation in this task. However, we believe that such an analysis will provide additional information as to the relationship between the modulating role of different subordinating conjunctions in both the production and interpretation of subject REs, which is indeed addressed in the interpretation task in Chapter 8.

Figure 26

Production of subject referring expressions by subordination type across groups



Note. The y axis represents values from 80-100 for ease of visualisation.

Table 33

Production of subject referring expressions by subordination type across groups

	Functional monolinguals	Instructed bilinguals	Immersed bilinguals
Subordinate-main	98.3 (113)	98.2 (326)	97.8 (363)
Main-subordinate	96.4 (295)	95 (748)	92.9 (971)

7.2.3.3 Number of potential antecedents

Another factor that has been found to trigger the use more explicit material in subject position and which has been included in RQ2 is the number of potential antecedents (Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021; T. Quesada & Lozano, 2020; Torregrossa et al., 2015, 2019). Previous research has considered what have been referred to as activated antecedents, that is, all referents that are mentioned either explicitly or implicitly within a number of clauses prior to a given subject RE.

Intervening antecedents have also been analysed, understood as the referents that appear or intervene between a given RE and its antecedent. The idea behind exploring whether a higher number of potential antecedents is associated with a higher production of explicit forms is related to the competition that several activated antecedents might create in the selection of an explicit RE to recover a potential referent in subject position.

7.2.3.3.1 Number of activated antecedents

Considering the above, Figure 27 and its corresponding Table 34 display how overt material distributes in TC considering the number of activated antecedents within the last four clauses prior to a given subject RE, counting both finite and non-finite clauses. Notably, a very clear pattern emerges in the first part (left) of this figure¹²⁷: all groups mostly produce a higher number of overt forms as the number of activated antecedents increases (functional monolinguals: 1%, 4.6%, 6.5%, and 9.8%; instructed bilinguals: 1.5%, 6.7%, 11.5%, and 9.8%; and immersed bilinguals: 3.4%, 8.4%, 13.8%, and 14.6%), as illustrated in examples 80 and 81.

80. (*Chaplin*) Ø_i *Vuelve a salir.* Ø_i *Cierra la ventana y* Ø_i *se acerca a la puerta.*
[ES_SP_27_15_FGB] (Immersed bilingual) – 1 activated antecedent (*Chaplin*)

‘(*Chaplin*) goes out again. (He) closes the window and approaches the door’.

81. *La señora_i insiste en que Chaplin_j se lo_k vuelva a llevar. Después de eso, Chaplin_j intenta librarse del bebé.* [ES_SP_25_14_JM] (Immersed bilingual) – 3 activated antecedents (the woman, *Chaplin*, and the baby)

‘The woman insists that *Chaplin* take him back. *Chaplin* tries to get rid of the baby’.

In fact, functional monolinguals’ production of overt forms is significantly higher when comparing contexts with 1 activated antecedent vs. 2 ($\chi^2 = 12.945, p < .001, h = .23$), 3 ($\chi^2 = 25.530, p < .001, h = .31$), or more than 3 ($\chi^2 = 33.322, p < .001, h = .43$). No other contrasts reach significance in the analysis of functional monolinguals. In the two bilingual groups, the aforementioned significant differences were also attested (instructed bilinguals: 1 vs. 2 ($\chi^2 = 43.551, p < .001, h = .28$), 1 vs. 3 ($\chi^2 = 130.923, p < .001, h = .45$), and 1 vs. more than 3 ($\chi^2 = 58.696, p < .001, h = .39$); immersed bilinguals: 1 vs. 2

¹²⁷ The role of the number of activated antecedents is first explored considering all syntactic contexts (first part) and then excluding those that involve coreferential coordination (second part). After confirming that contexts involving coreferential coordination have been found to be almost exclusively encoded via null pronouns in the production tasks analysed, the role of the number of activated antecedents is investigated in the rest of contexts where more overt forms are attested to explore the findings replicate.

($\chi^2 = 34.001, p < .001, h = .22$), 1 vs. 3 ($\chi^2 = 128.153, p < .001, h = .39$), and 1 vs. more than 3 ($\chi^2 = 68.469, p < .001, h = .41$). Additional differences were found between contexts with 2 and 3 activated antecedents in both instructed ($\chi^2 = 7.932, p = .005, h = .17$) and immersed bilinguals ($\chi^2 = 12.305, p = .001, h = .17$). The overt forms employed in contexts with 3 or more than 3 activated antecedents do not significantly differ in any of the three groups, which seems to suggest that contexts with 3 or more than 3 activated antecedents might be equally demanding.

Figure 27

Production of overt subject referring expressions by number of activated antecedents across groups

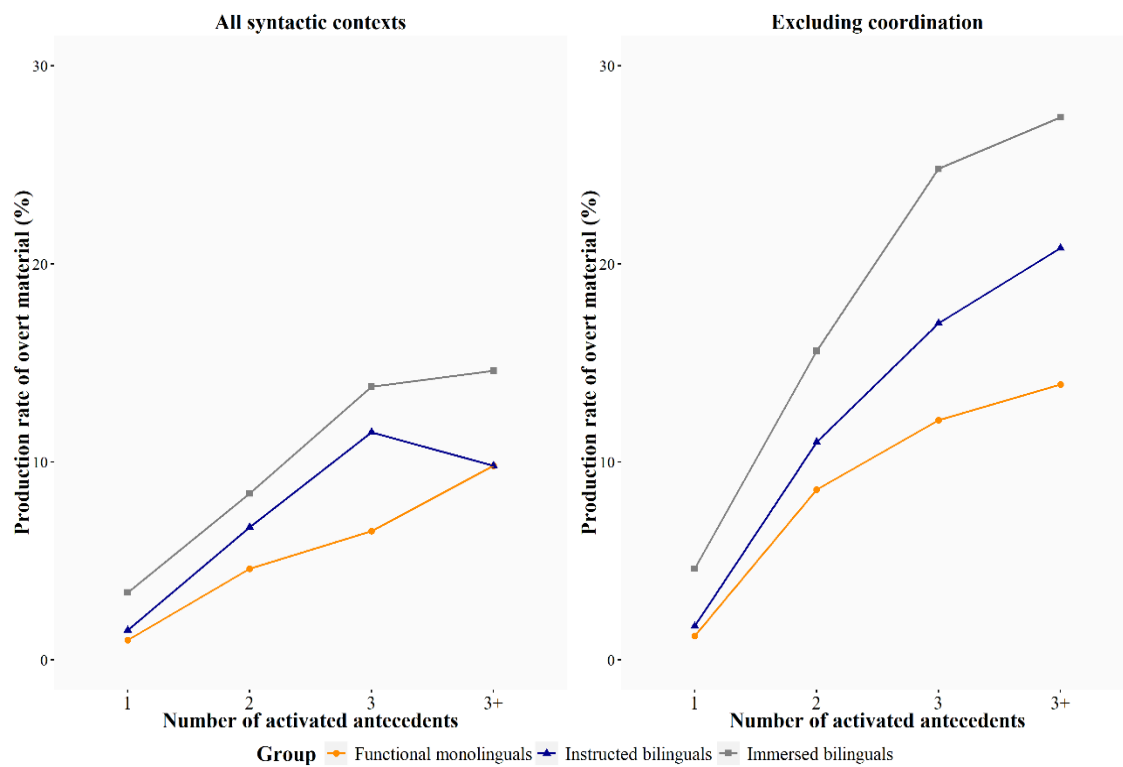


Table 34

Production of overt subject referring expressions by number of activated antecedents across groups

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	All contexts	Without coord.	All contexts	Without coord.	All contexts	Without coord.
1 act. ant.	1 (8)	1.2 (6)	1.5 (29)	1.7 (21)	3.4 (83)	4.6 (68)
2 act. ant.	4.6 (11)	8.6 (10)	6.7 (34)	11 (27)	8.4 (64)	15.6 (57)
3 act. ant.	6.5 (18)	12.1 (16)	11.5 (84)	17 (64)	13.8 (133)	24.8 (103)
3+ act. ant.	9.8 (9)	13.9 (5)	9.8 (21)	20.8 (15)	14.6 (37)	27.4 (29)

It is also worth mentioning that the second part of Figure 27 (right) presents the number of overt REs produced by the number of activated antecedents without considering contexts involving coreferential coordination. As addressed above, contexts involving coreferential coordination are almost exclusively encoded through the use of null pronouns (see Figure 25) and hence, very few overt forms are employed, which might make the exploration of the role of activated antecedents more difficult. After depicting the overt forms used in TC in all contexts but in coordinated scenarios, it is visually salient that all groups resort to a higher production of overt forms as the number of activated antecedents increases. The same significant differences that have been reported for all contexts are maintained when excluding coreferential coordination contexts in all groups. Therefore, the effect of an increase in the presence of activated antecedents becomes notable regardless of the context in which a given subject RE is embedded, even though the pattern is more noticeable without considering coreferential coordination.

When comparing the proportion of overt forms used by the three groups in each of the specific contexts separately, i.e., with 1, 2, 3 and more than 3 activated antecedents, significant differences are found when analysing all syntactic configurations between functional monolinguals and immersed bilinguals ($\chi^2 = 12.090$, $p < .001$, $h = .17$) and instructed and immersed bilinguals ($\chi^2 = 15.297$, $p < .001$, $h = .12$) in contexts with 1 potential antecedent, and between functional monolinguals and instructed bilinguals ($\chi^2 = 5.677$, $p < .02$, $h = .18$) and the former and immersed bilinguals ($\chi^2 = 11.003$, $p < .001$, $h = .25$) in contexts with 3 activated antecedents. While the differences attested in scenarios with 1 activated antecedent and that between functional monolinguals and immersed bilinguals in those with 3 activated antecedents are replicated in the analysis that excludes coreferential coordination contexts, a further significant difference in the production of overt forms is found between instructed and immersed bilinguals in the presence of 3 activated antecedents ($\chi^2 = 7.207$, $p = .007$, $h = .19$). In relation to the analysis by groups, it is worth noticing that immersed bilinguals are largely more explicit than the other two groups, and particularly in contexts with 1 activated antecedent, which means that they use significantly more explicit REs in the least demanding contexts and where ambiguity is not necessarily at stake, a finding that deserves further attention and which will be addressed in section 7.3.

All in all, an increase in the presence of activated antecedents is a very clear factor in determining the employment of more explicit subject material in TC in the three groups

investigated. Such a pattern is found both when exploring all contexts as well as when coreferential coordination is excluded, although such a pattern is more emphasised in the second analysis. Furthermore, it is important to mention that immersed bilinguals are the group that exhibits a significantly higher overproduction of overt forms in the least challenging scenarios, i.e., those where there is only 1 activated antecedent, which coincides with the referent recovered by a given RE and where there is no ambiguity.

7.2.3.3.2 Number of intervening antecedents

Turning now to the role played the number of intervening antecedents between a given RE and its antecedent, a general increase in the use of overt forms can be observed as illustrated in Figure 28 and Table 35 (functional monolinguals: 2.7%, 4.8%, and 5.4%; instructed bilinguals: 3.8%, 8.2%, and 10.9%; and immersed bilinguals: 6%, 10.6%, and 9.2%). In spite of the visual trend, significant differences between the three contexts are only confirmed when comparing scenarios with no and 1 intervening antecedent in instructed ($\chi^2 = 25.775, p < .001, h = .19$) and immersed bilinguals ($\chi^2 = 25.628, p < .001, h = .17$), and when comparing no and 2 intervening antecedents in the former ($\chi^2 = 5.970, p = .01, h = .28$). If coreferential coordination is not included in the analysis as done with activated antecedents (see Figure 27 above) given the high proportion of null pronouns that have been observed in such contexts, the highest production of overt material is found in contexts with 1 intervening antecedent in the three groups explored (functional monolinguals: 3.6%, 8.5%, and 6.3%; instructed bilinguals: 4.6%, 15.2%, and 10%; and immersed bilinguals: 8.5%, 21%, and 9.5%). Notably, the production of overt material is significantly higher in such analysis when comparing scenarios with no and 1 intervening antecedent in functional monolinguals ($\chi^2 = 7.155, p = .008, h = .21$), instructed ($\chi^2 = 53.869, p < .001, h = .37$) and immersed bilinguals ($\chi^2 = 59.303, p < .001, h = .36$). Taking the above into consideration, contexts with 1 intervening antecedent, illustrated in example 82, largely require the use of more explicit forms in all groups and are then taken to be the most cognitively challenging. Nevertheless, it is worth mentioning that contexts with 2 intervening antecedents are very scarce (see Table 35), which might explain the potential lack of significant differences attested.

82. *La mujer_i le_j dice que Ø_j se lleve al niño_k. Chaplin_j decide llevárselo.*
 [ES_SP_20_14_MMC] (Functional monolingual) – 1 intervening antecedent (the baby)

‘The woman asks him to take the baby. Chaplin decides to take him’.

Figure 28

Production of overt subject referring expressions by number of intervening antecedents across groups

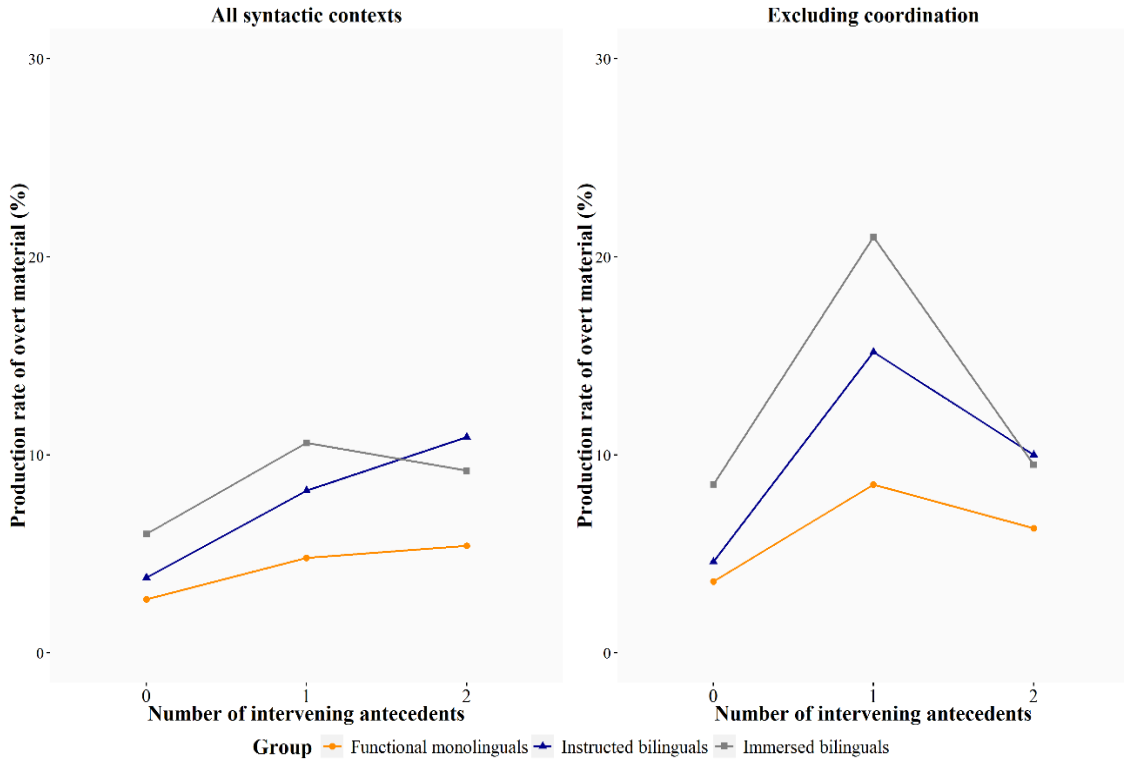


Table 35

Production of overt subject referring expressions by number of intervening antecedents across groups

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	All contexts	Without coord.	All contexts	Without coord.	All contexts	Without coord.
0 int. ant.	2.7 (27)	3.6 (21)	3.8 (96)	4.6 (70)	6 (201)	8.5 (160)
1 int. ant.	4.8 (17)	8.5 (15)	8.2 (67)	15.2 (55)	10.6 (109)	21 (95)
2 int. ant.	5.4 (2)	6.3 (1)	10.9 (5)	10 (2)	9.2 (6)	9.5 (2)

The analysis between groups by number of intervening antecedents reveals significant differences with no intervening antecedents between functional monolinguals and immersed bilinguals and between instructed and immersed bilinguals both when including all syntactic configurations ($\chi^2 = 17.005, p < .001, h = .17$; $\chi^2 = 14.422, p < .001, h = .1$, respectively) and when excluding those involving coreferential coordination ($\chi^2 = 15.320, p < .001, h = .21$; $\chi^2 = 20.631, p < .001, h = .16$, respectively). Furthermore,

the production of overt material is shown to be significantly lower in functional monolinguals when compared to instructed and immersed bilinguals with 1 intervening antecedent in the first and second analysis, respectively (all syntactic configurations in functional monolinguals vs. instructed bilinguals: $\chi^2 = 4.397$, $p = .03$, $h = .14$; and functional monolinguals vs. immersed bilinguals: $\chi^2 = 10.939$, $p < .001$, $h = .22$; coreferential coordination excluded in functional monolinguals vs. instructed bilinguals: $\chi^2 = 4.656$, $p = .03$, $h = .21$; and functional monolinguals vs. immersed bilinguals: $\chi^2 = 13.689$, $p < .001$, $h = .36$). Moreover, instructed and immersed bilinguals are found to produce significantly different overt forms in scenarios with 1 intervening antecedent when the analysis excludes coreferential coordination ($\chi^2 = 4.536$, $p = .03$, $h = .15$).

It is worth mentioning that the overall pattern that emerges highlights that the most challenging context in the tasks analysed and the one that is associated with a higher production of overt forms is the one with one intervening antecedent in all three groups, which becomes more noticeable in the analysis that does not include coreferential coordination. It might appear that one intervening antecedent might be sufficient to trigger the use of more explicit material between a given subject RE and its antecedent. However, considering the low frequencies of production of contexts with 2 intervening antecedents (see Table 35), future studies should further address this in a more controlled design to further corroborate or disconfirm these findings. Furthermore, both groups of bilinguals largely employ more overt subject forms in arguably nondemanding contexts such as those where there are no intervening antecedents, which might suggest that bilinguals are more redundant than functional monolinguals. In addition, in the most challenging contexts for all groups in the present task analysed (i.e., those with 1 intervening antecedent), bilinguals exhibit higher proportions of overt subject REs when compared to functional monolinguals, which could reflect their preference for the use of more explicit material in an attempt to avoid potential ambiguity. This later finding will be further developed in relation to the PPVH in section 7.3.

7.2.3.4 Gender of activated/intervening antecedents

Having explored some of the factors that trigger the overuse of overt forms (i.e., overt pronouns and NPs), let us consider now whether the gender of activated and intervening antecedents determines the type of overt material that is employed in TC. As argued in

previous studies (e.g., Lozano, 2016; Martín-Villena & Lozano, 2020), overt pronouns are more predominantly used in contexts when the antecedents do not match in gender since they are sufficient to disambiguate, as illustrated in example 83.

83. (*Chaplin*) \emptyset_i Encuentra en el suelo un bebé_j. Entonces **él**_i coge al bebé_j.
[ES_SP_29_14_AFF] (Immersed bilingual) – 2 same-gender activated antecedents
(Chaplin and the baby)

‘Chaplin finds a baby on the floor. Then he takes the baby’.

By contrast, in scenarios with same-gender antecedents (see 84), given that the use of an overt pronoun would lead to ambiguity, an NP would be rather favoured.

84. (*Chaplin*) \emptyset_i Pasa cerca de donde está la señora_j. Entonces **la señora**_j cree que ha sido **él**_i [...] [ES_SP_22_14_AMBP] (Functional monolingual) – 2 different-gender activated antecedents (Chaplin and the woman)

‘Chaplin is walking close to where the woman is. Then the woman thinks that he [...]’.

To explore this, Figure 29 and Table 36 display the proportion of overt pronouns and NPs in contexts with 2 activated antecedents with the same or different gender. Interestingly, NPs are the most frequent form produced in both contexts: 2 same-gender antecedents (functional monolinguals: 55.6%, instructed bilinguals: 61.3%, and immersed bilinguals: 70.2%) and 2 different-gender antecedents (functional monolinguals: 100%, instructed bilinguals: 66.7%, and immersed bilinguals: 100%). Regarding overt pronouns, they appear to be more predominantly used in contexts with 2 same-gender antecedents (functional monolinguals: 44.4%, instructed bilinguals: 38.7%, and immersed bilinguals: 29.8%) as opposed to those where the 2 activated antecedents differ in gender (functional monolinguals: 0%, instructed bilinguals: 33.3%, and immersed bilinguals: 0%). Despite this overall trend, it is important to highlight that the frequencies of production in the latter contexts are very low (functional monolinguals: 2, instructed bilinguals: 3, and immersed bilinguals: 7) and therefore, inferential statistics were not performed, and percentages should be cautiously interpreted. However, by focusing on the results presented in Figure 29 and Table 36, while a higher percentage of NPs is shown in scenarios with 2 different-gender antecedents, in line with the initial prediction, the trend observed with overt pronouns goes against previous findings. A more frequent production

of overt pronouns is attested in contexts with 2 same-gender antecedents, which would hypothetically lead to ambiguity.

Figure 29

Production of overt subject referring expressions by gender of 2 activated antecedents

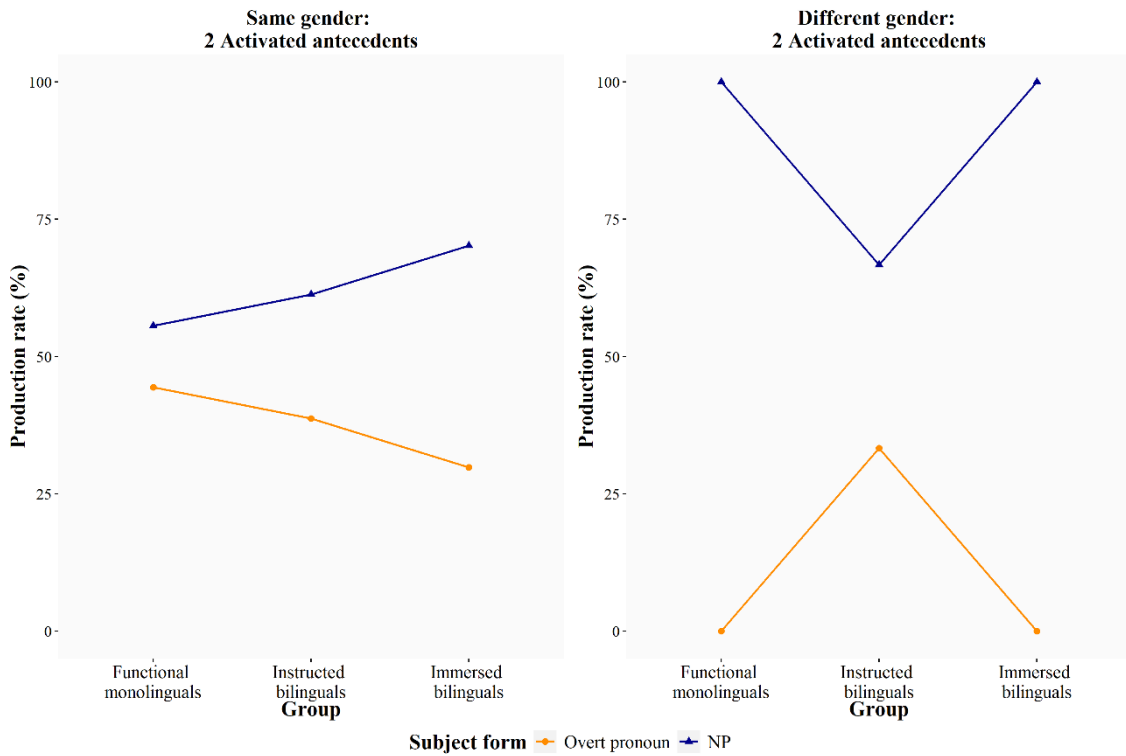


Table 36

Production of overt subject referring expressions by gender of 2 activated antecedents

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Same gen.	Diff. gen.	Same gen.	Diff. gen.	Same gen.	Diff. gen.
NP	55.6 (5)	100 (2)	61.3 (19)	66.7 (2)	70.2 (40)	100 (7)
Overt pr.	44.4 (4)	0 (0)	38.7 (12)	33.3 (1)	29.8 (17)	0 (0)

When exploring contexts with 3 same-gender activated antecedents and those where they differ in gender, a similar trend emerges (see Figure 30 and Table 37). The production of NPs is higher in both scenarios: 3 antecedents sharing gender features (functional monolinguals: 87.5%, instructed bilinguals: 72.9%, and immersed bilinguals: 79%) vs. those where there is a mismatch (functional monolinguals: 80%, instructed bilinguals: 75%, and immersed bilinguals: 76.3%). The proportion of overt pronouns is lower in both contexts (functional monolinguals: same 12.5% vs. different 20%; instructed bilinguals: same 27.1% vs. different 25%; and immersed bilinguals: same 21% vs. different 23.7%).

In this analysis, nevertheless, a higher production of NPs would be expected given that in contexts with 3 activated antecedents with different gender, there are always 2 out of the 3 that match in gender, and therefore, an NP would be preferred to avoid potential ambiguity. Additionally, the inferential statistics report no significant differences in any of the contexts in any of the groups¹²⁸ and thus, NPs are more predominantly employed in both scenarios in an attempt to avoid potential ambiguity.

Figure 30

Production of overt subject referring expressions by gender of 3 activated antecedent

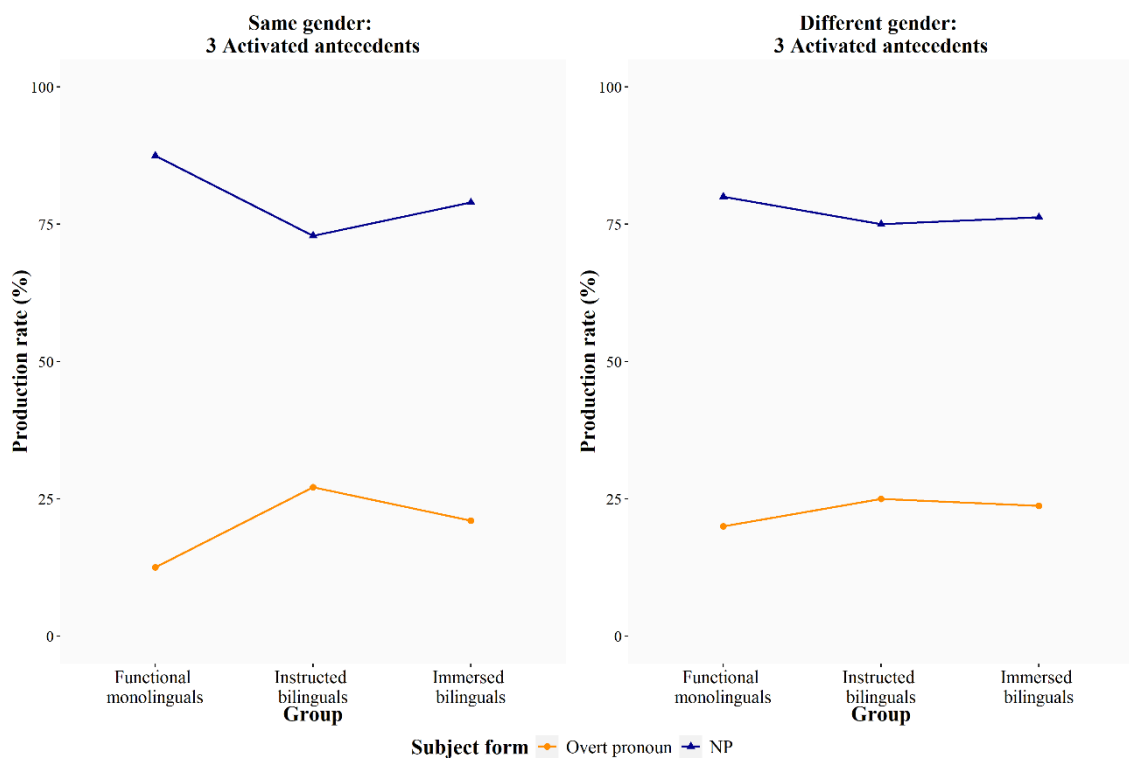


Table 37

Production of overt subject referring expressions by gender of 3 activated antecedents

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Same gen.	Diff. gen.	Same gen.	Diff. gen.	Same gen.	Diff. gen.
NP	87.5 (7)	80 (8)	72.9 (35)	75 (27)	79 (45)	76.3 (58)
Overt pr.	12.5 (1)	20 (2)	27.1 (13)	25 (9)	21 (12)	23.7 (18)

¹²⁸ Despite the low frequencies in the functional monolinguals, the trend observed is the same as the one found in the two bilingual groups.

On another note, a final analysis explores whether the gender of an intervening antecedent¹²⁹ can account for the distribution of overt forms in TC. As Figure 31 and Table 38 exhibit, NPs are mainly produced when the intervening antecedent matches (functional monolinguals: 73.3%, instructed bilinguals: 66.1%, and immersed bilinguals: 70.2%) or does not match in gender with a given RE (functional monolinguals: 100%, instructed bilinguals: 50%, and immersed bilinguals: 73.3%).

Figure 31

Production of overt subject referring expressions by gender of 1 intervening antecedent

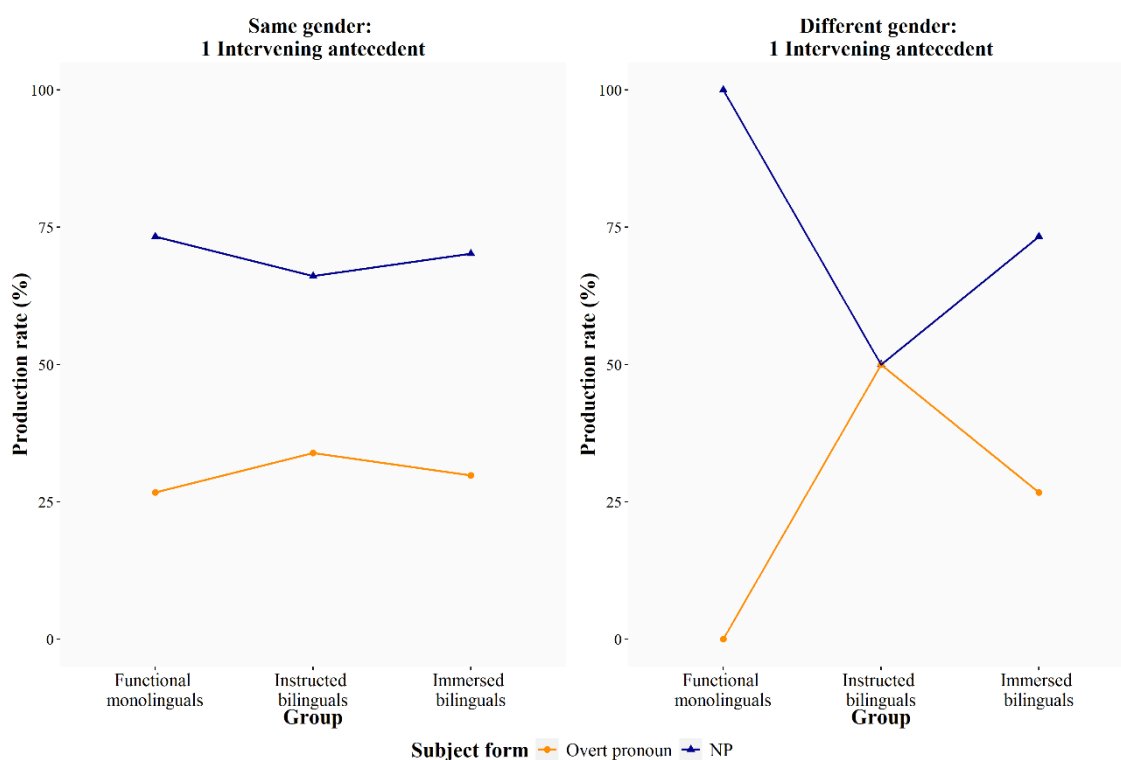


Table 38

Production of overt subject referring expressions by gender of 1 intervening antecedent

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Same gend.	Diff. gend.	Same gend.	Diff. gend.	Same gend.	Diff. gend.
NP	73.3 (11)	100 (2)	66.1 (39)	50 (4)	70.2 (66)	73.3 (11)
Overt pr.	26.7 (4)	0 (0)	33.9 (20)	50 (4)	29.8 (28)	26.7 (4)

¹²⁹ Even though other scenarios such as those with 2 and 3 intervening antecedents and their gender were tagged, such analyses are not further developed since some groups did not produce any instances of overt material in such contexts and where some overt forms are attested, they only amounted to 4 instances in total.

All three groups resort to the use of overt pronouns in both contexts more infrequently (match - functional monolinguals: 26.7%, instructed bilinguals: 33.9%, and immersed bilinguals: 29.8%/ mismatch - functional monolinguals: 0%, instructed bilinguals: 50%, and immersed bilinguals: 26.7%). Nonetheless, it should be highlighted that the frequencies of the latter contexts are considerably lower in the three groups (2, 8, and 15, respectively) and no further statistical analyses were performed. What can be observed even though the figures are low and thus, results should be cautiously interpreted, is that NPs are the most attested overt form used in both scenarios, and therefore, none of the groups are more likely to encode TC using overt pronouns when the gender of the intervening antecedent and that of the RE analysed is different. In such contexts, an overt subject pronoun would be sufficient to disambiguate, and it would thus be the most felicitous form.

All in all, the gender of activated and intervening antecedents does not modulate the production of different overt forms (i.e., overt pronouns and NPs) in TC in any of the three groups analysed. In general, NPs are predominant over overt pronouns irrespective of the gender (mis)match of the antecedents, and hence, the prediction that overt pronouns would be more likely to be found in gender mismatch contexts was not fully met. Furthermore, it should be noted that no inferential statistics could be provided considering the low frequencies of overt forms produced in some contexts, and therefore, these results remain rather qualitative in nature and future research should address this factor in a more controlled fashion.

7.2.4 Summary of production results

Having presented the results from the two oral production tasks, it has been found that the most frequently employed subject REs in TC are null pronouns. Even though the production of null pronouns is considerable in both tasks, there is a very clear significant difference between the two in that significantly more overt material is employed in the three groups in Task 2, i.e., where Chaplin intervenes with other characters with the same or different gender. In addition, whereas no differences are found between the production of null pronouns in Task 1 between the three groups, a clearly differentiated pattern is attested between the three groups in Task 2 and when considering both tasks together.

Overall, immersed bilinguals use more explicit material than instructed bilinguals, who are in turn more explicit than functional monolinguals.

In order to explore potential differences in the production of overt material, several factors have been found to trigger the use of more explicit subject REs in TC. In the first place, the distance between a given subject RE and its textual antecedent does not seem to modulate the forms produced in subject position in line with our initial predictions. More overt material is not largely employed with distant textual antecedents. By contrast, it appears that the distance between a given subject RE and its cognitive antecedent, i.e., the last explicit mention that activates that referent regardless of whether overt or null material is employed, is a determining factor in triggering the use of more explicit material in TC. More overt material is employed with distant cognitive antecedents and this tendency is more pronounced in the two bilingual groups.

On another note, regarding the syntactic configuration where the subject RE analysed is embedded, more explicit material is found in intersentential contexts, followed by subordinated clauses and then those involving coordination, a pattern that replicates in the three groups analysed. In addition, considering subordination contexts, more null pronouns are found when the subject RE is inserted in a main clause as opposed to its subordinate counterpart.

Finally, the last two factors explored have been the number and gender of potential antecedents. Generally, an increase in the production of overt material has been attested as the number of both activated and intervening antecedents increases. Regarding the gender of both activated and intervening antecedents, it was found that NPs are largely produced in scenarios where antecedents differ or have the same gender, which does not confirm the predictions articulated suggesting that more overt pronouns would be triggered by the presence of same-gender antecedents and more NPs in those contexts where the gender is the same. However, taking into consideration the scarcity of data to be analysed in relation to this factor, the results remain rather qualitative in nature.

7.3 Discussion of production results

The aim of this section is to discuss the results from the two corpus-based tasks in relation to previous studies that have investigated the production of more or less explicit subject

REs in L1 Spanish. The discussion of the results will be done following the research questions and hypotheses that were formulated in section 5.1.

Firstly, RQ1 aimed at exploring the distribution of overt and null subject REs in TC in the oral production of advanced instructed and immersed bilinguals compared against that of functional monolinguals. As previously illustrated, TC contexts are largely encoded through the use of null pronouns in the three groups analysed in line with previous studies (Blackwell & Quesada, 2012; Collewaert, 2019; Lozano, 2009, 2016; Martín-Villena & Lozano, 2020; Montrul & Rodríguez-Louro, 2006; T. Quesada, 2021). In addition, similarly to the general patterns attested in previous research, NPs are largely more frequent in encoding TC than overt pronouns, whose production has been reported to be remarkably limited (Collewaert, 2019; Giannakou & Sitaridou, 2020, 2022; Lozano, 2016; Martín-Villena & Lozano, 2020; Montrul & Rodríguez-Louro, 2006). Despite the similarity in the trend to produce null pronouns, followed by NPs and overt pronouns in the three groups, significant differences have been attested although not across the board. Interestingly, bilinguals have been found not to differ from functional monolinguals and among themselves in the production of null pronouns to encode TC in the absence of potential antecedents. In Task 1, i.e., where the main and only animate character that was present was Charles Chaplin, both bilingual groups mostly employed null pronouns (over 98%) to the same extent as functional monolinguals. This implies that, in the absence of pressing cognitive demands, advanced bilinguals do not seem to be significantly different from functional monolinguals when tested in their L1. Nevertheless, a different overall pattern is manifested when analysing Task 2 in isolation or when conflating the results from both tasks. Importantly, it is worth noting that, in Task 2, several characters took a leading and active role at different times in the video, which made its retelling more cognitively challenging and demanding given that the felicitous selection of an overt or null subject RE had to be done in an attempt to avoid potential referential ambiguity.

One of the main differences between Task 1 and 2 lies in the presence of potential contexts of ambiguity that are only present in the latter but not in the former. In order to prevent potential ambiguity, speakers need to consider different dimensions (e.g., degree of activation of the antecedents, distance of a given antecedent and the subject RE that recovers it, or number of potential antecedents), which undoubtedly make the second retelling a more demanding task. It is in this second task where both advanced bilingual groups were found to significantly differ from functional monolinguals. Notably, both

instructed and immersed bilinguals made use of significantly more explicit forms in Task 2 than functional monolinguals. Furthermore, the proportion of overt forms used in instructed and immersed bilinguals significantly differed in that immersed bilinguals proved to be the most (over)explicit group when encoding TC contexts in line with previous studies (Köpke & Genevska-Hanke, 2018). Thus, in line with the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012) and its specific predictions for L1 attrition, L1 production of 3rd singular REs in TC (Lozano, 2009) has expectedly been shown to be a vulnerable domain in the two bilingual groups analysed, and particularly in contexts that require the simultaneous integration of information from different domains. These differences between functional monolinguals and the two bilingual groups might be attributed to the fact that some of the necessary processing demands from such a task are actually required in bilinguals to inhibit the language not in use. Therefore, they might resort to more explicit forms in an attempt to release these processing demands (Chamorro & Sorace, 2019; Sorace, 2016).

Moreover, it is important to mention that these results are also partially in line with the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007). Considering differences in variables such as recency and frequency of L1 use, the three groups analysed have been shown to exhibit distinct distribution patterns of subject REs. In the first place, functional monolinguals, who use the L1 more frequently and recently (see section 6.3) are the least overexplicit of the three groups when encoding TC. The group of instructed bilinguals, who use the L1 both less frequently and less recently, are significantly more overexplicit than the functional monolinguals, although they significantly overproduce less overt forms than the immersed bilinguals, who in turn use the L1 less frequently and recently than the former. Hence, these results can also be accounted for by theories that focus on variables that are essential within the bilingual experience and that do not make predictions for categorically distinct groups but that can be used to understand bilinguals in a continuum.

On another note, RQ2 dealt with the factors that constrain the production of null and overt subject REs in the two bilingual groups and the functional monolingual controls. Among these factors, distance between a given subject RE and its antecedent was the first to be explored. Several accounts such as Accessibility Theory (Ariel, 1990, 1991), the Givenness Hierarchy (Gundel et al., 1993) or Givón's (1983) Continuity Scale within the Topicality Model (see section 3.2.2) have emphasised the role distance has in

contributing to antecedent salience, prominence, or accessibility. In general, closer antecedents to a given REs are argued to be more salient, prominent, or accessible and thus, the use of less explicit material is required. In relation to this and in our production study in particular, a distinction was drawn between textual and cognitive antecedents, which had not been previously addressed, understanding the former as any explicit mention to a given referent that uniquely identifies it even if taken out of context and the latter as any implicit or explicit mention that activates a given referent so that a mental representation of that given referent is (likely to be) created.

Therefore, concerning the analysis of the distance between REs and their textual antecedents, the findings revealed that, contrary to our initial predictions, the presence of a distant textual antecedent was not linked with an increase in the use of overt material. However, immersed bilinguals were found to produce more overt material than functional monolinguals in contexts with distant textual antecedents, that is, those that were 3 or more than 3 clauses apart. In addition, immersed bilinguals were shown to be more overexplicit than instructed bilinguals when the antecedent was more than 3 clauses away. Even though the hypothesis that more explicit material would be present with distant textual antecedents, the findings from group comparisons reveal that immersed bilinguals appear to be more sensitive to the distance factor than the other two groups and resort to the use of overt forms in order to potentially avoid ambiguity (Lozano, 2016).

Although textual antecedent distance was not found to be a relevant factor, our analyses revealed that cognitive antecedent distance could largely account for a significant increase in the use of overt material, although exclusively in the two bilingual groups. This scenario might in fact indicate that bilinguals are sensitive to the last mention of a given referent, be it explicit or implicit. Overall, significant differences were found in the use of more explicit material when comparing contexts where the cognitive antecedent was located 1 clause away with those where it was 2, 3 or more than 3 clauses away. Even though the former contrast, i.e., 1 vs. more than 3 clauses apart, only reached significance for immersed bilinguals, no significant differences were revealed between contexts where the antecedent was 3 or more than 3 clauses away in instructed bilinguals. By contrast, the overexplicit production of overt material by functional monolinguals was not modulated by cognitive antecedent distance, although this could arguably be due to the low frequency of contexts where the cognitive antecedent was separated by 3 ($N = 10$) or more than 3 clauses ($N = 2$) from the subject RE that recovers it. Despite this

argument, no differences were found between the overt forms used when the cognitive antecedent was either 1 or 2 clauses away and future studies should further address this. All in all, it appears then that more distant cognitive antecedents require the use of more explicit forms in the production of instructed and immersed bilinguals. Therefore, the positive effect of cognitive antecedent distance could arguably explain the lack of an effect of textual antecedent distance: referents can be activated even without using fully explicit material (e.g., an NP) and the use of more overt material is required when antecedents have been more distantly recovered regardless of their form.

Importantly, the finding presented above ties in with the predictions from the PPVH (Lozano, 2016, 2018), which hypothesises that bilinguals are more likely to be redundant than ambiguous. However, instances of redundancy are likely to be motivated to some extent by additional variables such as cognitive antecedent distance, which contribute to the gradience of instances of redundancy, making the violation of the Principle of Informativeness/Economy a milder or a stronger one. The PPVH argues that all instances of redundancy are not tantamount. For instance, in the presence of distant cognitive antecedents, an overt form encoding TC would be considered less redundant (i.e., milder violation) in that its use might be motivated by a willingness to reduce potential ambiguity. Notably, even though bilinguals have been shown to produce more overt material than functional monolinguals, overproduction instances have been found to be modulated by cognitive antecedent distance to some extent. Taking these results together, it becomes relevant to add another variable to the list of factors that contribute to grading redundancy provided by Quesada (2021). It is also worth mentioning that, although the predictions from the PPVH were made for L2 acquisition, they provide a rich testing ground for L1 attrition contexts.

The second variable that was considered relevant when exploring differences in the use of null and overt pronouns in TC was syntactic configuration. As predicted, contexts involving coreferential coordination were encoded almost exclusively (over 97%) through the use of null pronouns in the three groups analysed confirming previous findings (Collewaert, 2019; Georgopoulos, 2017; Martín-Villena & Lozano, 2020; T. Quesada, 2021; T. Quesada & Lozano, 2020). These contexts were followed by those involving subordination (over 94%), and lastly by intersentential ones (over 81%). Interestingly, unlike the two last contexts, those that involve coreferential coordination are similar in Spanish and in English in that both of them are largely realised via null

pronouns (T. Quesada, 2021), which could arguably explain the predicted lower production of overt REs in the bilinguals' L1.

On another note, while no differences were attested between functional monolinguals and instructed bilinguals when comparing the production of null pronouns employed in the different syntactic configurations analysed, immersed bilinguals were found to produce significantly fewer null pronouns than functional monolinguals in both coordinated, subordinated, and intersentential contexts and that instructed bilinguals in the two last scenarios. Hence, a similar general pattern is attested in that immersed bilinguals appear to be the group where more redundancy scenarios are found regardless of the context analysed, being followed by instructed bilinguals and eventually by functional monolinguals. This pattern could likely be due to factors such as recency or frequency of L1 use as predicted by the Activation Threshold Hypothesis (Paradis, 1993, 2004, 2007). In addition, when exploring differences between the three contexts analysed by group, the following picture emerged: while functional monolinguals and instructed bilinguals produced significantly more null pronouns in contexts with coreferential coordination compared to the other two, the null pronouns employed by immersed bilinguals were significantly different in all three contexts. In line with the results presented in García-Alcaraz and Bel (2019), a higher proportion of null pronouns was attested in subordinated contexts as opposed to intersentential ones.

A final point to discuss in relation to syntactic configuration concerns the proportion of null and overt subject REs produced in the two subordination scenarios analysed, i.e., when the subject RE analysed was placed in the subordinate or in the main clause. The results revealed that more null pronouns were found when a given subject RE is placed in the main clause when compared to those embedded in subordinate clauses, a tendency which was similar in the three groups analysed. The difference between the two contexts analysed reached significance in both instructed and immersed bilinguals. Importantly, these findings are in line with previous research exploring PAS contexts, which are the contexts analysed in the interpretation and processing tasks included in this dissertation (see Chapter 8 and Chapter 9, respectively). Previous studies have indeed found a stronger subject-null bias in subordinate-main syntactic configurations, that is, when the anaphor is placed in the main clause (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015, 2018; de Rocafiguera & Bel, 2022). In addition, these results could partly be in line with studies that have tested main-subordinate syntactic configurations

where the anaphor is placed in the subordinate counterpart and have found no clear or a milder subject-null bias (Chamorro, 2018; Chamorro, Sorace, et al., 2016; Giannakou & Sitaridou, 2020; Schimke et al., 2018). Although the proportion of null pronouns used in TC contexts in our study is also high when they are embedded in subordinate clauses, it could be possible that other factors might have intervened to make the subject-null association less likely to manifest (e.g., the subordinating conjunction used to link main and subordinate clauses, a finding to which we will return in section 8.3).

The last factor that was explored in relation to the production of more or less explicit subject REs was the number of potential antecedents. As already explained, the role played by potential antecedents was investigated considering two dimensions. The first one concerned the effect of the number of activated antecedents, that is, the number of referents that were active in the last four clauses prior to a given subject RE. The second dimension explored the role played by intervening antecedents, that is, those that were present between a given subject RE and its antecedent or last activation (see section 7.1.2.4). Regarding the effect of activated antecedents, it was found that a higher number of activated antecedents was associated with an increase in the production of overt forms in both bilingual groups and functional monolinguals (Arnold & Griffin, 2007; Blackwell & Quesada, 2012; Cunnings et al., 2017; Fukumura & van Gompel, 2010; Lozano, 2016; Martín-Villena & Lozano, 2020; T. Quesada, 2021). Even though the proportion of overt forms produced by functional monolinguals was significantly higher in the presence of 2, 3 or more than 3 antecedents when contrasting them with contexts with 1 activated antecedent, additional differences were found in the bilinguals' production between contexts with 2 and 3 potential antecedents, revealing more nuanced subtleties in the two advanced bilingual groups. These effects were replicated both when exploring all syntactic configurations and when excluding coreferential coordination scenarios considering the high production of null pronouns attested in such contexts. Additionally, it is worth noting that no significant differences were found between the overt forms produced in contexts with 3 or more than 3 activated antecedents, which might indicate that contexts with 3 activated antecedents may already impose high demands in bilinguals, making it more likely for them to resort to the use of overt material.

When performing group comparisons on the forms used in each context, i.e., with 1, 2, 3 or more than 3 activated antecedents, noticeable differences emerged. Results revealed that immersed bilinguals produced significantly more overt material in contexts

with 1 potential antecedent when compared to functional monolinguals and instructed bilinguals. In addition, significant differences were found in the forms produced in the presence of 3 potential antecedents between functional monolinguals and the two bilingual groups. Thus, although immersed bilinguals appear to be largely overexplicit in the least demanding contexts, that is, when there is only 1 activated antecedent and they in fact differ from the other two groups, both bilingual groups exhibit differences in the overt forms used in contexts with 3 activated antecedents when compared to functional monolinguals. This implies that apart from the effect of activated antecedents, immersed bilinguals seem to overproduce overt forms in contexts where they are not necessarily required (i.e., with 1 activated antecedent).

The results obtained for the effect of the number of intervening antecedents are in line with previous findings (T. Quesada, 2021; Torregrossa et al., 2015, 2019). The most notable difference attested is the significant increase in the production of overt forms when comparing contexts with no and 1 intervening antecedent in favour of the latter in the three groups analysed. Contexts involving 2 intervening antecedents are so low in frequency in the task analysed that future studies should address the difference between the forms used with 1 or more than 1 intervening antecedent in a more controlled fashion. The presence of an intervening antecedent makes it more likely for overt material to be employed to encode TC contexts with an aim to prevent potential ambiguity. Moreover, significant differences were exhibited in contexts with no intervening antecedents between functional monolinguals and immersed bilinguals and between the two groups of bilinguals in that the immersed bilingual group displayed the highest production of overt forms. Furthermore, both bilingual groups were significantly more explicit than functional monolinguals in contexts with 1 intervening antecedent. Therefore, it appears that immersed bilinguals are largely more explicit even in contexts where no ambiguity is at stake but that they are also more redundant together with instructed bilinguals when the number of intervening antecedents is higher.

Overall, the findings from the number of both activated and intervening antecedents are in line with the predictions formulated within the PPVH (Lozano, 2016; T. Quesada, 2021), the IH and the ATH. Bilinguals are generally more redundant than functional monolinguals, arguably in an attempt to avoid potential ambiguity that might arise when different antecedents are available to be recovered by a given subject RE. Hence, the effect of the number of both activated and intervening antecedents is

confirmed in our corpus-based study as a modulator of the graded violation of the Principle of Informativeness/Economy, in line with the findings reported in Lozano (2016) and Quesada (2021). Furthermore, bilinguals are found to be more overexplicit than functional monolinguals, as predicted by the IH, and further differences are found in the two bilingual groups based on frequency and recency of L1 use following the ATH.

Regarding RQ2.1, the gender of both activated and intervening antecedents was investigated to account for the different overt forms (i.e., NPs or overt pronouns) produced by the three groups under scrutiny. Despite available evidence from previous findings of an increase in the use of overt pronouns in contexts where the gender of the antecedents is different and of NPs when they match in gender (Lozano, 2016; Martín-Villena & Lozano, 2020), our results do not confirm such pattern and therefore, our initial hypothesis was not confirmed. Overall, more NPs were produced in contexts with same-gender or different-gender antecedents, although no inferential statistics could be performed considering the low frequencies of overt forms attested. Importantly, the results from Lozano (2016) and Martín-Villena and Lozano (2020) are rather qualitative in nature considering the very low frequencies of overt pronouns and NPs analysed, which might suggest that the effect of gender on subject RE selection should perhaps be addressed experimentally to obtain more solid conclusions, as it was done for English in Arnold and Griffin (2007).

Finally, RQ3 focused on whether overproduction instances found in TC could largely be explained by internal factors (e.g., number and gender of potential antecedents or their distance) or whether they could mainly be due to crosslinguistic differences between English and Spanish. Although, in order to fully address this question, another group with a different L2 configuration similar to the L1 (e.g., Greek) should be used to ascertain whether differences are likely to be due to the different nature of the L2 or perhaps to a more general bilingualism effect or the effect of additional variables, we can indeed make some tentative conclusions. Firstly, in Task 1, in the absence of additional characters, which might affect antecedent recoverability (Arnold, 2010; Arnold & Griffin, 2007), both functional monolinguals and the advanced bilingual groups exhibited comparable distribution patterns when encoding TC contexts. In this case, null pronouns were largely used in these groups. By contrast, where advanced bilinguals were found to differ from functional monolinguals was in their performance on Task 2, which has been shown to be more cognitively taxing considering the presence and alternation of same-

gender and different-gender antecedents. It is indeed in the overall production patterns attested in Task 2 where the three groups differ: immersed bilinguals exhibiting the highest overproduction of overt forms in line with previous findings on L1 attrition in production (Köpke & Genevskaja-Hanke, 2018), followed by instructed bilinguals and then by functional monolinguals. This picture is compatible with accounts that predict variability in performance based on factors such as L1 frequency and recency of use such as the ATH (Paradis, 1993, 2004, 2007). Additionally, these findings are also compatible with accounts such as the IH (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016), which claims that vulnerability in L1 attrition settings is more likely to surface when additional processing resources are required, which are may be reduced in bilinguals for various reasons, including the need to inhibit the language not in use. This is evidenced in the significant differences that are exhibited between functional monolinguals and instructed and immersed bilinguals in the contexts analysed in Task 2.

Moreover, regarding the role played by additional language internal variables in the use of overexplicit forms, as predicted by the PPVH (Lozano, 2016, 2018), instances of redundancy appear to be modulated by variables such as cognitive antecedent distance as well as the number of activated and intervening antecedents. Both bilingual groups have been shown to be rather sensitive to these factors. As predicted, more redundancy scenarios are found in the two bilingual groups compared to functional monolinguals, arguably in an attempt to avoid potential ambiguity. These factors then contribute to grading instances of redundancy in production (i.e., whether overproduction is found to be more or less redundant), contributing to those variables addressed in Quesada (2021). Therefore, these results might indicate that overproduction in L1 attrition settings is more likely to be motivated by increased processing demands in bilinguals as well as the interaction of the aforementioned language internal factors than by crosslinguistic differences between the L1 and the L2.

In general, the findings from the production tasks are in line with the predictions from the IH in that bilinguals appear to be more explicit than functional monolinguals in TC. Moreover, differences in overproduction are to be additionally accounted for by the ATH in that the group that employs more explicit subject REs is the one that uses the L1 less frequently and recently, with instructed bilinguals in between the other two groups, and functional monolinguals as the least overexplicit group. On a final note, the findings are also consistent with the predictions from the PPVH in that the two bilingual groups

are more redundant than the functional monolinguals, and instances of redundancy represent milder or stronger violations of the Principle of Informativeness/Economy considering the interaction of factors such as cognitive antecedent distance, the number of activated and intervening antecedents, and the syntactic configuration where the subject RE is embedded. The overall findings from this first task are connected with the findings that will be presented in the next chapter (Chapter 8), which presents the methodology, results, and discussion of an interpretation task that taps into the biases of null and overt subject pronouns in PAS contexts in the three same groups that have been analysed. Regarding its findings, an increase in the use of more explicit material exhibited in this chapter is connected with a tendency to interpret overt pronouns as coreferential with subject antecedents in more L2-dominant bilinguals, which will be subsequently detailed.

CHAPTER 8. Offline picture selection task

8.1 Methodology

An offline picture selection task was used to investigate interpretation preferences of null and overt subject pronouns. The stimuli used for this task were adapted from Tsimpli et al. (2004), which tested offline subject interpretation preferences in L1 Italian and L1 Greek-L2 English attriters in the UK. Given that our study tests L1 Spanish preferences of L1 Spanish-L2 English attriters, an approximate replication (Porte & McManus, 2019) was deemed necessary to allow for comparability of the results across other null-subject languages (e.g., Italian and Greek), which is desirable in any scientific field. These stimuli have also been used in other studies including L1 Greek attriters in Sweden (Kaltsa et al., 2015), but also in several L2 contexts in adults and children (Belletti et al., 2007; Clements & Domínguez, 2017; Papadopoulou et al., 2015; Peristeri & Tsimpli, 2013; Serratrice, 2007; Skrimpa et al., 2022; Sorace & Filiaci, 2006, among others). Additionally, this study is also testing L1 Spanish-L2 English early immersed bilinguals, those who have been living in an L2 environment for less than 5 years. Thus, using a methodology with which attrition effects have already been found in long-immersed bilinguals was considered paramount to make sure that, if the results were to replicate, the task would be accurate enough for them to surface. For these reasons, using a replication or extension study was considered advantageous and contributes to a necessary endeavour that is required in science to make meaningful scientific contributions. The following section will then introduce the main experiment that serves as the basis for this interpretation task.

8.1.1 Original picture selection task

The original experiment by Tsimpli et al. (2004) contained 20 experimental items where pronoun type and clause order were manipulated, i.e., half of them contained overt pronouns and the other half null pronouns. Moreover, half of the overt and null pronoun stimuli presented a main-subordinate configuration, and the other half displayed the opposite one (see Table 39).

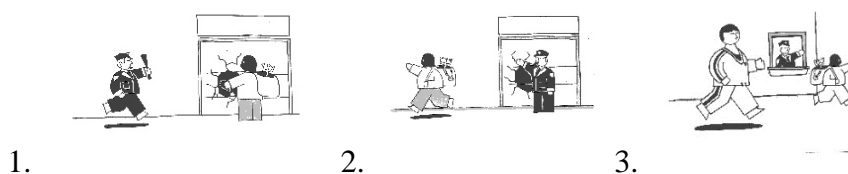
Table 39*Original experimental design in Tsimpli et al. (2004)*

		Clause order	
		Main-subordinate	Subordinate-main
Pronoun	Null	a (N = 5)	b (N = 5)
	Overt	c (N = 5)	d (N = 5)

Each sentence presented two antecedents in subject and object position in the main clause which matched in number and gender, and which could be selected as the antecedent for the null and overt pronouns presented in the subordinate clause as shown below.

85. *Il poliziotto vede il ladro mentre corre.*

‘The policeman sees the thief while (he) is running’.



Moreover, each test item was presented with three pictures, one displaying a subject interpretation (85.1), another one an object interpretation (85.2) and finally, another one depicting an external referent (85.3) as the agent of the verb in the subordinate clause. In this case, participants were asked to indicate which of the three pictures presented matched the meaning of the sentence correctly and could select more than one option.

Despite the counterbalancing of the aforementioned factors in the original design, considering the multiple factors that can modulate pronoun interpretation preferences in both L1 and L2 grammars, several adaptations were made to the original stimuli to control for variability to the extent that it was possible. The following sections will illustrate how the stimuli included in this study were adapted as well as the reasons behind such choices.

8.1.2 Tenses

The original stimuli were first translated into Spanish using the English translations of the stimuli in Greek (see Appendix H. Picture selection task: stimuli)¹³⁰. While translating the stimuli, certain decisions had to be made. First, the tenses used in all main clauses were not the same in all items: there was a combination of 11 past progressive (e.g., The mother *was kissing* her daughter while she was putting her coat on) and 9 preterit form (e.g., The nurse *pushed* the cleaning lady while she was getting out of the elevator), and crucially, this factor was not counterbalanced. Thus, to standardise this in our stimuli, we decided to use preterit for the main clause and past imperfect for the subordinate clause. Aspect has been argued to potentially modify interpretation preferences of null and overt pronouns (Chamorro, 2018; Shin, 2014), so it was considered necessary to minimise variability due to factors which were not being addressed in the design by maintaining them constant. Furthermore, this specific combination of tenses has also been used in other studies testing pronoun interpretation in Spanish (Chamorro, 2018; Chamorro, Sorace, et al., 2016).

8.1.3 Temporal subordinating conjunctions: *cuando* ‘when’ vs. *mientras* ‘while’

During the translation process, several discussions were motivated by which subordinating conjunction should be used in each sentence, either *cuando* ‘when’ or *mientras* ‘while’¹³¹. Interestingly, the original overt pronoun stimuli contained 7 sentences linked by ‘when’ and 3 by ‘while’, and the null pronoun counterparts contained half of the items linked using the conjunction ‘when’ and half of them using ‘while’ (see Appendix in Peristeri & Tsimpli, 2013). After careful inspection by two experienced linguists who are native speakers of Spanish, some sentences sounded more natural with one conjunction over the other. Thus, a decision was made to test the role played (if any) by such subordinating conjunctions in the interpretation of null and overt pronouns in native Spanish to be able to implement the changes in the actual experiments used in this thesis, both the offline picture selection task and the online self-paced reading task. The findings from this study will not only be relevant for this thesis, since it will enable a more controlled and counterbalanced design, but they will also make it possible to

¹³⁰ We would kindly like to express our gratitude to Prof. Ianthi Tsimpli for sharing both the stimuli and the visual materials for this study.

¹³¹ The Greek counterpart for *while* was either ‘kathos’ or ‘eno’.

account for differences in studies which have used only one of the two subordinating conjunctions ('when' in Chamorro, 2018; Giannakou & Sitaridou, 2020). Having argued for the need to test the role played by the subordinating conjunction used, the next section will briefly describe the nature of the experiment testing such effect.

8.1.3.1 Experiment with conjunctions

In this experiment, the original sentences from Tsimpli et al. (2004) were translated into Spanish (see Appendix H. Picture selection task: stimuli). Interestingly, the conjunction linking the main and subordinate clauses was counterbalanced and two lists were created with half of the overt and null subject sentences containing *cuando* and the other half *mientras*. Participants had to choose between three pictures which represented either a subject, object, or external referent interpretation (see example 86). Contrary to the original experiment, participants could only select one of the three possible interpretations instead of more than one. This forced-choice adaptation would encourage participants to choose their preferred interpretation¹³². Furthermore, the pictures were the same as the original ones, with the exception that the labels that were in Greek were translated to Spanish and some additional manipulations which are referred to in section 8.1.6. Participants were also presented with 30 filler items adapted from another study using this task (Peristeri & Tsimpli, 2013). It is worth mentioning that, taking into account the results from this study, which are summarised in section 8.2.1.5, the main offline picture selection experimental task included in this dissertation additionally manipulated the conjunction used to link main and subordinate clauses.

86. *La anciana saludó a la mujer cuando ella cruzaba la calle.*

'The old lady greeted the woman while she was crossing the street'.



¹³² Kaltsa et al. (2015, p. 270) also argue that allowing participants to choose more than one option would encourage optionality, would weaken participants' preferences, and obscure differences between the groups that are being compared.

8.1.4 Equipotentiality of antecedents

As argued in the original study, the sentences were designed to be fully ambiguous so that the embedded pronoun could be coreferential to either the preceding subject or object (Tsimpli et al., 2004). However, after a careful look at the original stimuli, given that the subject and the object of the main clause were realised by common NPs (e.g., ‘the secretary’ or ‘the nurse’), the verb in the subordinate clause could arguably be said to be slightly biased towards either the subject or the object of the main clause in some items¹³³. For instance, in the sentence presented in example 87 below, it could be argued that ‘the secretary’ would be more likely to write a letter than ‘the nurse’.

87. *La secretaria ayudó a la enfermera cuando ella escribía una carta.*

‘The secretary helped the nurse when she was writing a letter’.

Some verbs or actions in the subordinate clause could be more likely realised by the subject or the object of the previous clause and this could in turn favour the expected PAS biases or generate predictions against them. Thus, to test whether both referents (subject/object) were equally likely to perform the action in the subordinate clause, an experiment was designed to test equipotentiality of both referents. This would provide useful information as to whether the neutral stimuli were presented in terms of the likelihood of selecting either a subject or an object interpretation.

8.1.4.1 Equipotentiality study

In this study, participants were presented with all the verbs and actions in the subordinate clause from each of the 20 experimental items. They were presented in the infinitive form (e.g., *abrir la puerta*, ‘open the door’) together with the subject (*padre*, ‘father’) and the object (*hijo*, ‘son’) that appeared in the main clause. Their task was to indicate how likely it was for the subject and the object to perform such action on a 5-point Likert scale (see Figure 32). The order of presentation of both referents was counterbalanced: half of the original sentences with null and overt pronouns presented the subject first and the rest the object to avoid a potential effect of order of presentation. Additionally, 10 distractors

¹³³ In the current design, implicit causality was not controlled as in other studies (Bel & García-Alcaraz, 2018; de Rocafiguera & Bel, 2022).

where the bias towards one of the two referents was very clear were added (see Figure 33). The results of this study will be presented below, and their implications will be discussed.

Figure 32

Instance of potentially ambiguous experimental stimulus in the equipotentiality study

* **¿Cómo de probable es que realicen la siguiente acción?**
ABRIR LA PUERTA

El hijo_____El padre

● Por favor seleccione 2 respuestas

	1	2	3	4	5
EL HIJO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EL PADRE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 33

Instance of potentially unambiguous experimental stimulus in the equipotentiality study

* **¿Cómo de probable es que realicen la siguiente acción?**
DETENER A UN LADRÓN

La policía_____La pianista

● Por favor seleccione 2 respuestas

	1	2	3	4	5
LA POLICÍA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LA PIANISTA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8.1.4.1.1 Participants

To test whether the two antecedents (i.e., subject or object) presented in the stimuli from the interpretation task were equally likely to be selected by the null or overt pronoun in the subordinate clause, 50 participants completed the equipotentiality study described above. The participants in this study were all Peninsular Spanish speakers and their age ranged from 18 to 57, with a mean of 26.8 (SD = 10.5).

8.1.4.1.2 Descriptive results

The means (and standard deviation) of the scores provided for each of the two antecedents in each item are presented in Table 40. Most of the means are above 3 points except for the object in items 2 and 11, or the subject in item 15. This indicates that, overall, participants in the experiment considered that almost all referents (i.e., antecedents) could potentially do the action depicted in the subordinate clause. Furthermore, the mean for all subject antecedents was 4.2, which was the same as the mean for all object antecedents. Therefore, looking at the general picture, all referents included as subject or object antecedents could perform the action in the subordinate clause to a considerably large extent.

Table 40

Likelihood of the antecedents (subject/object) as being the agents of the action in the verb in the subordinate clause

	1	2	3	4	5
Subject	4.4 (.91)	4.7 (.44)	3.9 (1.1)	4.5 (.81)	4.5 (.80)
Object	4.7 (.57)	2.9 (1.34)	4 (1.23)	4.7 (.65)	4.5 (.76)
	6	7	8	9	10
Subject	4.8 (.61)	4 (1.15)	4.2 (1.12)	3.8 (1.17)	4.2 (1.18)
Object	4.2 (1.01)	4.6 (.56)	4.8 (.55)	3.3 (1.32)	3.6 (1.43)
	11	12	13	14	15
Subject	4.5 (.81)	4.8 (.47)	3.7 (1.17)	4.7 (.77)	2.9 (1.41)
Object	2.9 (1.53)	3.5 (1.25)	4.6 (.70)	4.8 (.67)	4.8 (.42)
	16	17	18	19	20
Subject	3.4 (1.44)	4.6 (.72)	4.6 (.88)	3.1 (1.31)	4.8 (.44)
Object	3.9 (1.22)	4.6 (.83)	4.1 (1.14)	4.7 (.57)	4.2 (1.2)

Note. Each number in bold corresponds to the experimental stimuli used, which are presented in Table 41 below.

Despite the overall trends reported, it is worth noticing that differences were found by items in terms of which antecedent would be more likely to perform the action depicted in the subordinate clause. After running one non-parametric paired samples Wilcoxon test by item, it was revealed that only the antecedents included in items 3, 4, 5, 14, and 17 were reported to be equally likely to perform the action in the subordinate clause. By contrast, the results from this study showed that the subject antecedent in items 2, 6, 9, 10, 11, 12, 18, and 20 was more likely to act as the agent of the verb in the subordinate

clause, whereas the object was favoured in items 1, 7, 8, 13, 15, 16, and 19. Therefore, while only 5 items were found to be neutral in terms of bias, 8 of them favoured a subject bias and 7 of them exhibited a stronger association towards the object.

Transferring the results from the equipotentiality study to the actual experimental sentences used in this dissertation, as can be seen in Table 41, out of those items that favoured a strong association towards either the subject or the object antecedent, items 2, 6, 9, and 11 (subject bias) or 16 and 19 (object bias) were not found to be largely problematic. These cases were thought not to pose major problems for the results from the interpretation task given that the associated bias they triggered based on the likelihood of one of the two antecedents to perform the action in the subordinate clause was contrary to the expected PAS bias, i.e., sentences containing null pronouns semantically biasing towards the object or those including overt pronouns biasing towards the subject. By contrast, items 1, 7, 8, 13, and 15, which contained an overt pronoun and for which participants indicated that the object was more likely to act as the agent of the verb in the subordinate clause should be cautiously considered as well as items 10, 12, 18, and 20, which contained a null pronoun and the expected agent of the verb in the subordinate clause was thought to be the subject. In these scenarios, since the bias expected from the PAS and the meaning-based bias were the same, it would be more difficult to discern whether participants selected a subject or an object interpretation based on the semantic bias created by the sentence or on the overall preference that an overt or a null pronoun would trigger.

Table 41

Stimuli from the picture selection task with pronoun and bias type

	Sentences	Pronoun	Bias
1	<i>La anciana saludó a la señora cuando ella cruzaba la calle.</i>	<i>Overt</i>	<i>Object</i>
2	La secretaria ayudó a la enfermera cuando ella escribía una carta.	Overt	Subject
3	El anciano habló rápido al nieto cuando leía el libro.	Null	No
4	La anciana mostró la foto a la nieta cuando tomaba el desayuno.	Null	No
5	La chica rubia dio el papel a la señora cuando entraba en la oficina.	Null	No
6	La madre besó a la hija cuando ella se ponía el abrigo.	Overt	Subject
7	<i>El padre saludó al hijo cuando él paseaba en bicicleta.</i>	<i>Overt</i>	<i>Object</i>
8	<i>El policía silbó al ladrón cuando él corría por la calle.</i>	<i>Overt</i>	<i>Object</i>
9	La profesora señaló a la alumna cuando ella gritaba en la clase.	Overt	Subject
10	<i>El entrenador habló alto al atleta cuando sujetaba la botella.</i>	<i>Null</i>	<i>Subject</i>

11	El hombre pagó al cajero cuando él cerraba la maleta.	Overt	Subject
12	<i>El portero saludó de prisa al cartero cuando abría la puerta.</i>	<i>Null</i>	<i>Subject</i>
13	<i>La anciana se acercó a la limpiadora cuando ella miraba el reloj.</i>	<i>Overt</i>	<i>Object</i>
14	El policía vio de repente al ladrón cuando giraba la esquina.	Null	No
15	<i>El cliente pagó al camarero cuando él echaba vino en la copa.</i>	<i>Overt</i>	<i>Object</i>
16	El revisor pidió el ticket al hombre cuando bostezaba intensamente.	Null	Object
17	La enfermera empujó a la limpiadora cuando ella salía del ascensor.	Overt	No
18	<i>El guardia vio de repente al mendigo cuando andaba en el parque.</i>	<i>Null</i>	<i>Subject</i>
19	El sacerdote habló continuamente al turista cuando esperaba al autobús.	Null	Object
20	<i>El padre dio las felicidades al hijo cuando abría la puerta.</i>	<i>Null</i>	<i>Subjet</i>

All in all, it seems that the likelihood of selecting a subject or an object antecedent is modulated by the meaning of the sentence in some of the stimuli included in the interpretation task. Nevertheless, it appears that the number of sentences biasing towards the subject or the object of the main clause is rather even (8 for subject-bias vs. 7 for object-bias). Moreover, within these sentences, the number of problematic ones (i.e., those where the expected PAS bias matched the bias created by the meaning of the sentence) does not prove to be too dissimilar (5 for the overt and 4 for the null pronoun). Despite these findings, we eventually decided to keep the experiment as similar as possible to the original (Tsimpli et al., 2004) considering the replication nature of this study, although this should be cautiously addressed in future studies.

8.1.5 Gender

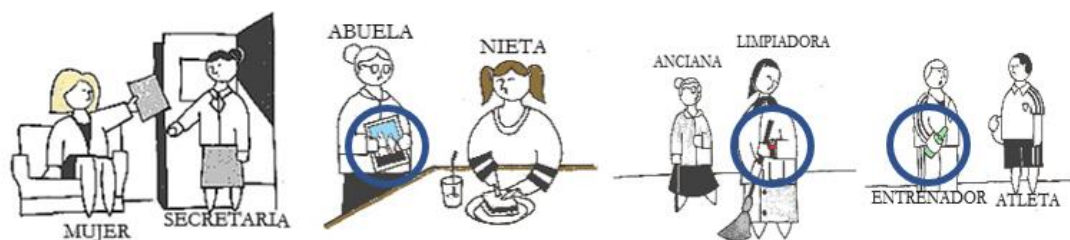
Another aspect that deserves attention from the experimental design included in Tsimpli et al. (2004) relates to the fact that the experimental items were not counterbalanced in terms of gender. In the overt pronoun stimuli, 6 sentences included feminine antecedents and only 4 were masculine. By contrast, only 2 were feminine in the null pronoun stimuli and the other 8 were masculine. Even though counterbalancing this would have been desirable, to keep the same pictures, we eventually decided to leave the stimuli as they were.

8.1.6 Pictures

It is worth mentioning that the pictures presented with each experimental sentence were slightly modified when necessary. A clear understanding of the action performed in the picture was needed for participants to accurately select their preferred interpretation of each sentence. Hence, the first decision made was to add a tag to each referent so that it was evident who each person appearing in the picture was (see Figure 34). A second change that was made was to visually present both referents in the same lineal order corresponding to the order in which they appeared in the sentence. This implies that the subject would always appear to the left of the picture and the object to the right¹³⁴. Some slight adaptations were also made to the pictures to make the action presented more salient. For instance, when some crucial objects (*foto* ‘picture’, *reloj* ‘watch’, and *botella* ‘bottle’) appeared in the sentence and they were coloured to receive more emphasis and to be perceptibly more salient (see Figure 34). Given that the pictures were presented to reflect either a subject or an object interpretation of the action in the subordinate clause, a potential additional processing time trying to interpret them would be detrimental for the completion of this task. Therefore, all these changes were made with the aim to ease the processing load of the pictures themselves. The same changes were made to the filler items to mask the purpose of the study.

Figure 34

Examples of modifications to the original pictures in the offline picture selection task



¹³⁴ This adaptation is thought to be extremely useful in the self-paced reading task in particular to ease processing of the picture, which could influence the reading time data.

8.1.7 Structure of the experimental items

The experiment consisted of 20 experimental items where the form of the pronoun had been manipulated (10 overt pronouns and 10 null pronouns)¹³⁵. Each experimental item contained a main clause with two animate antecedents (lexical NPs) in subject and object position, respectively, followed by a subordinate clause introduced by a temporal conjunction and which contained a null or an overt pronoun. The ambiguous pronoun in the subordinate clause matched in gender and number with the antecedents presented in the main clause, as illustrated in the following examples:

88.

La anciana_i saludó a la mujer_j cuando ella_{i/j} cruzaba la calle.

‘The old lady_i greeted the girl_j when she_{i/j} crossed the street’.

El padre_i saludó al hijo_j mientras él_{i/j} montaba en bicicleta.

‘The father_i greeted the son_j while he_{i/j} was riding a bike’.

Following the results from the experiment on conjunctions (see section 8.2.1), two balanced lists were created to further test whether the role played by different temporal conjunctions such as *cuando* ‘when’ and *mientras* ‘while’ in Spanish might modulate interpretive biases of null and overt pronouns in our bilingual participants. Hence, each participant was eventually presented with 10 stimuli with the subordinating conjunction *cuando* and 10 with *mientras*, showing five examples of null pronouns and five of overt pronouns within each of these conditions. Thus, two lists were randomised, and participants were randomly allocated to either list 1 or 2 (see Table 42).

Table 42

Experimental design from the offline picture selection task: conditions

		Conjunction type	
		<i>Cuando</i> ‘when’	<i>Mientras</i> ‘while’
Pronoun	Null	a (N =5)	b (N =5)
	Overt	c (N =5)	d (N =5)

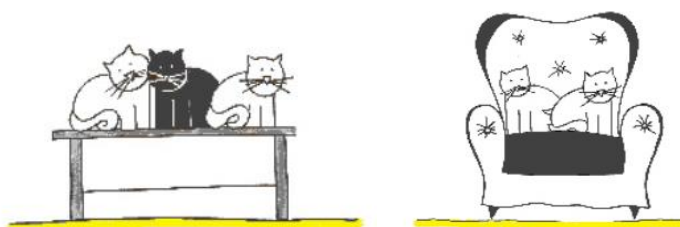
¹³⁵ One of the limitations of the study is that the sentences with null and with overt pronouns were different and are thus not lexically matched (Keating & Jegerski, 2015). Even though this would have been desirable, the final decision was to keep the design as close as possible to the original to conform to the replication nature of this study.

In addition, the experiment contained 30 filler items, which were translated and adapted from the Greek stimuli in Peristeri and Tsimpli (2013). The pictures for the filler items were selected from those which were best recognised as matching or unmatching from the experiment on conjunctions (see section 8.2.1). None of the fillers tested another grammatical structure and each sentence could be uniquely identified with only one of the two pictures presented, as shown in example 89.

89.

Dos de los tres gatos encima de la mesa son blancos.

‘Two of the three cats on the table are white’.



For each of the experimental and filler sentences, participants were presented with two pictures from which they had to choose the one that best matched the sentence that appeared on the screen. The experimental pictures, presented in random order, contained the subject or the object of the main clause as agents. Thus, participants had to choose their preferred interpretation for the null or overt pronoun in the subordinate clause. Differently from the original study by Tsimpli et al. (2004) where participants could select more than one possible answer, i.e., subject, object or external referent interpretation, as mentioned above, participants were instructed to only choose their preferred interpretation (subject or object), even if they considered that more than one of the answers presented was possible¹³⁶. In this way, we would be targeting their preferred interpretation for each type of pronoun in a forced-choice manner¹³⁷, similarly to other studies on pronoun resolution (e.g., Contemori, 2021).

The experimental sequence each participant was presented with contained 20 target sentences like the one presented in Figure 35 (10 with a null pronoun and 10 with an overt pronoun) and 30 fillers, all of which were presented in random order, making

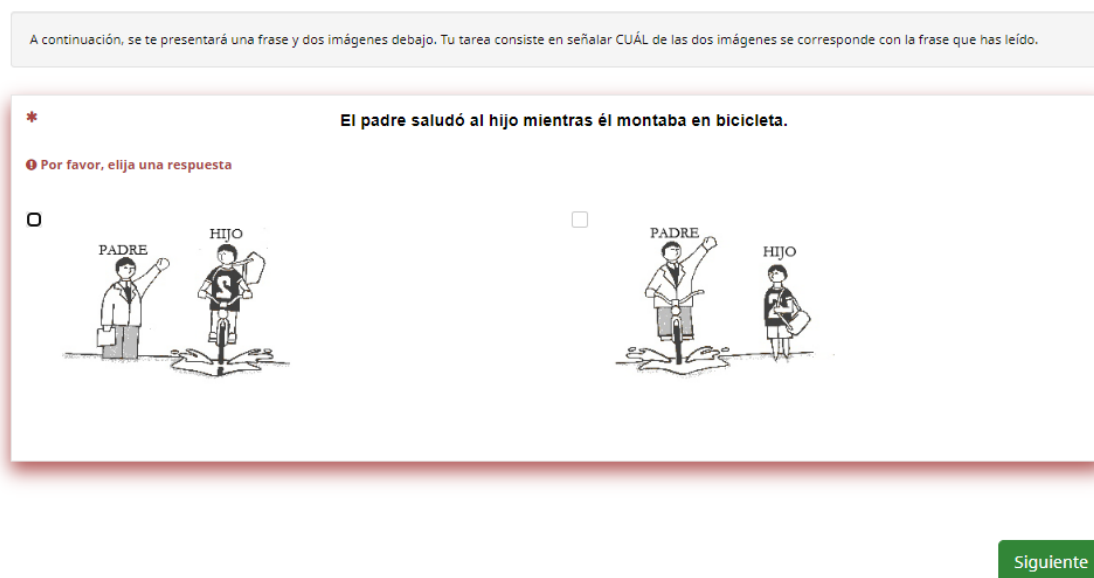
¹³⁶ Interestingly, the external referent option was very infrequently selected by participants in the pilot and this result has also been replicated in other studies (Chamorro, 2018).

¹³⁷ For the final instructions, see Appendix G. Instructions picture selection task.

sure that experimental items did not appear consecutively. There was then a 1:1.5 ratio of fillers and there were additionally two practice items at the beginning to get participants familiarised with the task.

Figure 35

Illustration of picture selection task stimulus



Having described the main points from the experimental design of the offline picture selection task included in this dissertation as well as their motivation, the following section will explain the general procedure for data analysis of this task and the pilot task described in section 8.1.3.1.

8.1.8 Interpretation tasks: general analysis

8.1.8.1 Data analysis

The analysis of the two interpretation tasks focused on the participants' selection of either a subject or an object interpretation for null or overt pronouns, which was implicitly presented as images where the subject or the object of the main clause performed the action in the subordinate clause as explained above. These answers were coded in a binary fashion in such a way that subject responses were coded as 1 and object responses corresponded to 0. This was then the dependent variable included in the statistical analyses.

After data cleaning, which will be specified for each task below, all the responses were analysed fitting generalised linear mixed-effects models using the *glmer* function with a binomial family from the *lme4* package (Bates et al., 2015) in R (R Core Team, 2021). Analysing data using mixed-effects models has several advantages over common analyses of variance such as standard or repeated measures ANOVA (Brown, 2021). In the first place, whereas ANOVAs can model item- and participant-level variability, the combination of both at once is not possible. By contrast, mixed-effects models can simultaneously take different sources of variability which are common in psycholinguistic experiments. Secondly, whereas ANOVAs work with aggregated means, which reduces important variability in the data, mixed-effects models model data using single data points. Thirdly, a related advantage of mixed-effects models over ANOVAs is the treatment of missing observations. When using an ANOVA, the data from a participant or item where there are missing values would altogether be deleted, considerably reducing sample size, which would not happen with mixed-effects modelling since it deals with single data points. Fourthly, mixed-effects models provide coefficient estimates for each predictor, indicating growth or trajectory, whereas ANOVAs can only provide information about the significance of a given effect or of its interaction with another one. The last important advantage of mixed-effects models when dealing with data is the possibility to include both categorical and continuous predictors (i.e., independent variables) and the possibility to analyse categorical dependent variables.

8.1.8.2 Interpretation of model output

The output from generalised mixed-effects logistic regression models is provided as coefficient estimates representing log odds (or logits), which indicate the probability of an event occurring versus it not occurring. Thus, a value lower than 0, and 0 being interpreted as the event occurring by chance (i.e., probability of .5 out of 1), would imply that there is a probability lower than .5 for the event to occur than not, that is, the event is more likely to not occur than to occur. By contrast, a value greater than 0 should be interpreted as a probability higher than .5 for that event to occur versus it not occurring.

8.2 Results

This section will include the results from the interpretation tasks conducted in this dissertation. First, the results from the interpretation task that was conducted as a pilot (see section 8.1.3.1) to the main picture selection task will be presented. The aim of this task was to first control for a potential effect of different temporal subordinating conjunctions (i.e., *mientras* ‘while’ and *cuando* ‘when’) in modulating interpretation preferences of null and overt subject pronouns. Subsequently, the results from the main offline picture selection task will be examined to address the research questions formulated for this specific task (RQ4 to RQ8). Importantly, the presentation of the offline picture selection task will be done first by collapsing all participants in a model and then by focusing on the two bilingual groups separately to address RQ8a and RQ8b, which were detailed in section 5.2.

8.2.1 Experiment with conjunctions

8.2.1.1 Participants

The participants in this study were 131 L1 Peninsular Spanish speakers who were born and raised in an environment where most of the speakers were functional monolinguals of Spanish, i.e., they were not raised as simultaneous bilinguals in a bilingual community in Spain (e.g., Catalonia). Their age ranged from 15 to 71, with a mean of 32.2 (SD = 14). Their self-reported percentage of daily use of Spanish was 86.5% (SD = 19.2). Furthermore, from the total group of participants, 122 reported being dominant in their L1 Spanish and the rest of them (N = 9) considered they were dominant in L2 English. In terms of L2 proficiency, 76 of them considered they were highly proficient in English, whereas 55 of them did not report being proficient enough in English as their L2. Moreover, 68 of them reported using the L2 while 63 of them did not use the L2 frequently.

8.2.1.2 Data cleaning and descriptive results

The percentages of selection of a subject antecedent are presented by pronoun and conjunction type in Figure 36 and in Table 43. It is important to mention that the responses where an external referent was selected only amounted to 3% (79/2620) of the

total number of responses provided. Therefore, we opted for the deletion of this third option considering their limited selection rate and to focus primarily on the main subject-object dichotomy. As can be observed below (see Figure 36 and Table 43), null pronouns were largely associated with subject antecedents and overt pronouns with object antecedents. Additionally, it is worth noting that while no difference between the selection of subject antecedents seems to be visually apparent in the overt pronoun condition, more subject antecedents are selected for null pronouns when the sentence they are embedded in is linked by *mientras* ‘while’ instead of *cuando* ‘when’.

Figure 36

Proportion of subject antecedent selection by pronoun and conjunction type

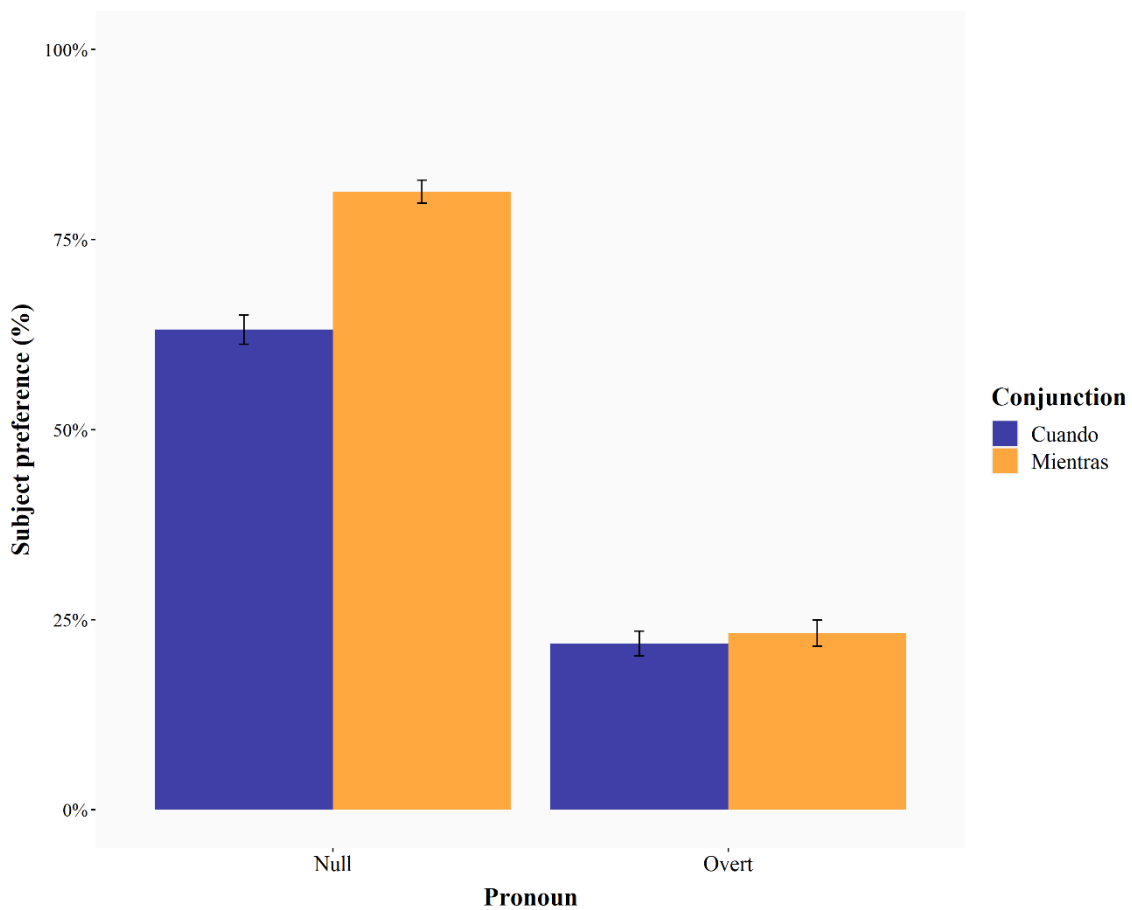


Table 43

Proportion of subject antecedent selection by pronoun and conjunction type

	<i>Quando</i>	<i>Mientras</i>
Null	.63 (.48)	.81 (.39)
Overt	.22 (.41)	.23 (.42)

8.2.1.3 Model selection

The data from this experiment were analysed fitting a generalised linear mixed-effects model with a binomial family using the *glmer* function of the *lme4* package (Bates et al., 2015) in the R programming environment (R Core Team, 2021). Both dummy-coded (Pronoun, Conjunction, High proficiency in the L2, Frequent L2 use, and Spanish dominance¹³⁸) and continuous (Percentage of daily Spanish use, Age) predictors as well as their hypothetically motivated interactions were included in the model. The final model of best fit was selected using maximum likelihood ratio comparisons. Regarding the random-effects structure, both participants and items were tested along with varying slopes that were supported by the data and the best random-effects structure was selected using the *anova* function of the *stats* package comparing models with simplified random structures following Matuschek et al. (2017). Notably, the dependent variable included in this model was binary, whereby subject answers were coded as 1 and object answers as 0, and the output of the model included the log odds for selecting or not a subject antecedent for the null and overt pronoun sentences.

8.2.1.4 Reported model

In order to account for the data presented on the selection of subject antecedents, the final model of best fit included the following dummy-coded and continuous fixed effects: Pronoun (null, overt), Conjunction (*mientras* ‘while’, *cuando* ‘when’), whether participants were highly proficient in L2 English (yes, no) and Age¹³⁹, which was scaled¹⁴⁰, in addition to the interactions Pronoun*Conjunction, Pronoun*Highly proficient L2 and Pronoun*Age. The random-effects structure supported by this model contained random intercepts for participant and item as well as a by-participant varying slope for the effect of Pronoun and a by-item varying slope for the effect of Conjunction.

¹³⁸ High proficiency in the L2 (yes/no) was self-reported by participants, i.e., whether they considered their proficiency level in the L2 to be C1 from the CEFR or higher. Similarly, participants also reported whether they used the L2 frequently or not and whether they considered Spanish to be their dominant language.

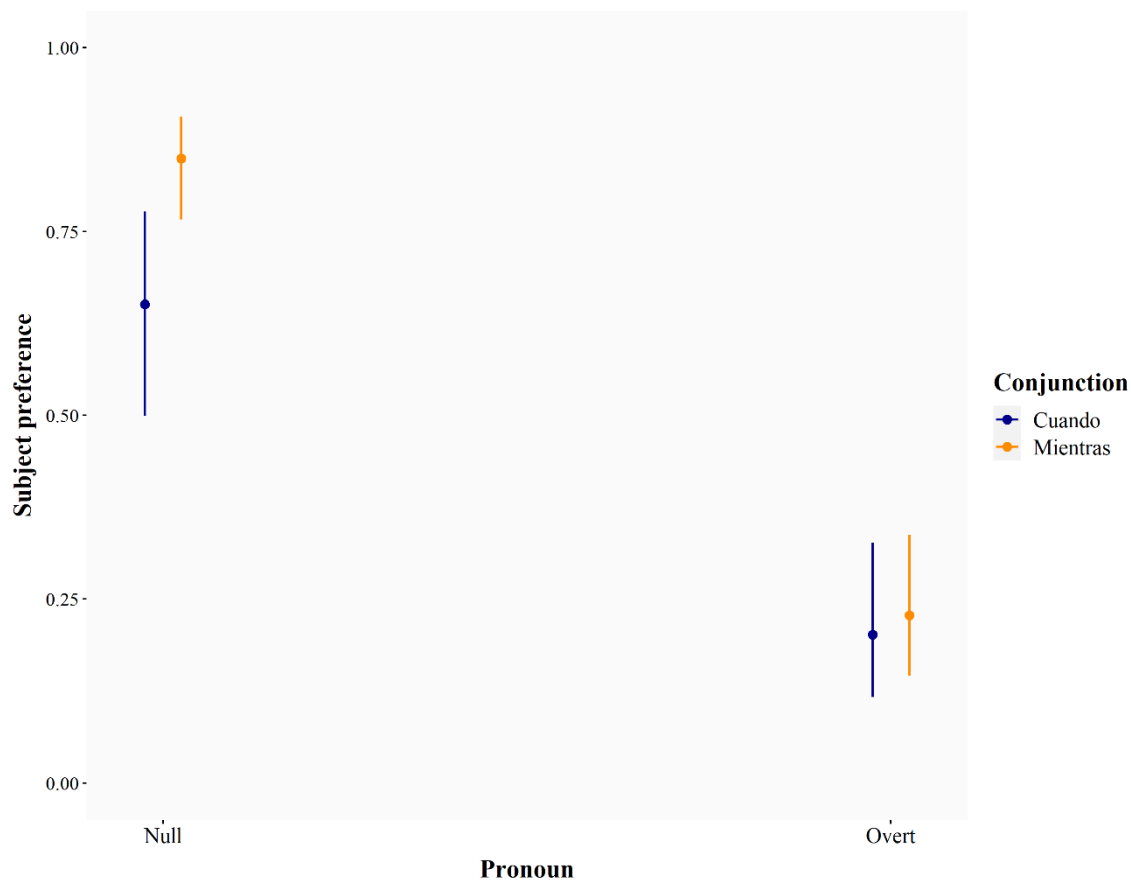
¹³⁹ Although no prior literature has been discussed regarding the effect of age, which is outside the scope of this dissertation, it was included in the model since the model including this variable proved to provide a better fit to the data. In addition, considering its effect proved to be significant, the age of the participants included in this dissertation was controlled given that the stimuli used in the pilot and the main interpretation task were (almost) the same.

¹⁴⁰ Continuous predictors were scaled using the *scale* function in R, which normalises the values by subtracting the mean and dividing it by the standard deviation. This ensures that all variables have mean 0 and standard deviation 1.

The model's total explanatory power is substantial (conditional $R^2 = .53$), and the part related to the fixed effects alone (marginal R^2) is of .33. The model's intercept, corresponding to Pronoun = null, Conjunction = *cuando* 'when', Highly proficient L2 = no and Age = 0, is at .62 (SE = .32, $z = 1.95$, $p = .051$). Concerning the results from the model, both the effect of Pronoun ($\beta = -1.99$, SE = .46, $z = -4.383$, $p < .001$) and Conjunction ($\beta = 1.1$, SE = .22, $z = 4.986$, $p < .001$) were significant, indicating that more subject interpretations were attested in the null pronoun condition and when the conjunction linking main and subordinate clauses was *mientras* 'while'. Moreover, the three interactions with pronoun proved to be significant. The pairwise comparisons using the *emmeans* package (Lenth et al., 2022) for the interaction between pronoun and conjunction revealed that, while more subject antecedents were significantly selected for null pronouns in sentences containing *mientras* 'while' as opposed to *cuando* 'when' ($\beta = -1.104$, SE = .22, $z = -4.986$, $p < .001$), no significant differences were found in the overt pronoun condition ($\beta = -.154$, SE = .22, $z = -.691$, $p = .49$) (see Figure 37).

Figure 37

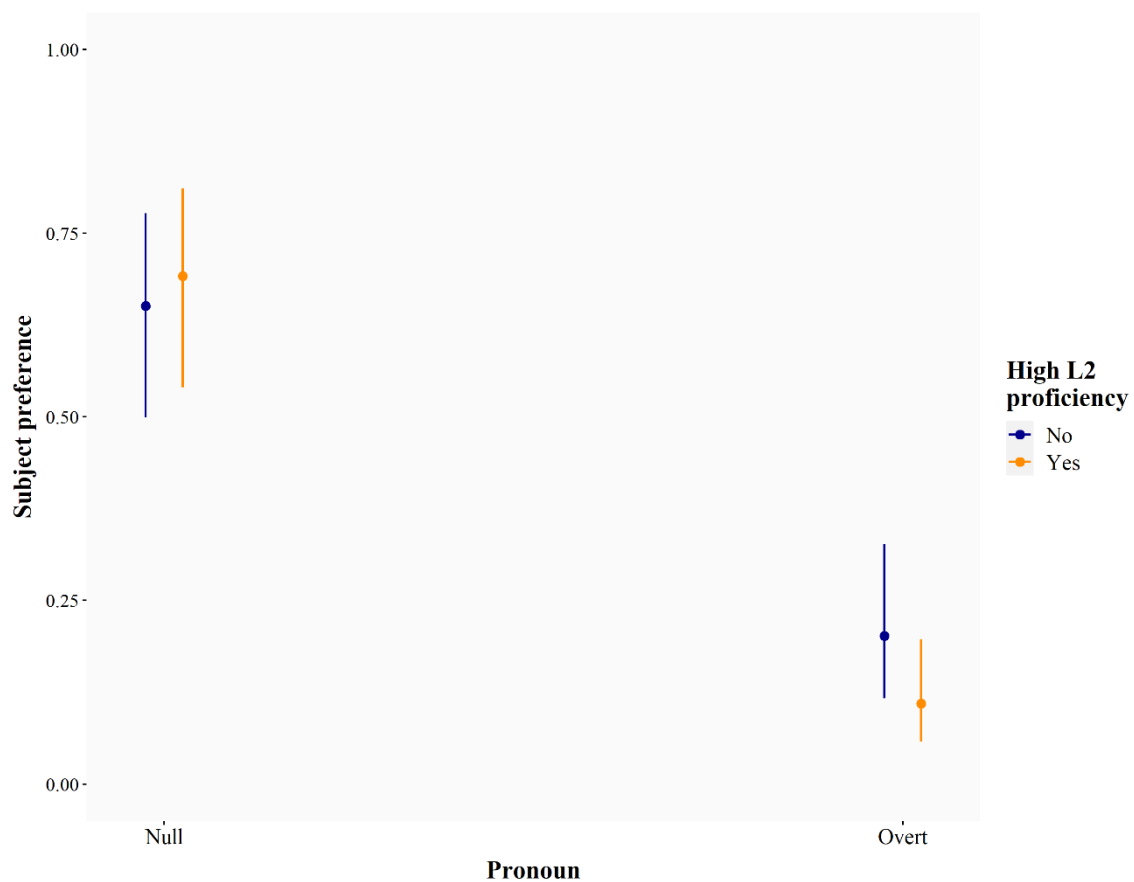
Predicted probabilities of subject antecedent selection by conjunction and pronoun type



Regarding the interaction Pronoun*Highly proficient L2, while no differences were found in the proportion of selection of subject antecedents for null pronouns between those who were highly proficient L2 speakers and those who were not ($\beta = -.185$, $SE = .20$, $z = -.934$, $p = .35$), those who were highly proficient in L2 English selected significantly fewer subject antecedents for the overt pronoun than those who were not proficient in the L2 ($\beta = .721$, $SE = .23$, $z = 3.104$, $p = .0019$), as illustrated in Figure 38.

Figure 38

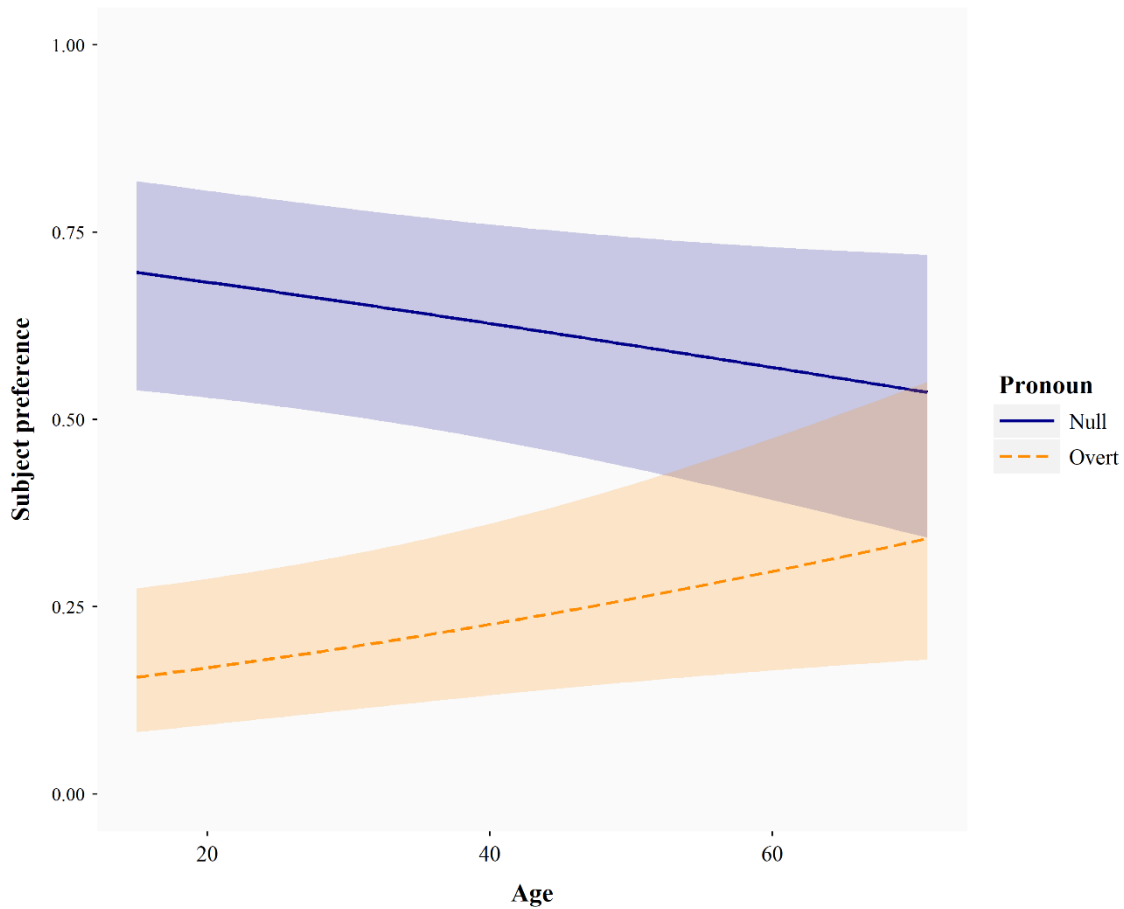
Predicted probabilities of subject antecedent selection by high proficiency in L2 English and pronoun type



As for the third interaction that was reported (see Figure 39), the effect was found to be significant exclusively for the selection of subject antecedents in the overt pronoun condition ($\chi^2(1) = 5.4872$, $p = .038$), suggesting that older participants selected more subject antecedents for the overt pronoun.

Figure 39

Predicted probabilities of subject antecedent selection by age and pronoun type



On another note, three additional models were run to test whether other variables such as how frequently they used Spanish daily measured in a continuum from 0 to 100, whether they used the L2 frequently or not, and whether they considered themselves dominant in Spanish or not. Importantly, none of the aforementioned variables proved to significantly contribute to explaining additional variance that was present in the data compared to the previous model, which provided a better fit in all three comparisons (daily Spanish use, $\chi^2(2) = 1.9675$, $p = .37$; frequent L2 use, $\chi^2(2) = 3.2606$, $p = .20$; and Spanish dominance, $\chi^2(2) = 1.3982$, $p = .497$).

8.2.1.5 Summary of findings

The results from this pilot study suggest that while null pronouns largely select subject antecedents, overt pronouns are specified for a change in topic and mainly select object antecedents. In addition, this tendency is modulated by conjunction type only for null

pronouns: the selection of subject antecedents for null pronouns is significantly higher in sentences linked by *mientras* ‘while’ as opposed to *cuando* ‘when’. Moreover, those participants who were highly proficient in an L2 selected fewer subject antecedents for overt pronouns than those who did not report being proficient in their L2 English. Considering the effect of age, the opposite trend was attested: the older participants were, the more likely they were to choose more subject antecedents for overt pronouns, thus exhibiting less clear-cut preferences. It is also worth mentioning that neither self-perceived dominance in Spanish, whether they frequently used the L2 or not, and the percentage of Spanish daily use significantly accounted for additional variance in this experiment.

8.2.2 Main interpretation task

Having presented the results from the pilot interpretation task, the main findings from the offline picture selection task will now be introduced. Given that the effect of conjunction was shown to be significant, we decided to further include such variable in the main experiment. The aforementioned results also reveal that participants mostly select between a subject and object interpretation for null and overt pronouns and the external antecedent option is very marginally chosen (3%). Therefore, this supports the decision to exclude the third option in this main interpretation task. Additionally, bearing in mind the effect of age in modulating pronoun interpretation, the age range from participants included in this thesis was carefully controlled (see section 6.3).

8.2.2.1 Data cleaning and descriptive results

Prior to analysing the data obtained from the picture selection task designed in LimeSurvey, the data were cleaned. The first step in the data analysis was to exclude participants who reported their L1 variety was not peninsular Spanish considering differences have been attested in different varieties of Spanish (see section 4.1.1). This excluded two participants from the whole sample. The second step was to check the percentage of correct responses by participant in the filler items. The threshold of accuracy of filler items was set at 80% and crucially, all participants had means above it, with an overall mean of 98.74% ($SD = .93$). This clearly indicates that all participants

accurately completed the task and were engaged in it, which suggests their answers were not random. The number of final total observations was 4140, i.e., 20 observations per participant (N = 207). In addition, the results from an item analysis showed that all items triggered similar variability in the participants' responses and hence, no items were excluded from the final analysis.

The proportion of subject interpretations by pronoun, conjunction and group are presented on Table 44 and visualised in Figure 40 below.

Figure 40

Proportion of subject and object responses by group, pronoun, and conjunction type

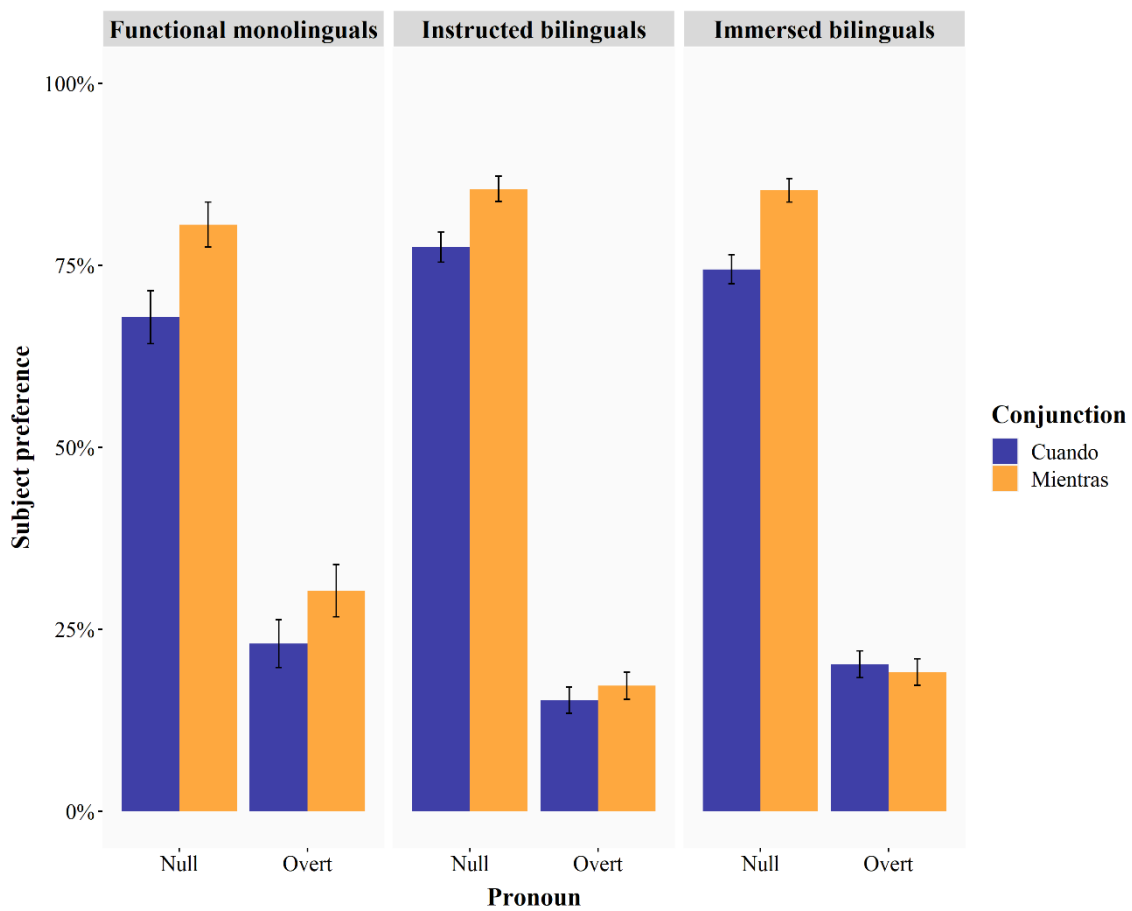


Table 44

Proportion of subject and object responses by group, pronoun, and conjunction type

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	<i>Mientras</i>	<i>Cuando</i>	<i>Mientras</i>	<i>Cuando</i>	<i>Mientras</i>	<i>Cuando</i>
Null	.80 (.39)	.67 (.46)	.85 (.35)	.77 (.41)	.85 (.35)	.74 (.43)
Overt	.30 (.46)	.23 (.42)	.17 (.37)	.15 (.35)	.19 (.39)	.20 (.40)

As can be observed, a considerably higher proportion of subject interpretations were attested in the null pronoun condition as opposed to the overt pronoun condition. Furthermore, while it appears that the three groups of participants selected more subject interpretations for null pronouns when the subordinating conjunction was *mientras* ‘while’ in line with the pilot study, the results for the selection of a subject antecedent with overt pronouns did not seem to be modulated by conjunction except for the group of functional monolinguals, where the difference becomes slightly more noticeable. Overall, null pronouns largely selected subject antecedents in an offline task in the three groups analysed, whereas overt pronouns were largely interpreted as coreferential with object antecedents, showing a complementary distribution following the PAS (Carminati, 2002).

8.2.2.2 Reported models

To analyse the interpretation of null and overt pronouns from the picture selection task (see section 8.2.2), we ran generalised linear mixed-effects models using the *glmer* function of the *lme4* package (Bates et al., 2015) in the R programming environment (R Core Team, 2021). The first model included all participants, and two other models were run for each of the bilingual subgroups separately to explore the contribution of variables that would only be relevant for one of the aforementioned groups, e.g., length of residence in the L2 environment for immersed bilinguals or length of intensive instruction for instructed bilinguals. Given that the outcome variable was binary (i.e., choice between a subject or an object interpretation), subject responses were coded as 1 and object responses were coded as 0. Hence, the output of each models provides log odds for the probability of selecting versus not selecting a subject response.

Regarding model selection (see section 8.1.8.1), fixed effects included Pronoun (null, overt), Conjunction¹⁴¹ (*mientras* ‘while’, *cuando* ‘when’) and Group (functional monolinguals, instructed bilinguals, and immersed bilinguals), all of which were dummy-coded, as well as the interactions Pronoun*Conjunction, Pronoun*Group, and Pronoun*Conjunction*Group. In addition, several scaled continuous predictors (e.g., Dominance score provided by the BLP, Working memory score, Length of residence in the L2 environment, or Length of intensive instructed exposure, among others) were

¹⁴¹ Both pronoun and conjunction were two-level within-subjects independent variables and group was a between-subjects independent variable.

included in the models as well as their interaction with Pronoun as long as their addition significantly improved model fit using model comparison (likelihood ratio test) through the *anova* function of the *stats* package. Considering random effects, varying intercepts for both participants and items were added to a maximal model in addition to the theoretically motivated varying slopes for both participant and item that were allowed by the design and supported by the data, and which did not lead to convergence issues (Barr et al., 2013). Following Matuschek et al. (2017), simplified structures were additionally tested using maximum likelihood ratio tests to see if they improved the fit. The specific allowed fixed- and random-effects structure will be detailed when reporting the results from each model separately. Additionally, the *emmeans* package (Lenth et al., 2022) was used to compute pairwise contrasts when required.

8.2.2.3 RQ4 to RQ8: Interpretation of null and overt subject pronouns and the effect of modulating variables

The results from each of the models run will be presented in this section. Given that the final models include relevant variables that are the object of multiple research questions (see section 5.2), the results will be presented by model altogether first those including all participants and then the ones that focus on the bilingual participants. The discussion will focus on each of the research questions separately.

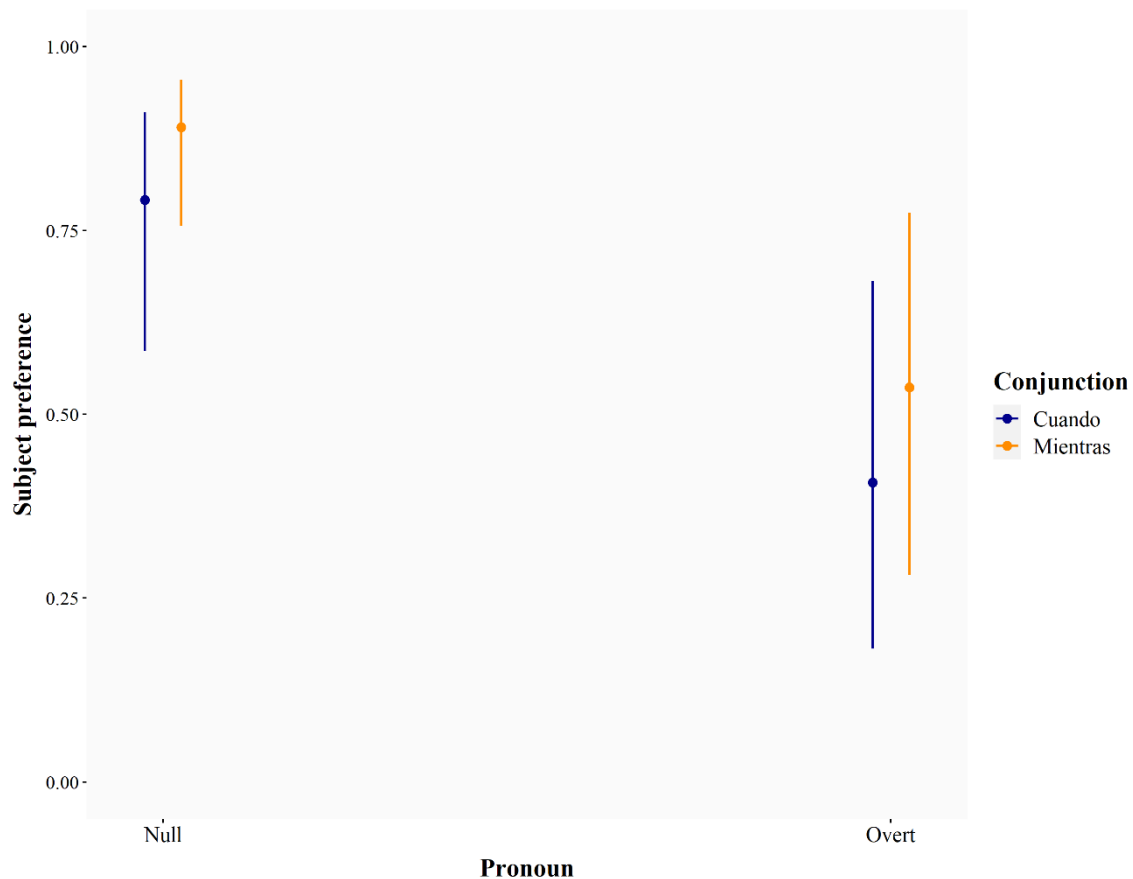
8.2.2.3.1 RQ4 to RQ7: Overall models

Firstly, the final model of best fit with all participants ($N = 207$) included the following fixed effects: Pronoun (null, overt), Conjunction (*mientras* ‘while’, *cuando* ‘when’), Group (functional monolinguals, instructed bilinguals, and immersed bilinguals), BLP dominance score, and Working memory score, together with the two-way interactions Pronoun*Conjunction, Pronoun*Group, Pronoun*BLP score, and Pronoun*Working memory score, and the three-way interaction Pronoun*Conjunction*Group. As random effects, the model contained varying intercepts for items and participants as well as a by-participant varying slope for the effect of Pronoun and a by-item varying slope for the effect of Conjunction. The model's total explanatory power is substantial (conditional $R^2 = .63$), and the part related to the fixed effects alone (marginal R^2) is of .43. The model's

intercept, corresponding to Pronoun = null, Conjunction = *cuando* ‘when’, Group = functional monolinguals, BLP dominance score = 0 and Working memory score = 0, is at 1.33 (SE = .50, $z = 2.63$, $p = .008$). The results from this model show significant simple effects of Pronoun ($\beta = -1.71$, SE = .81, $z = -2.10$, $p = .036$), Conjunction ($\beta = .76$, SE = .32, $z = 2.41$, $p = .016$), and Working memory ($\beta = .25$, SE = .10, $z = 2.49$, $p = .013$), indicating that more subject interpretations were provided for null pronouns, when the subordinating conjunction was *mientras* ‘while’, and as working memory capacity increased. Moreover, the interaction Pronoun*Conjunction proves to be significant in all three groups, suggesting that the selection of subject antecedents was significantly higher when sentences contain the conjunction *mientras* ‘while’ when compared to those containing *cuando* ‘when’ (functional monolinguals: $\beta = -.76$, SE = .32, $z = -2.41$, $p = .016$ /instructed bilinguals: $\beta = -.58$, SE = .25, $z = -2.34$, $p = .02$ /immersed bilinguals: $\beta = -.81$, SE = .24, $z = -3.42$, $p = .0006$), an effect that is not significantly replicated with overt pronouns (see Figure 41).

Figure 41

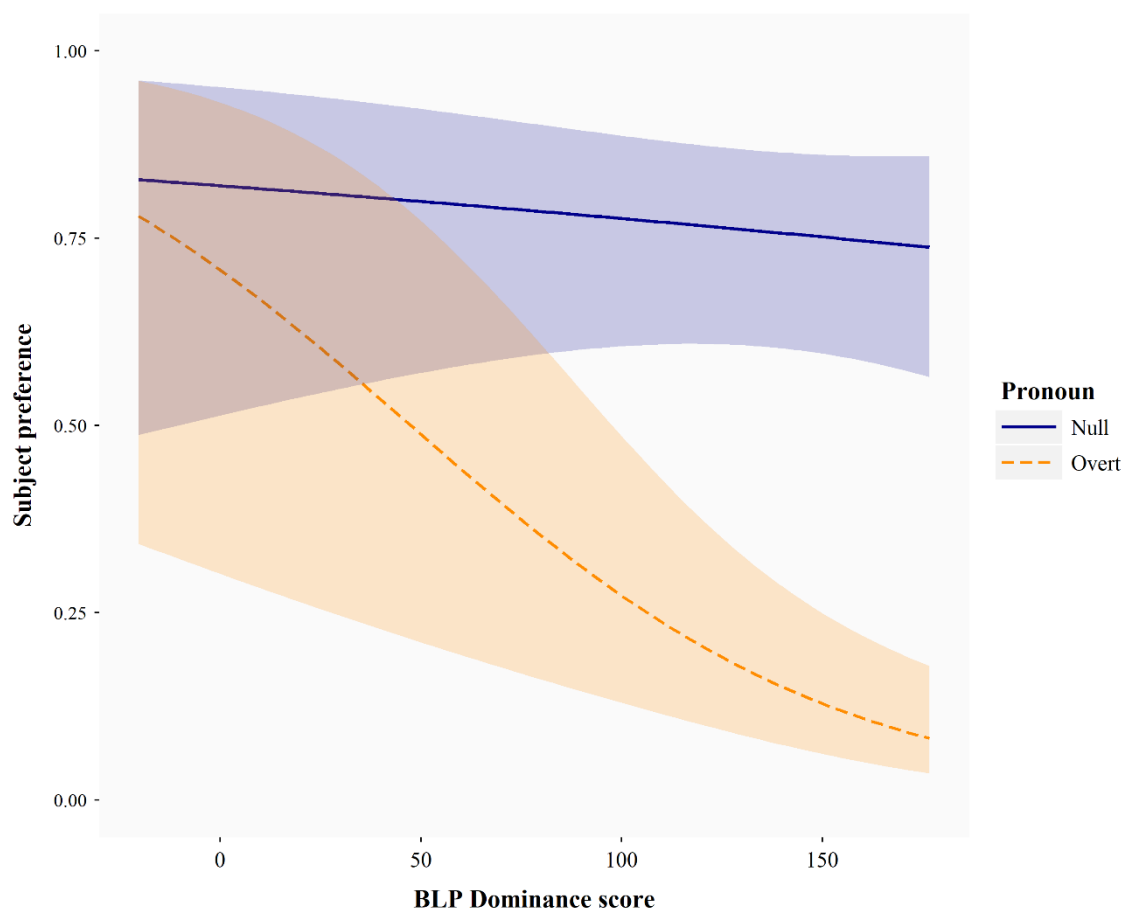
Predicted probabilities of subject interpretation in all groups by pronoun and conjunction type



Another remarkable result from the model shows that both bilingual groups selected significantly fewer subject antecedents for the overt pronoun than functional monolinguals (instructed bilinguals: $\beta = -2.34$, $SE = .82$, $z = -2.853$, $p = .004$ /immersed bilinguals: $\beta = -1.99$, $SE = .92$, $z = -2.15$, $p = .031$), whereas the two bilingual groups did not differ¹⁴². Finally, considering the interactions of Pronoun*BLP dominance score (Figure 42) and Pronoun*Working memory score (Figure 43), the two continuous variables are found to only modulate one of the two types of pronouns regarding subject interpretation selection. A higher BLP dominance score (i.e., indicating higher L1 Spanish dominance) triggered a significantly lower selection of subject antecedent responses for the overt pronoun ($\beta = -.63$, $SE = .31$, $z = -2.06$, $p = .039$). Notably, more L1-dominant bilinguals exhibit clearer PAS preferences (i.e., object interpretation) for the overt pronoun.

Figure 42

Effect of language dominance on the selection of subject antecedents by pronoun type in all participants

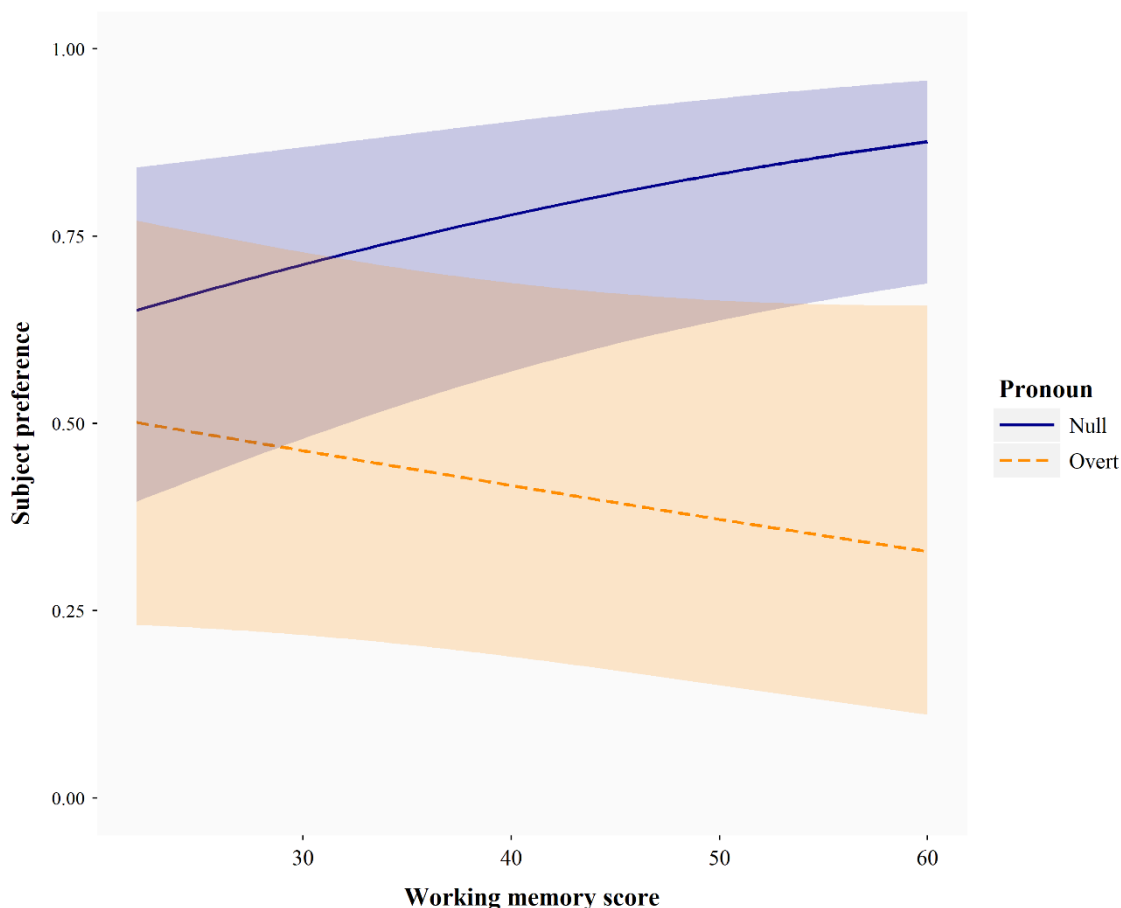


¹⁴² This finding is in line with the tendency found in the pilot study for highly proficient bilinguals to select fewer subject interpretations for overt pronouns.

By contrast, a higher working memory span was associated with a higher selection of subject antecedents for only null subject pronouns ($\beta = -.38$, $SE = .17$, $z = -2.28$, $p = .02$). Those with higher spans presented a clearer tendency to link null subject pronouns with subject antecedents again in line with the PAS.

Figure 43

Effect of working memory span on the selection of subject antecedents by pronoun type in all participants



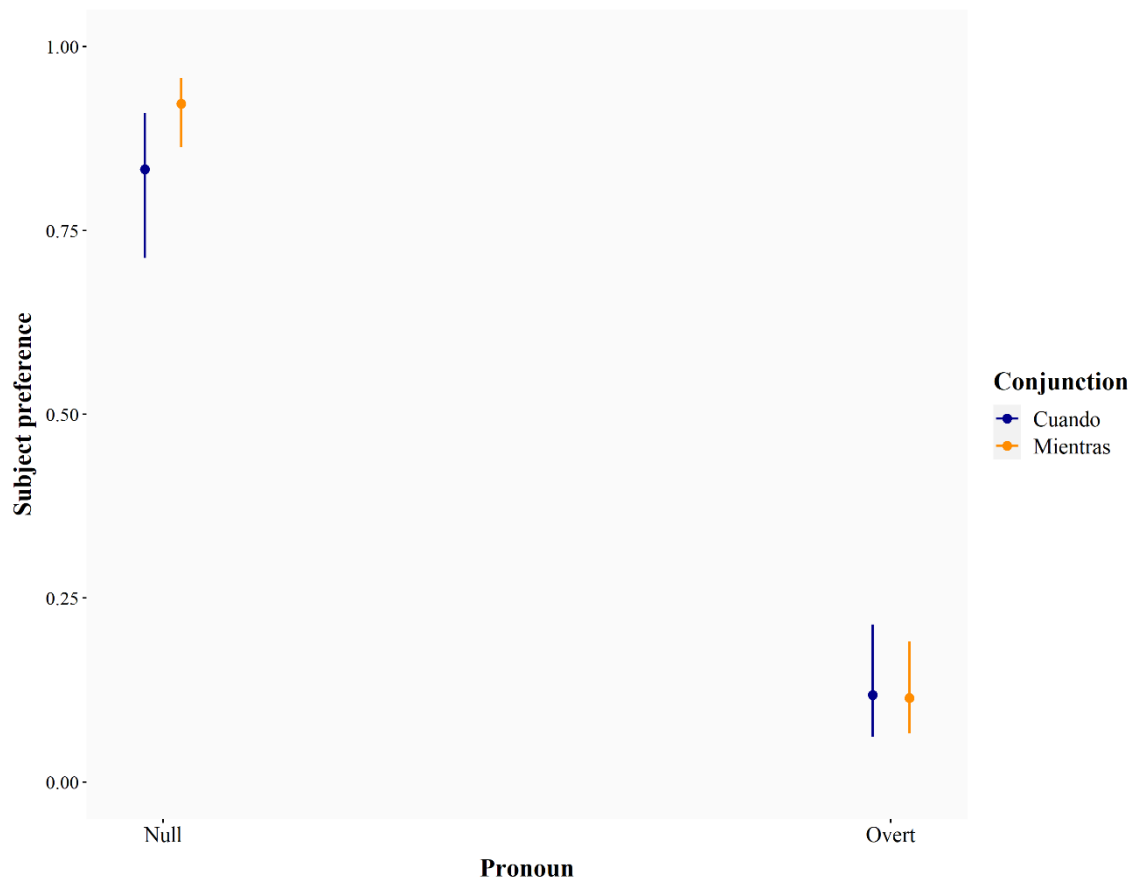
8.2.2.3.2 RQ8: Models with bilingual participants

Having described the overall model including all participants, a specific separate analysis for each of the two bilingual groups will be presented subsequently. First, another model was run on the group of immersed bilinguals ($N = 94$) to explore whether length of residence in the L2 environment further modulated interpretation preferences of null and overt subject pronouns, which was addressed in RQ8a. The final model of best fit included the following main effects and interactions in the fixed-effect structure: Pronoun (null, overt), Conjunction (*mientras* ‘while’, *cuando* ‘when’), BLP dominance score,

Working memory score, and Length of residence in the L2 environment along with the two-way interactions Pronoun*Conjunction, Pronoun*BLP dominance score, Pronoun*Working memory score, and the three-way interaction Pronoun*BLP dominance score*Length of residence in the L2 environment. The random-effects structure allowed by the design was identical to the one selected in the overall model including all participants. The model's total explanatory power is substantial (conditional $R^2 = .66$), and the part related to the fixed effects alone (marginal R^2) is of .43. The model's intercept, corresponding to Pronoun = null, Conjunction = *cuando* 'when', BLP dominance score = 0, Length of residence in the L2 environment = 0 and Working memory score = 0, is at 1.61 (SE = .36, $z = 4.50$, $p < .001$). As for the results, the effect of Pronoun ($\beta = -3.62$, SE = .53, $z = -6.89$, $p < .001$) and Conjunction ($\beta = .87$, SE = .30, $z = 2.86$, $p = .004$) are statistically significant, which again indicate that more subject interpretations were selected with null pronouns and in clauses linked with *mientras* 'while'. Their interaction is also significant (see Figure 44).

Figure 44

Predicted probabilities of subject interpretation in immersed bilinguals by pronoun and conjunction type

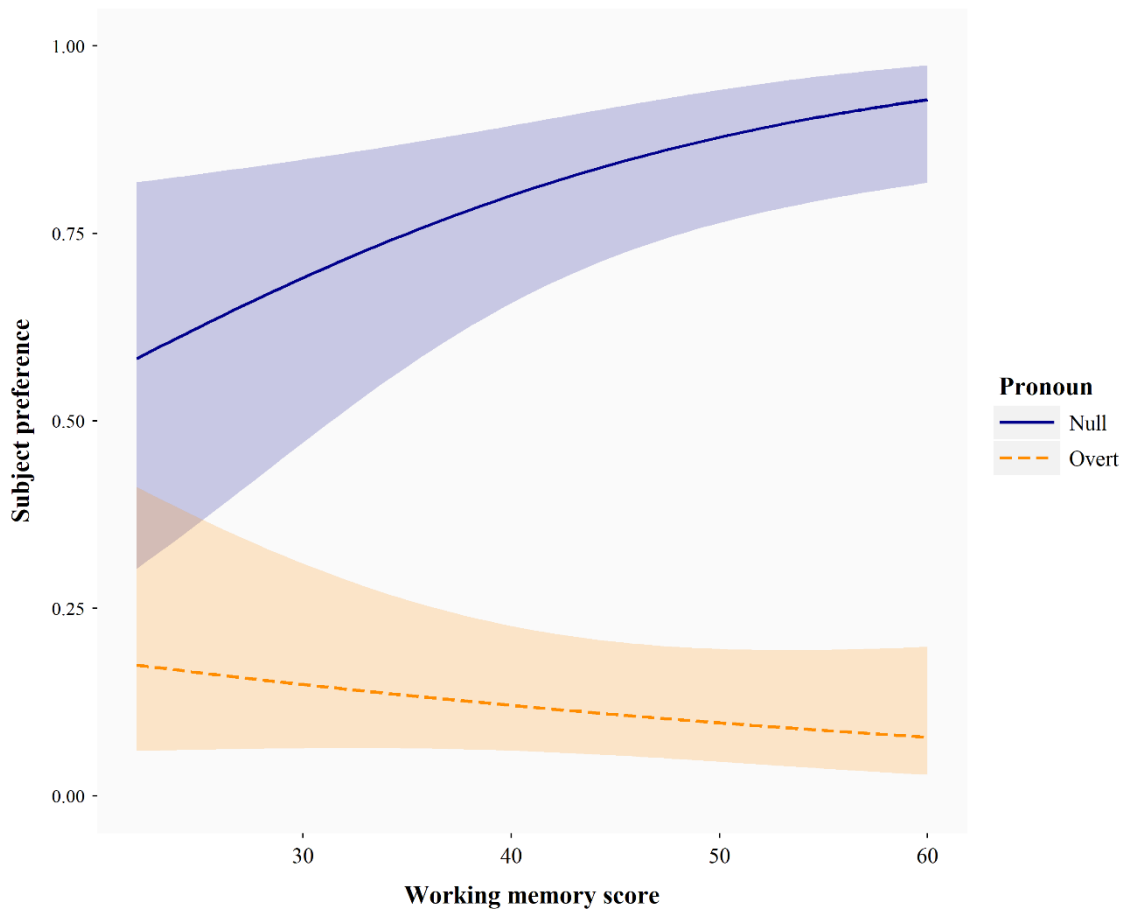


The Pronoun*Conjunction interaction again indicates that more subject interpretations were selected in clauses linked by *mientras* ‘while’, although this only applies to the null pronoun condition ($\beta = .87$, $SE = .30$, $z = 2.857$, $p = .004$). This finding is in line with both the results from the preliminary study on conjunctions and with the results from the overall model presented above.

Furthermore, in the analysis run on immersed bilinguals, the effect of working memory is reported as significant ($\beta = .41$, $SE = .16$, $z = 2.60$, $p = .009$) in that a higher working memory span was associated with an increase in the selection of subject antecedents. Moreover, the effect of working memory span interacts with pronoun significantly as it only affected null pronouns ($\beta = -.57$, $SE = .26$, $z = -2.25$, $p = .02$) as illustrated in Figure 45, which again supports the results from the overall model.

Figure 45

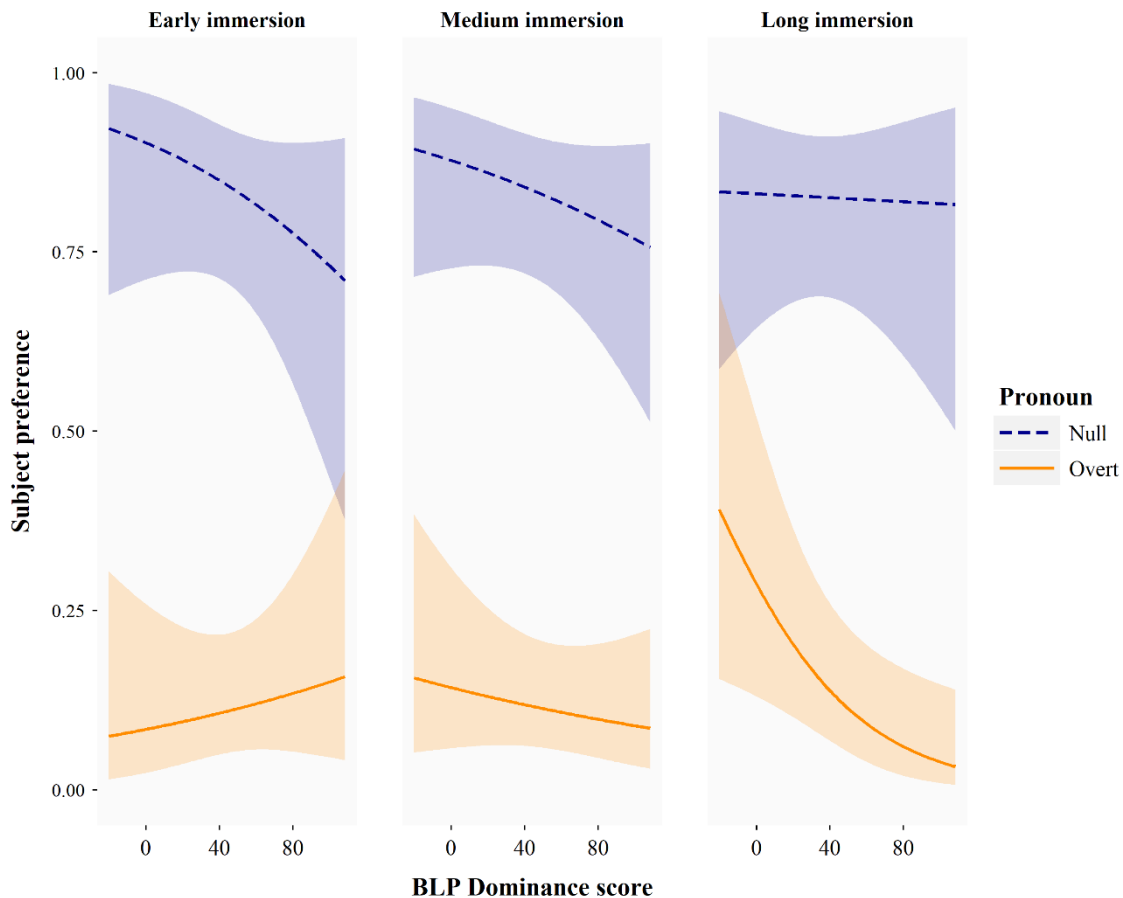
Effect of working memory on the selection of subject antecedents by pronoun type in immersed bilinguals



Finally, a three-way interaction Pronoun*BLP dominance score*Length of residence in the L2 environment is shown to be significant only for overt pronouns ($\beta = -.32$, $SE = .16$, $z = -2.04$, $p = .042$), which indicates that more subject antecedents were selected for overt pronouns in more L1 Spanish-dominant speakers who had been immersed in the L2 environment for longer (see Figure 46).

Figure 46

Effect of language dominance and length of residence on the selection of subject antecedents by pronoun type in immersed bilinguals

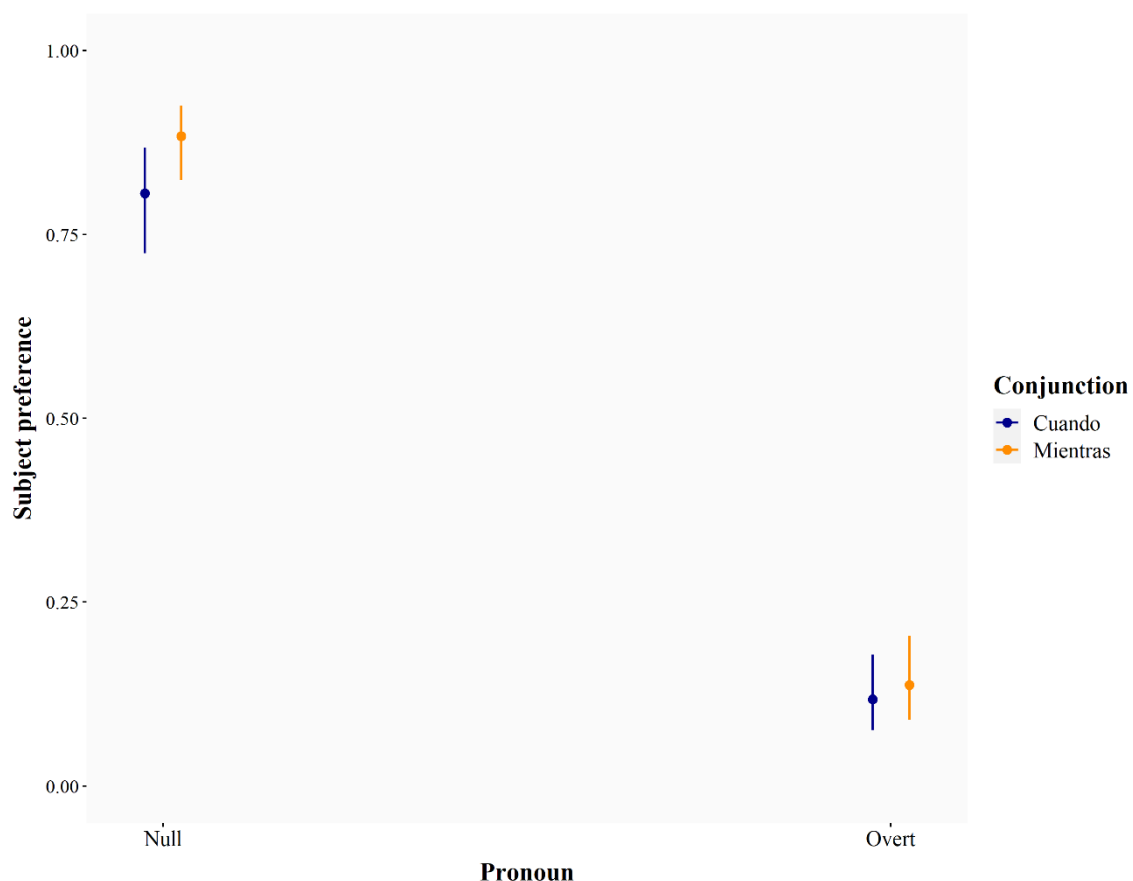


Focusing now specifically on the instructed bilinguals ($N = 80$), a generalised linear mixed-effect model was run to further analyse the role played by length of intensive instructed exposure addressed in RQ8b. The model included Pronoun (null, overt), Conjunction (*mientras* ‘while’, *cuando* ‘when’), BLP dominance score, and length of intensive instructed exposure as well as the interactions Pronoun*BLP dominance score, Pronoun*Length of intensive instructed exposure and Pronoun*BLP dominance score*Length of intensive instructed exposure as fixed effects. In addition, random intercepts were included exclusively for participants and items since adding slopes led to

convergence issues. The model's total explanatory power is substantial (conditional $R^2 = .58$), and the part related to the fixed effects alone (marginal R^2) is of .47. The model's intercept, corresponding to Pronoun = null, Conjunction = *cuando* 'when', BLP dominance score = 0 and Length of intensive instructed exposure = 0, is at 1.42 (SE = .23, $z = 6.11$, $p < .001$). Similarly to the overall model including all participants and the one exploring immersed bilinguals, both the effect of Pronoun ($\beta = -3.44$, SE = .32, $z = -10.60$, $p < .001$) and Conjunction are significant ($\beta = .60$, SE = .19, $z = 3.11$, $p = .001$), which again indicates that more subject antecedents were selected with null pronouns and in stimuli containing the subordinating conjunction *mientras* 'while' (see Figure 47).

Figure 47

Predicted probabilities of subject interpretation in instructed bilinguals by pronoun and conjunction type

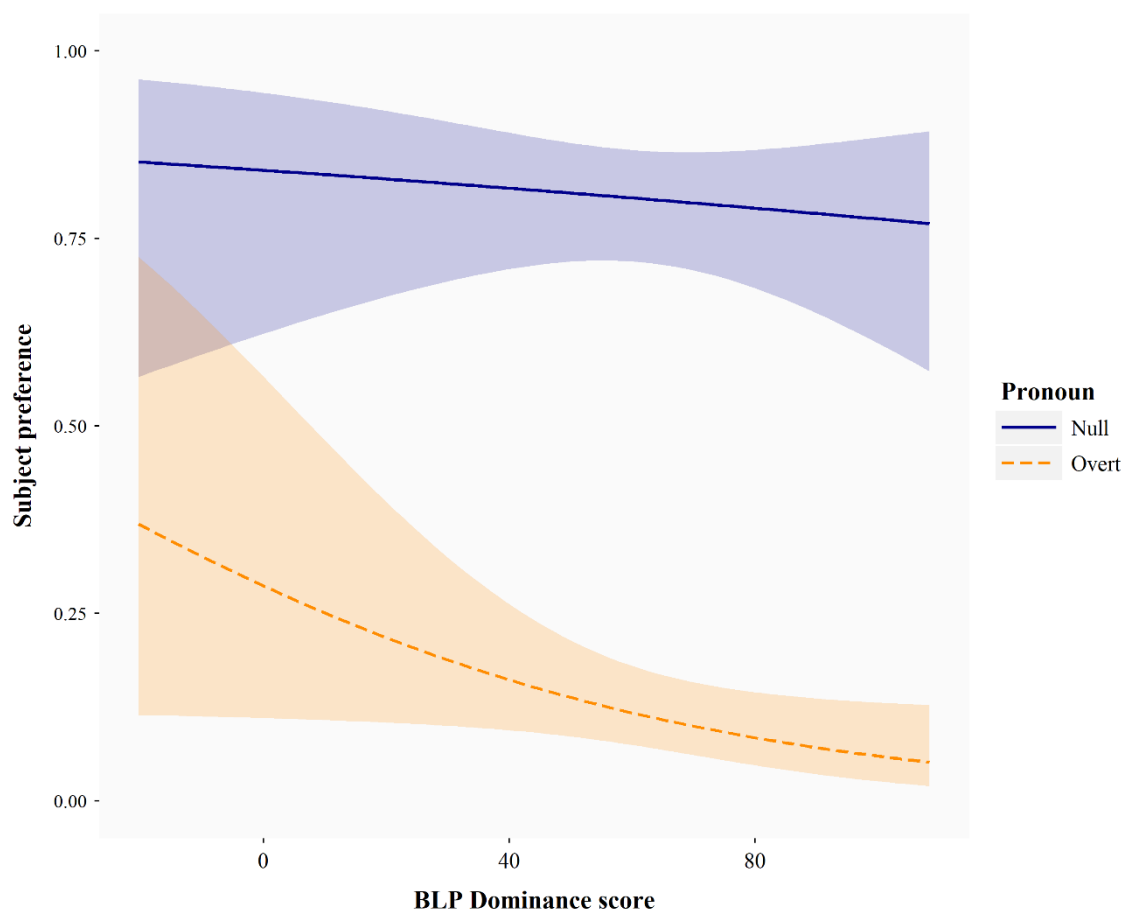


In addition, only in sentences containing a null pronoun and not an overt pronoun, less subject antecedents were significantly selected when the stimulus contained the conjunction *cuando* 'when' ($\beta = -.60$, SE = .19, $z = -3.12$, $p = .002$). As illustrated in Figure 48, the interaction Pronoun*BLP dominance score proved to also be significant (β

= -.46, SE = .15, $z = -3.06$, $p = .002$), suggesting that higher L1 Spanish dominance was associated with a decrease in the selection of subject antecedents only for overt pronouns. This effect was again not replicated in the null pronoun condition in line with the results from the previous models. Notably, the effect of length of intensive instructed exposure or the three-way interaction Pronoun*BLP dominance score*Length of intensive instructed exposure were not significant, indicating that the aforementioned effects surfaced regardless of the amount of time participants had been exposed to the L2 in an intensive instructed setting.

Figure 48

Effect of language dominance on the selection of subject antecedents by pronoun type in instructed bilinguals



On a final note, it is worth mentioning that further analyses were conducted including other variables such as age, age of onset to the L2, and frequency of L1 and L2 use, the last two variables as self-reported by the participants from 0 to 100. Importantly, none of them significantly improved the fit of the final models selected, which indicates that none

of the aforementioned variables could meaningfully account for the variability that is present in the data reported above¹⁴³.

8.2.2.4 Summary of interpretation results

Taking the results from the three models together, it appears that there is a rather salient and significant effect of pronoun. This suggests that null pronouns largely selected subject antecedents whereas overt pronouns most likely linked back to object antecedents, thus establishing a complementary distribution in line with the predictions from the PAS (Carminati, 2002). Furthermore, the two conjunctions included in the analysis (i.e., *mientras* ‘while’ and *cuando* ‘when’) did not seem to trigger the same type of responses and could thus account for additional variance. Subjects embedded in clauses introduced by *mientras* ‘while’ were significantly more likely to be interpreted as coreferential with the previous subject from the main clause. In addition, an interaction between these two variables (i.e., pronoun and conjunction) was reported in all three models: specifically for null pronouns, those that were included in while-clauses significantly selected more subject antecedents than those found in when-clauses. By contrast, such an effect was not attested in the overt pronoun condition.

Another remarkable finding from the results reported above relates to the effect of the continuous variable of language dominance as measured by the BLP. The interaction between pronoun and dominance score indicates that those bilinguals who are more L2-dominant selected more subject antecedents only for the overt pronoun, a tendency which did not surface when analysing null pronouns. This two-way interaction is further modulated by length of residence in immersed bilinguals, i.e., more subject antecedents were selected for overt pronouns by more L2-dominant bilinguals who had been immersed in the L2 environment for longer. On the contrary, the interaction of language dominance as measured by the BLP, and length of residence did not seem to significantly account for sufficient variability in the null pronoun condition. Moreover, when analysing a potential interaction of length of intensive instruction and language dominance with the type of pronoun, none of them reached significance, which might indicate that these variables are not sufficiently helpful in trying to account for variability

¹⁴³ The results from the additional models can be found on Appendix K. Background information and statistical analyses.

in instructed bilinguals' interpretation of null and overt subject pronouns. Finally, it is worth addressing the interaction that becomes evident when investigating working memory span and pronoun type. Overall, the results show that those participants with higher working memory capacity were more likely to interpret null subject pronouns as coreferential with the previous subject antecedent, an effect that did not reach significance in the overt pronoun condition.

8.3 Discussion of interpretation results

This section will deal with the research questions that were formulated for the interpretation of null and overt subject pronouns (see section 5.2). Even though the models reported above dealt with the effect of different variables jointly, the discussion to follow will focus on each specific question separately.

Firstly, regarding RQ4, which addresses the overall interpretive biases of null and overt subject pronouns and whether L1 attrition would most likely manifest in the interpretation of overt pronouns, the results from the offline picture selection task revealed that all three groups interpreted null pronouns as coreferential with subject antecedents and overt pronouns as coreferential with object antecedents. Thus, the predictions from the PAS (Carminati, 2002) were fully met in both instructed and immersed bilinguals as well as in functional monolinguals. These results clearly pattern with previous findings that have reported the two PAS biases in native Spanish (Contemori & Di Domenico, 2021; de la Fuente, 2015), although they clearly contrast with studies that have not found either a subject-null (Bel, García-Alcaraz, et al., 2016; Chamorro, 2018; Chamorro, Sorace, et al., 2016; de Rocafiguera & Bel, 2022; Giannakou & Sitaridou, 2020; Schimke et al., 2018) or an object-overt association (Alonso-Ovalle et al., 2002; Bel, García-Alcaraz, et al., 2016; Clements & Domínguez, 2017; de Rocafiguera & Bel, 2022; Giannakou & Sitaridou, 2020; Jegerski et al., 2011; Keating et al., 2011). By using the same experimental stimuli that have been widely tested in the interpretation of null and overt subject pronouns in Greek and in Italian (Belletti et al., 2007; Papadopoulou et al., 2015; Peristeri & Tsimpli, 2013; Sorace & Filiaci, 2006; Tsimpli et al., 2004), Spanish has been found to exhibit similar interpretation preferences following the PAS.

In addition, as revealed by the interaction of Pronoun*Group, it was found that both instructed and immersed bilinguals exhibited clearer interpretation biases for the overt pronoun in that they significantly selected fewer subject antecedents when compared to the functional monolinguals, and in fact, no significant differences were found between the two groups of bilinguals. Therefore, at first sight, it might appear that no attrition effects were found and contrary to that, bilinguals seem to have reinforced the null-overt interpretive biases, since they distinguish both types of pronouns more clearly as reported in previous studies for L1 Italian under the influence of L2 English in a non-immersion setting (Miličević & Kraš, 2017). Thus, in principle, and as opposed to previous research (Chamorro, Sorace, et al., 2016; Gürel, 2004; Tsimpli et al., 2004), at the group level, instructed and immersed bilinguals do not show vulnerability on the interpretation of subject pronouns and particularly overt pronouns, as would have been predicted by the IH (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016) or the ATH (Paradis, 1993, 2004, 2007). However, we will return to this issue while addressing RQ6.

To explore potential factors modulating the interpretation of null and overt subject pronouns, RQ5 was formulated to investigate whether internal variables such as the subordinating conjunction used would trigger different interpretive biases of null and overt subject pronouns. This factor was explored in order to address the imbalance in the subordinating conjunctions employed in the study that served as the basis for this replication (Tsimpli et al., 2004) and given that different studies testing interpretation of subject pronouns in Spanish have used different subordinating conjunctions (Chamorro, 2018; de Rocafiguera & Bel, 2022; Giannakou & Sitaridou, 2020; Jegerski et al., 2011; Keating et al., 2011), which could arguably explain some of the variability attested. As evidenced by a significant interaction Pronoun*Conjunction, both the temporal subordinating conjunctions *cuando* ‘when’ and *mientras* ‘while’ were found to trigger different association strengths, particularly in the null pronoun condition. In the three groups analysed, null pronouns in sentences containing the subordinating conjunction *mientras* ‘while’ were significantly more likely to select subject antecedents than those that were linked with *cuando* ‘when’. These results can be explained in terms of the meaning associated with each conjunction, which are key in establishing relationships between propositions and discourse relations (Holler & Suckow, 2016), which can in turn trigger or suppress pronoun interpretation preferences (Kehler et al., 2008; Kehler & Rohde, 2019). Even though the two subordinating conjunctions analysed might arguably

convey similar temporal meanings, *while* ‘*mientras*’ is more restricted in meaning in that it almost exclusively allows for a simultaneous reading of the two clauses and *cuando* ‘when’ can additionally trigger a sequential reading apart from a simultaneous one (Kupersmitt & Nicoladis, 2021; Silva, 1991; Winskel, 2003, 2004). Hence, a simultaneous-only reading for clauses linked by *mientras* ‘while’ arguably triggers a tighter link between the two clauses, which can then favour a strong subject-null association as illustrated in the results from this task.

It is important to mention that the aforementioned results on the effect of different subordinating conjunctions are likely to address inconsistencies shown in previous studies on the interpretation of null and overt subject pronouns in native Spanish. Notably, several studies that have not replicated the subject-null association bias (Chamorro, 2018; Chamorro, Sorace, et al., 2016; Giannakou & Sitaridou, 2020) have indeed only used the subordinating conjunction *cuando* ‘when’ in their stimuli, which might in part explain this decreased association strength of null pronouns towards the previous subject. In addition, even though Contemori and Di Domenico (2021) found both interpretation patterns predicted by the PAS, the percentage of subject selection for null pronouns was comparatively lower (62%) when compared to that found in other studies, e.g., 73.2% in Alonso-Ovalle et al. (2002). These less polarised results might arguably be justified considering the stimuli in Contemori and Di Domenico (2021) were also linked using the subordinating conjunction *cuando* ‘when’. On a final note, Schimke et al. (2018) used *before* clauses and did not report a significant bias of null pronouns towards subject antecedents. While the linker used is different, it could be argued that it also conveys a sequential reading making it more similar to *cuando* ‘when’, which could have lowered the association strength between the null pronoun and a subject antecedent.

Considering these results, it is worth emphasising their relationship with the predictions formulated by the Form-Specific Multiple-Constraints Approach (Kaiser & Trueswell, 2008). The exploration of a language internal factor such as the use of different subordinating conjunctions has revealed that different pronominal forms, i.e., null and overt pronouns, can be subject to different constraints as well as to different degrees (Wolna et al., 2022). It was evidenced that only null pronouns appear to be sensitive to the different conjunctions used, which might influence antecedent salience, while overt pronouns appear to be insensitive to this particular cue. These results then contribute to previous research that has investigated the role of different syntactico-semantic cues in

pronoun interpretation in languages such as Estonian, German, English, or Dutch (Kaiser, 2010, 2011).

The following research question, i.e., RQ6, aimed at investigating the role of language dominance in modulating pronoun interpretation biases. Instead of exploring language dominance dichotomously, we investigated whether a continuous measure such as the overall score from the BLP explained variability in the interpretation of null and overt subject pronouns in line with the predictions from the IH, the ATH and the PPVH. The significant interaction Pronoun*BLP dominance score revealed that, while the interpretation of null pronouns was insensitive to differences in language dominance, those participants who were more L2 dominant significantly selected more subject antecedents for overt pronouns, making them more redundant, in line with the predictions from the PPVH. This finding suggests that, despite there not being a significant difference at the group level between functional monolinguals vs. instructed and immersed bilinguals in line with the predictions formulated by the IH for L1 attrition, L1 attrition is manifested in the interpretation of overt pronouns when considering factors such as language dominance. These findings on the vulnerability of overt pronouns are partly in line with previous research on L1 attrition both in Spanish (Chamorro, Sorace, et al., 2016) and in other null-subject (Gürel, 2004; Tsimpli et al., 2004) and non-null-subject languages (Wilson, 2009). Overall, the predictions from the IH are met in that only overt pronouns appear to be affected by attrition and not null pronouns.

However, added to the prediction that attrition would most likely manifest in online processing, which is also reported in Chapter 9, evidence is provided of vulnerability in offline interpretation. When exploring gradience in bilingualism profiles through language dominance, L1 attrition effects can also be observed in tasks that do not necessarily involve the processing of interface structures in real time. This vulnerability of overt pronouns in the offline interpretation task parallels with the absence of a processing penalty found in instructed and immersed bilinguals when interpreting overt pronouns referring back to subject antecedents in real time, which is later evidenced in the self-paced reading task. Importantly, these findings seem to suggest that future theories should make predictions that explore bilingualism as a continuum instead of making categorical predictions considering the dichotomy bilingual vs. monolingual.

Furthermore, the previous findings are also in line with the claims made by the ATH, which predicts vulnerability in forms that have a high activation threshold due to

disuse and a competing element in the L2, that is, Spanish overt pronouns in this particular case. These findings can additionally be explained accounting to factors such as frequency and recency of L1 use considering that more L2-dominant bilinguals will use the L1 both less frequently and less recently, as these domains were included in the computation of the BLP score (see section 6.2.2). Finally, it is important to highlight that this effect was replicated in both groups of bilinguals and thus, L1 attrition has been attested in both immersed and instructed bilinguals (Długosz, 2021; Requena & Berry, 2021).

Another factor included in the analysis was working memory capacity, which was addressed in RQ7. Following Vogelzang et al. (2021), who hypothesised working memory to affect null pronoun interpretation and not that of overt pronouns, our findings provided additional evidence of such an effect in Spanish. A significant interaction Pronoun*Working memory score showed that only the interpretation of null pronouns was modulated by working memory capacity. Higher working memory spans were associated with an increase in the selection of subject antecedents for null pronouns (Bel, Sagarra, et al., 2016; Vogelzang et al., 2021). The working memory effect on null pronoun interpretation might be explained given that salience is maintained for more distant subject antecedents, which is in fact better preserved in individuals with higher working memory spans (Cunnings & Felser, 2013; Daneman & Carpenter, 1980; J. L. Nicol & Swinney, 2003; Nowbakht, 2019).

Finally, RQ8 was formulated to explore the potential role of length of residence or length of intensive instructed exposure in triggering different interpretation biases of subject pronouns in immersed and instructed bilinguals, respectively. While no effect was found for length of intensive instructed exposure, length of residence in the L2 environment accounted for variability in interpretation patterns of overt pronouns in immersed bilinguals. While some authors argue that length of residence is a crucial factor in L1 attrition (Schmid, 2019; Schmid & Cherciov, 2019), the evidence available to date is still inconclusive (see section 2.2.2). In our study, as evidenced by a significant three-way interaction Pronoun*BLP dominance score*Length of residence in the L2 environment, overt pronouns were found to be more likely interpreted as coreferential with subject antecedents the longer bilinguals had been immersed in the L2 environment and the more L2-dominant they were. This effect of length of residence has been reported in previous studies investigating L1 morphosyntactic attrition (Wilson, 2009) but not in others (Gürel, 2004). However, it is worth highlighting that Gürel (2004) performed an

analysis whereby she collapsed participants into those that had been longer immersed with those with shorter length of residence, which might have in fact done away with variability that is relevant to explain the effect. Moreover, it could also be that the effects of length of residence might not be visible when testing participants who have been immersed in the L2 environment for longer than 10 years as it was the case in Gürel (2004), since attrition effects seem to stabilise when length of immersion is that high (de Bot & Clyne, 1994; Waas, 1996).

On another note, in relation to the ATH, the effect reported can first be accounted for by the competition in overt pronouns between Spanish and English, which makes them more vulnerable in language contact situations due to their high activation threshold. In addition, considering recency and frequency of L1 use, as already stated, the longer participants have been immersed in the L2 environment, the more likely it will be that they have used the L1 possibly less frequently and less recently. However, it makes sense that this effect interacts with language dominance. Longer immersion does not necessarily imply a more infrequent use of the L1, a factor that is indeed included within the BLP computation, and thus, the interaction effect that was reported combines both the amount of time they have spent in the L2 environment but also how frequently they use the L1 as gauged by the BLP score. This contrasts with the pattern attested in earlier studies where L1 use was not likely to be maintained after migration (de Bot & Clyne, 1994; Waas, 1996).

Overall, the findings from the interpretation task reveal L1 attrition effects in the interpretation of overt pronouns in both instructed and immersed bilinguals in line with the IH, the ATH, and the PPVH. Particularly, overt pronouns appear to be vulnerable in L1 attrition as predicted by the IH, although this effect is not found at the group level but when exploring individual variability in bilinguals through language dominance. In addition, the type of subordinating conjunction has been found to modulate interpretation preferences of only null pronouns and provides further evidence on the claims made within the FSMC approach. Finally, the effect of working memory has been exhibited in modulating interpretation biases of only null pronouns. These findings then pattern with an increased overexplicit use of overt pronouns in instructed and immersed bilinguals reported in the production tasks in Chapter 7, as well as with the absence of a processing penalty when forcing coreference with subject antecedents for overt pronouns that will

be presented in Chapter 9. The following chapter will then present the methodology used in the self-paced reading task, as well as the results, and a final discussion.

CHAPTER 9. Online self-paced reading task

9.1 Methodology

A self-paced reading task was used to measure sensitivity to antecedent-pronoun (mis)matches in the bilingual groups under investigation. This technique uses reaction time (RT) as the dependent variable, which relates to the time it takes to react to a given stimulus, and, in this case, to a linguistic stimulus (e.g., word, phrase, or clause, among others). A self-paced reading experiment is said to measure online processing time and thus reflects online cognitive mechanisms (Just et al., 1982; Marsden et al., 2018). In this study, the focus will be on ambiguity resolution to explore whether different conditions might lead to processing costs, which are manifested as longer RTs (Keating & Jegerski, 2015). Including this task provides relevant data on the processing of these two types of pronouns, which complements the results from the oral production and interpretation tasks.

The aim of this task was to analyse whether the presentation of a matching or mismatching picture with the interpretation of each sentence, and particularly, with the interpretive biases of null and overt pronouns, would cause the bilingual participants to read the segments of interest slower or faster in line with the predictions from the PAS (Carminati, 2002). For instance, it could be argued that the segments of interest within a null pronoun experimental condition could be read slower if the picture presented depicted the object of the main clause performing the action in the subordinate clause (contrary to the predictions of the PAS). The presentation of the matching and mismatching picture was counterbalanced across null and overt pronoun conditions (see example 90), i.e., the same sentence was presented with a matching interpretation (see 90.1) in one list and with a mismatching interpretation (see 90.2) on the other. Two counterbalanced lists were then created¹⁴⁴.

¹⁴⁴ Note that example 90 only displays an illustration of the matching or mismatching pictures that were presented with each experimental item. For an illustration of an experimental trial, see Figure 49.

90. *El abuelo habló rápido al nieto mientras leía el libro.*

‘The grandpa spoke fast to the grandson while he was reading the book’.



1. PAS match



2. PAS mismatch

The stimuli from this task were almost identical to the ones used in the offline picture selection task (see Chapter 8). They were additionally modelled after the task used in Kaltsa et al. (2015), which investigated the processing of null and overt subject pronouns in L1 Greek-L2 Swedish attriters, among other groups. The only modification which was added compared to the offline picture selection task was that the additional factor of conjunction type was not manipulated in the self-paced reading task used in this dissertation, but it was controlled. Half of the experimental stimuli contained the conjunction *cuando* ‘when’ and the other half contained *mientras* ‘while’. This was done to gain more statistical power in the results from differences in the attachment of null and overt pronouns which could be further obscured by the role played by the subordinating conjunction considering the limited number of experimental items included in this design¹⁴⁵.

Thus, half of the 20 final experimental items in this task contained an overt pronoun and the other half a null pronoun¹⁴⁶ (see Appendix J. Self-paced reading task: stimuli), half of which were presented with a subject-biasing picture and the other half with an object-biasing picture, thus creating four different conditions (see Table 45). Note that one of the aims of this thesis was to explore whether the processing of null and overt pronouns differed in advanced instructed and immersed bilinguals and those with low L2

¹⁴⁵ Contrary to a picture selection task, the use of a self-paced reading methodology adds another layer in the data analysis, i.e., outlier deletion, after which some data points are eliminated. Hence, the addition of another layer of analysis and the subsequent data loss that is common in this methodology could make it more difficult to address our research questions. Furthermore, the reasoning behind this was to also keep the design as close as possible to the original.

¹⁴⁶ Following the recommendations from Keating and Jegerski (2015), 8 to 12 items per condition would have been desirable to keep 6 to 10 items per condition after data trimming and outlier deletion. Even though this was not possible in our study considering its replication nature, the number of participants was considerable to have enough observations for statistical analyses to be reliable.

English proficiency, that is, functional monolinguals. For each item, we selected the conjunctions that more clearly biased towards the expected PAS interpretation from the experiment with conjunctions (see section 8.1.3.1). This means that for the same experimental stimulus which had been presented with *cuando* ‘when’ and *mientras* ‘while’ in two counterbalanced lists, the conjunction selected for the self-paced reading task was that whose percentage of selection of the subject for the null pronoun condition and the object for the overt pronoun condition was higher. Therefore, each of the pronouns in the subordinate clause had been clearly interpreted as referring to either the subject or the object of the main clause in the pilot experiment with conjunctions (see section 8.2.1) with L1 Spanish participants. It is worth mentioning then that if the presentation of a mismatching picture leads to a greater processing cost in both overt and null pronoun conditions, this will surface more evidently in items showing a clearer bias following the PAS (Carminati, 2002).

Table 45

Experimental design of the self-paced reading task: conditions

		Bias type	
		<i>Subject-bias</i>	<i>Object-bias</i>
Pronoun	Null	a (N =5)	b (N =5)
	Overt	c (N =5)	d (N =5)

9.1.1 Format of experimental stimuli and fillers

Each experimental and filler sentences contained seven segments that appeared non-cumulatively in the centre of the screen by pressing the space bar. In particular, the experimental stimuli (see Table 46 and Table 47) contained the following segments:

Table 46

Segments in overt pronoun condition in the self-paced reading task

S1 (subj.)	S2 (v.)	S3 (obj.)	S4 (conj.)	S5 (pron.)	S6 (v.)	S7 (object)
La anciana	saludó	a la mujer	cuando	ella	cruzaba	la calle.

Table 47

Segments in null pronoun condition in the self-paced reading task

S1 (subj.)	S2 (v.)	S3 (adv/obj.)	S4 (obj.)	S5 (conj.)	S6 (v.)	S7 (object)
El abuelo	habló	rápido	al nieto	mientras	leía	el libro.
La abuela	mostró	la foto	a la nieta	mientras	tomaba	el desayuno.

As can be appreciated, to keep the number of segments constant in the two conditions, an additional segment was present in the null pronoun conditions (see Table 47), which could be either an adverb (6 instances) or an NP, mostly an object (4 instances), as illustrated above in segment 3.

In terms of length (see Appendix J. Self-paced reading task: stimuli), most sentences contained between 10 to 12 words in total, with only one of them containing 13 words (item 5 from the null pronoun condition). As for the segments of interest, i) in the null pronoun condition, 7 of the verbs in segment 6 contained 3 syllables and 3 of them contained 4, and ii) in the overt pronoun condition, 8 of them contained 3 syllables and only 2 of them contained 4. Regarding the number of syllables in segment 7, most of them contained between 3 to 5 syllables with only two exceptions, which included 6 syllables in total (one in the overt pronoun condition and another one in the null). The number of words and syllables in the sentence and each segment was controlled to the extent that it was possible (Keating & Jegerski, 2015), given that the stimuli were adapted from Tsimpli et al. (2004) and Kaltsa et al. (2015) and some minor changes had to be made in translating the sentences. Importantly, these issues will be addressed to the extent that it is possible in the statistical analysis using mixed-effects models¹⁴⁷.

Table 48

Structure of experimental sentences: length of critical segments

	NULL	OVERT
Average sentence length in number of words	11	11.2
Average number of syllables in segment 6	3.3	3.2
Average number of syllables in segment 7	4.1	4.1

Considering the frequency of the lexical items included in segment 6, i.e., the verbs within the subordinate clause were all highly frequent verbs with over 10,000 raw occurrences in the *Corpus del español: Now (2012-2019)*¹⁴⁸ by Mark Davies, with the exception of two verbs (i.e., *bostezar* ‘to yawn’ and *ponerse* ‘put something on’), one in the null and the other one in the overt pronoun condition, respectively. The raw mean of occurrences of the verbs selected was 307,295.05. Furthermore, the nouns appearing in segment 7 were highly frequent nouns, with raw frequencies of over 25,000 in the *Corpus del*

¹⁴⁷ Whenever possible, a random effect will be included for the effect of item, which will potentially account for variability within items.

¹⁴⁸ <https://www.corpusdelespanol.org/now/>

español: Now (2012-2019) and with a mean of 476,696.15. Since it is desirable to control for lexical frequency to have a more balanced and carefully controlled design, it is worth mentioning that this study builds on a previous one as a quasi-replication, as has been already argued, and the selection of high frequency verbs and nouns in the critical regions was controlled to the extent that it was possible. Moreover, the words selected had to be easily represented visually (i.e., bearing in mind their imageability) considering the final format of this experiment.

In addition to the experimental items, there were 30 fillers which were the same included in the offline picture selection task. Each of the fillers was presented with either a matching or unmatching picture in relation to the meaning of the sentence depicted. The ratio of experimental items and fillers was 1:1.5, so there were more fillers, as recommended by Keating and Jegerski (2015), to divert participants' attention from the aim of the study. Filler items were also divided into seven segments and contained between 7 to 14 words, with a mean of roughly 11 words (see example in Table 49). Thus, the mean number of words was almost identical to that of critical items. The sequence of presentation of critical and filler trials was randomised in such a way that experimental conditions appeared separated by one or two filler items.

Table 49

Segments in filler item in self-paced reading task

S1	S2	S3	S4	S5	S6	S7
La chica	había	empezado	a escribir	una carta	cuando	oscureció.

Finally, it is worth mentioning that prior to starting the main experiment, participants became familiar with the format of the task with eight practice items which also contained seven segments and where participants had to answer a comprehension question at the end¹⁴⁹. The structures included were not similar to the ones manipulated in the experiment and the aim was to minimise task familiarity effects (Keating & Jegerski, 2015).

¹⁴⁹ The number of practice items included was higher than the mean of 5.01 (SD = 5.2) reported in Marsden et al. (2018).

9.1.2 Listening to reading

Even though the experiment that served as the basis for this replication made use of a self-paced listening methodology (Kaltsa et al., 2015), the final experiment used in this study was a self-paced reading task. The motivation to do this was that, due to the restrictions imposed by the COVID-19, the data had to eventually be collected online using OpenSesame (Mathôt et al., 2012), which was made available using the JATOS server (Lange et al., 2015). Given that each participant would have to complete the task using their own device, there could potentially be added limitations regarding the time lag of each device to present the sound if the task was kept as the original, the quality of the speakers, or the limitations when dealing with sound recordings of the pieces of software run online, among others. Thus, the decision was to adapt it to a self-paced reading¹⁵⁰ format since some online self-paced reading tasks had already been implemented using different software and results proved not to differ significantly from tasks conducted in a lab setting (Bridges et al., 2020; Gastmann et al., 2022; Mathôt & March, 2022). Nevertheless, several adaptations had to be made given that the same procedure could not be followed.

9.1.3 Procedure

Firstly, regarding the instructions they were provided to complete the task (see Appendix I. Instructions self-paced reading task), they were told that they would first be presented with an image that they could watch for as long as they wished. Then, a fixation point would appear for 500 ms and the first segment would be presented. They needed to move along the segments by pressing the space bar as fast as they could¹⁵¹. Once they had read the sentence, they would need to answer the comprehension question as fast as they could. Furthermore, they were also reminded to complete the task in a quiet place with no distractions to mimic the conditions in the lab.

Considering the procedure, recall that the aim of this task was to measure reaction/reading times (RTs) of different segments as arguably influenced by the presentation of matching or mismatching pictures biasing towards the (un)expected

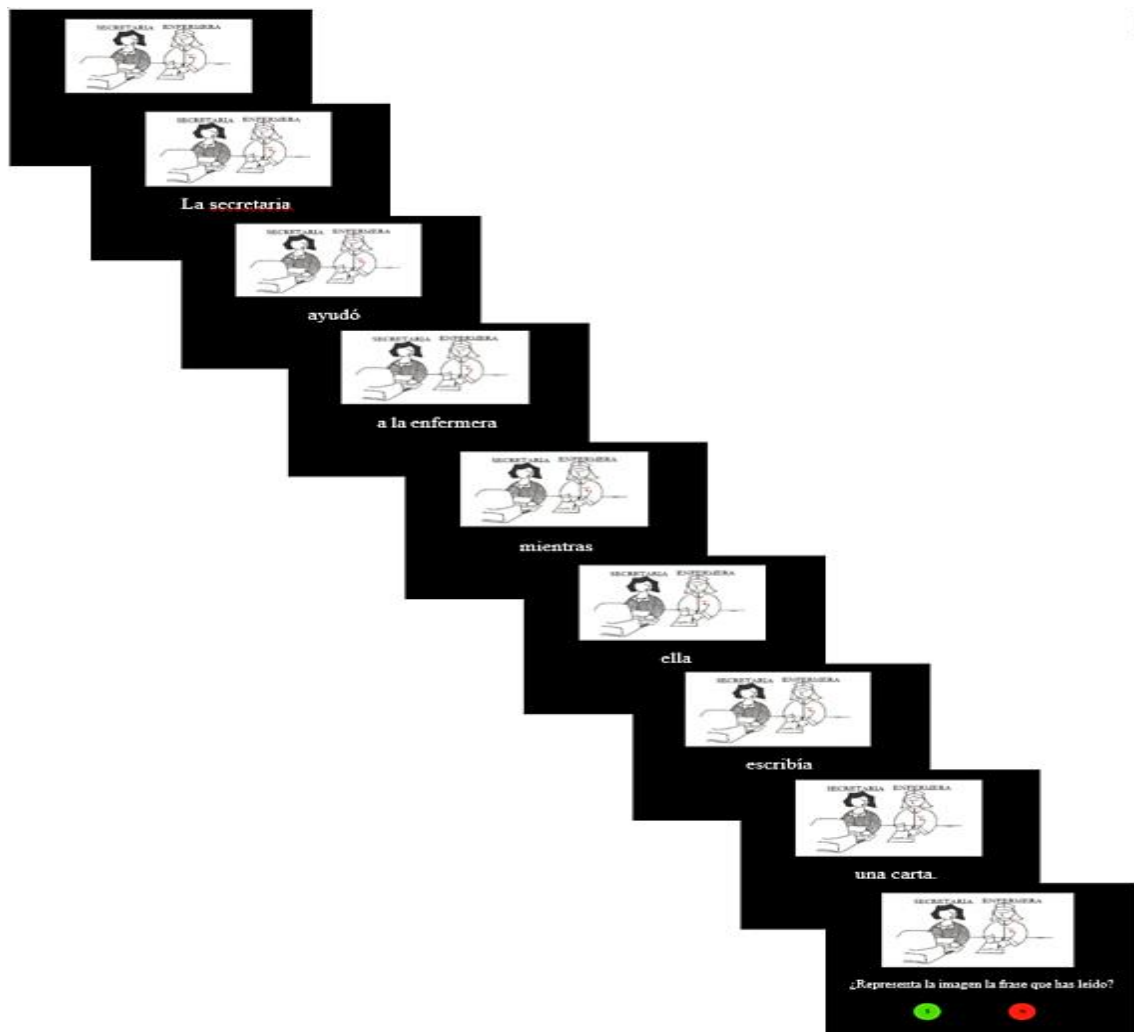
¹⁵⁰ In terms of the participants who took part in the experiment being healthy adults tested in their L1, the adaptation to a self-paced reading format was not thought to be problematic.

¹⁵¹ Participants were reminded to complete the task accurately and to read the sentences as fast as they could to tap into processing and not metalinguistic knowledge.

interpretation of null and overt pronouns following the PAS (Carminati, 2002). Hence, for the task to capture this, we had to make sure that participants retained the information depicted in the picture while reading each experimental stimuli in a segment-by-segment fashion and non-cumulatively. This was achieved in the original self-paced listening task (Kaltsa et al., 2015) by simultaneously presenting each image with the seven pre-recorded segments of each sentence which participants would move along by pressing the space bar. Nevertheless, a self-paced reading format would not allow for the simultaneous presentation of the written segments and the picture at once from the onset since participants would have to first explore the image so that the matching or mismatching interpretation was created. Therefore, this alternative was discarded. The solution to this was to allow participants to first examine the picture purposefully for as long as they wished, and by pressing the space bar, they would then start reading each segment of the sentence separately and non-cumulatively as illustrated in Figure 49.

Figure 49

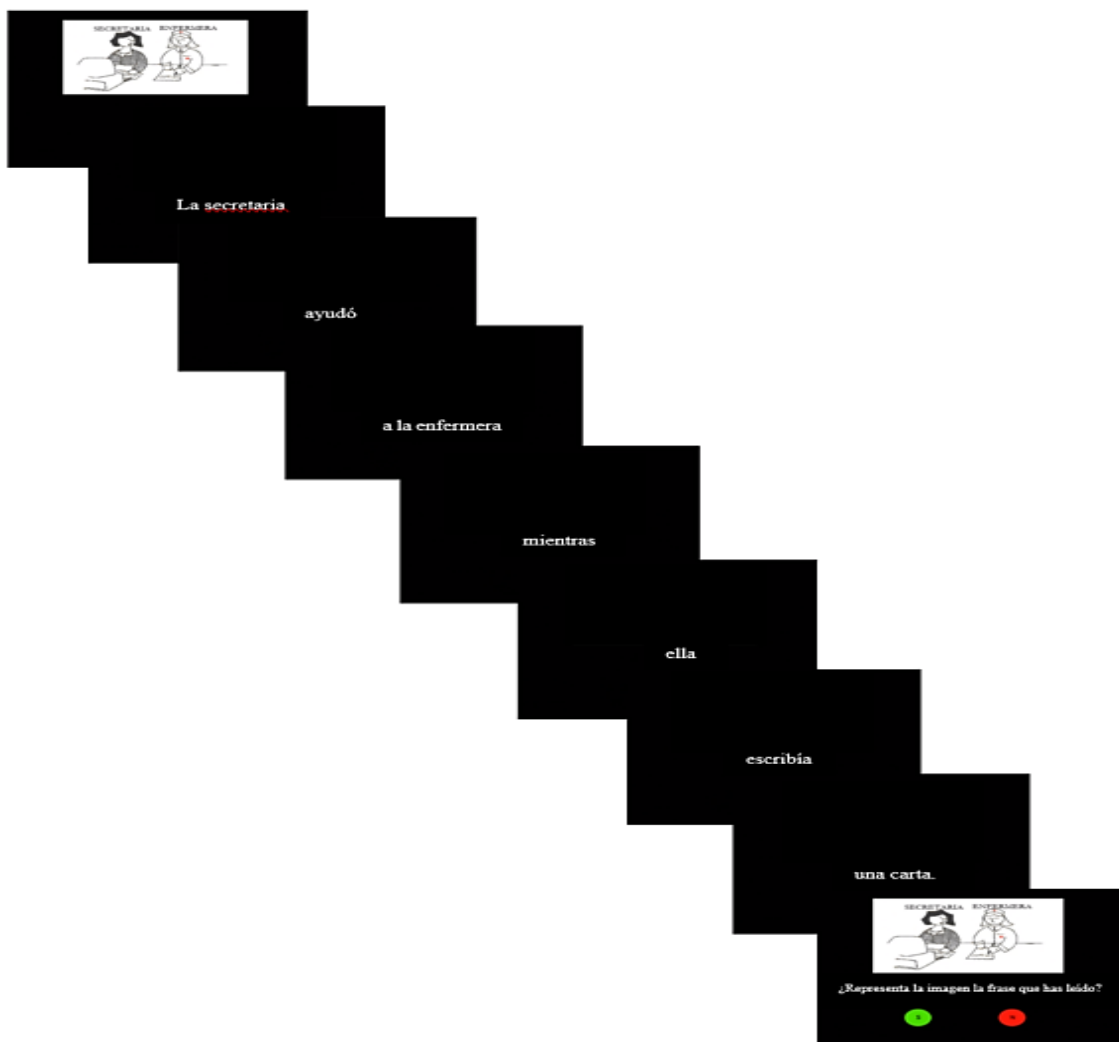
Experimental trial in the self-paced reading task



It is important to note that two options emerged as possible regarding the presentation of the picture while each subject read the experimental sentences and fillers in the adaptation of the task. On the one hand, the picture could be eliminated from the screen once the participants had carefully inspected it, so the segments would then be presented in isolation (see Figure 50). On the other hand, the picture could remain in combination with the written segments on the screen, so that participants would have simultaneous access to both visual prompts and the written stimuli (see Figure 49).

Figure 50

Experimental trial in self-paced reading task: discarded option



Each of the options proved to be accompanied by some limitations. Deleting the picture would demand extra cognitive resources on the participants' side, who would have to memorise the picture properly and accurately to later answer whether it matched the sentence they read or not. This would mean that we would have to rely on their working memory skills and their correct recall of the picture, which could potentially then bias for

or against the interpretation of the sentence following the PAS. We thought this would not be the case in many instances and we could then not validly interpret our differences in RTs with such a presentation. By contrast, the second option (i.e., leaving the picture while the segments were presented) presented in Figure 49 could be problematic in the sense that the measures we would be obtaining could arguably not be merely the result of additional reading time in a given condition compared to a control condition. Given that the picture was present, participants could either exclusively read the segments ignoring the picture or read the segments and look at the picture, and the latter is something that we could not tease apart. However, the additional time spent, whether it was exclusively looking at the picture and reading the segment or merely taking longer to process the segment would be indicative of an additional processing time of a given segment which could surface in some conditions over others. Furthermore, the picture was present throughout the presentation of all segments, so such an effect would not need to uniquely emerge in the critical segments.

Lastly, after reading all the seven segments, participants had to indicate whether the picture they had seen matched the meaning of the sentence they had read. To do this, they had to press ‘S’ for yes (‘sí’ in Spanish) or ‘N’ for no in their keyboards as fast as they could. There was an equal number of ‘yes’ and ‘no’ responses, which were counterbalanced and randomly presented in the sequence of presentation making sure that the same two experimental conditions did not appear one after the other. We decided to leave the picture while participants gave an answer to the question for an accurate recall of it and a more reliable judgement. With an aim for participants to rely less on metalinguistic awareness (Sorace, 2011), they were instructed to give an answer as quickly as they could.

9.2 Results

This section of results will display the main findings from the analysis of the self-paced reading task to account for the processing of null and overt subject pronouns in functional monolinguals and the two groups of advanced bilinguals. A first subsection will delimit the type of analysis that was carried out, including how data were dealt with prior to running mixed-effects models, followed by the description of the main results obtained from the final models of best fit.

9.2.1 Data cleaning and descriptive results

Despite the fact that sentences were presented in 7 segments in a phrase-by-phrase fashion (see Table 50 below), given that the critical regions of interest in each of the conditions (i.e., null and overt pronoun sentences) were different¹⁵², we decided to perform two separate analyses. In the first place, in stimuli containing a null pronoun, the critical verb in the subordinate clause occupied the sixth segment. Importantly, this segment was crucial since the possible ambiguity created between a potential object and a subject interpretation might start at this precise moment. By contrast, in sentences that contained an overt pronoun, even though the verb in the subordinate clause was also found in segment 6, the pronoun was always read in segment 5 and thus, the ambiguity at stake was triggered earlier on in the sentence. Therefore, the analysis of the reading times for the null pronoun condition was done on the sum of the RTs in segments 6 and 7 (in bold and italics), while that of sentences containing overt pronouns additionally included segment 5 (in bold and italics). Each of the final summed segments included both critical and spill-over regions.

Table 50

*Examples of null and overt pronoun stimuli*¹⁵³

	S1	S2	S3	S4	S5	S6	S7
Null	El abuelo	habló	rápido	al nieto	mientras	<i>leía</i>	<i>el libro.</i>
Overt	La madre	besó	a la hija	mientras	<i>ella</i>	<i>se ponía</i>	<i>el abrigo.</i>

In addition to the RTs in the final summed segments, another analysis was performed for on the time taken to answer the comprehension question following Kaltsa et al. (2015), given that such a measure could provide further information about the association strength between null and overt pronouns with either a subject or an object interpretation. In this case, the question was the same for null and overt pronoun sentences (i.e., *¿Representa la imagen la frase que has leído?* ‘Does the picture match the sentence you have read?’) and therefore, we decided to perform the analysis including both pronouns, given that this could be informative of later stages of processing (Keating & Jegerski, 2015; Marsden et

¹⁵² The decision to keep the sentences as close as possible to the original ones is explained considering the replication nature of this study so that these results can be compared to those where the same stimuli have been used for other null-subject languages (e.g., in Greek, Kaltsa et al., 2015).

¹⁵³ The translation of the sentences presented is as follows: null (The grandfather spoke fast to the grandson while (he) was reading a book) and overt (The mother kissed the daughter while she was putting her coat on).

al., 2018). Finally, a last analysis focuses on their interpretation preferences for which both the descriptive results and the coding procedure will be described in section 9.2.3.3.

It is important to note that prior to analysing RTs, we initially examined accuracy rates for the comprehension question responses focusing on the filler items. Following Marsden et al. (2018), we excluded participants whose accuracy rate fell below 80%, thus resulting in the exclusion of one participant. Moreover, given that the experiment does not deal with correct or incorrect responses within the experimental sentences, no data points were deleted considering this criterion. The selection of a positive (yes) or negative (no) answer would provide information about their interpretation patterns and thus, all data points were considered.

After having collapsed the aforementioned segments and excluded the participant with lower comprehension rate (i.e., below 80%), data were screened for extreme values and outliers (Keating & Jegerski, 2015; Marsden et al., 2018) both in the summed segments and in the time taken to answer the comprehension question. Focusing on the plotted quantile distribution of RTs for both null and overt pronoun stimuli¹⁵⁴ (Hao & Chondrogianni, 2021; Requena & Berry, 2021), we decided to exclude summed segments with RTs below 200 ms as the lower cut-off for both types of pronouns and above 4375 ms for null and 6350 ms for overt pronouns as the upper cut-offs. Regarding the comprehension question, the lower and upper cut-offs selected were 100 ms and 5500 ms. Percentages of data that were removed can be seen in Table 51 below.

Table 51

Observations before and after trimming

	Original observations	Final observations	Data removed
Null pronoun condition	2070 (100%)	2021 (97.6%)	49 (2.4%)
Overt pronoun condition	2070 (100%)	2022 (97.7%)	48 (2.3%)
Comprehension question	4140 (100%)	4044 (97.7%)	96 (2.3%)

Before presenting the inferential statistics, several figures will illustrate raw RTs in both the summed segments for null and overt pronoun stimuli as well as RTs in the comprehension question for the two pronoun conditions. As can be observed in Figure 51 and Table 52, whereas functional monolinguals' RTs for the subject and object condition

¹⁵⁴ See Appendix K. Background information and statistical analyses for visual inspection.

appear to be rather similar¹⁵⁵, both bilingual groups' RTs are shorter in the subject-bias condition.

Figure 51

RTs in the null pronoun condition

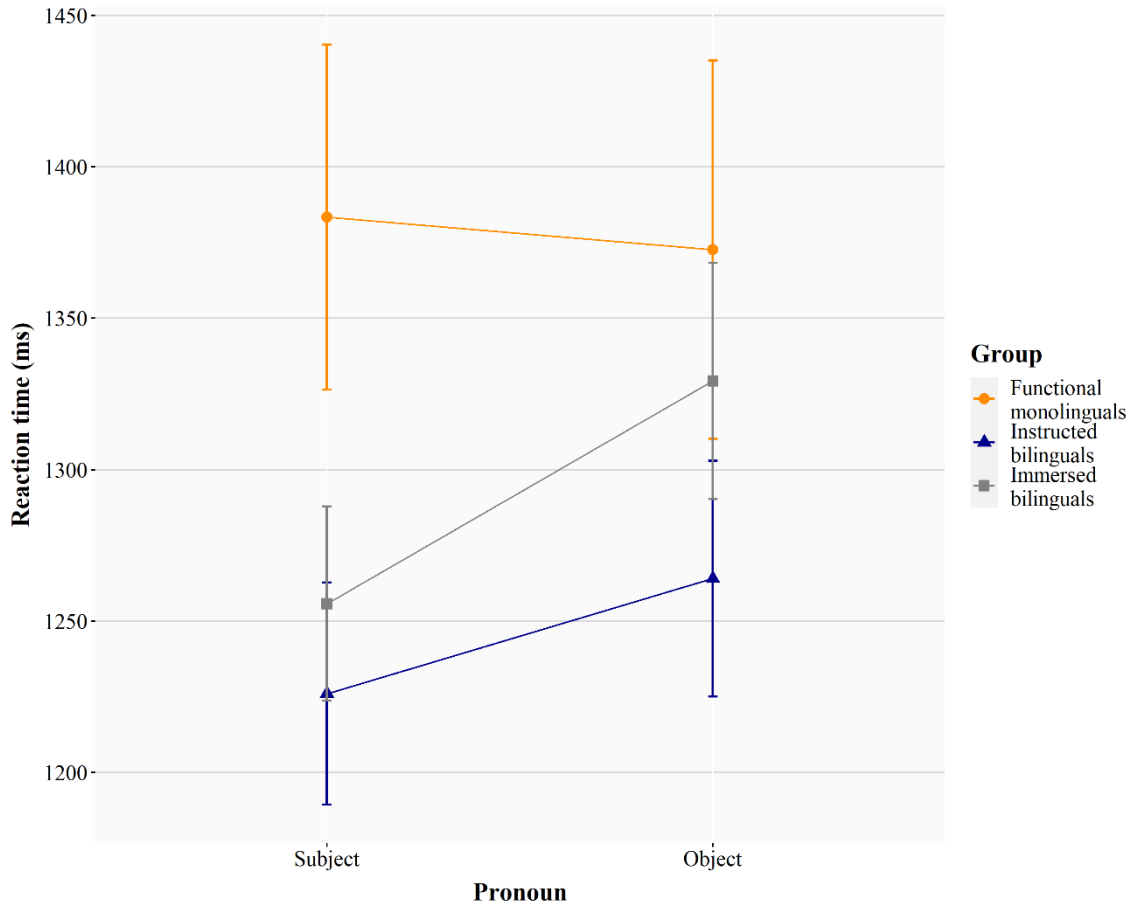


Table 52

RTs in the null pronoun condition

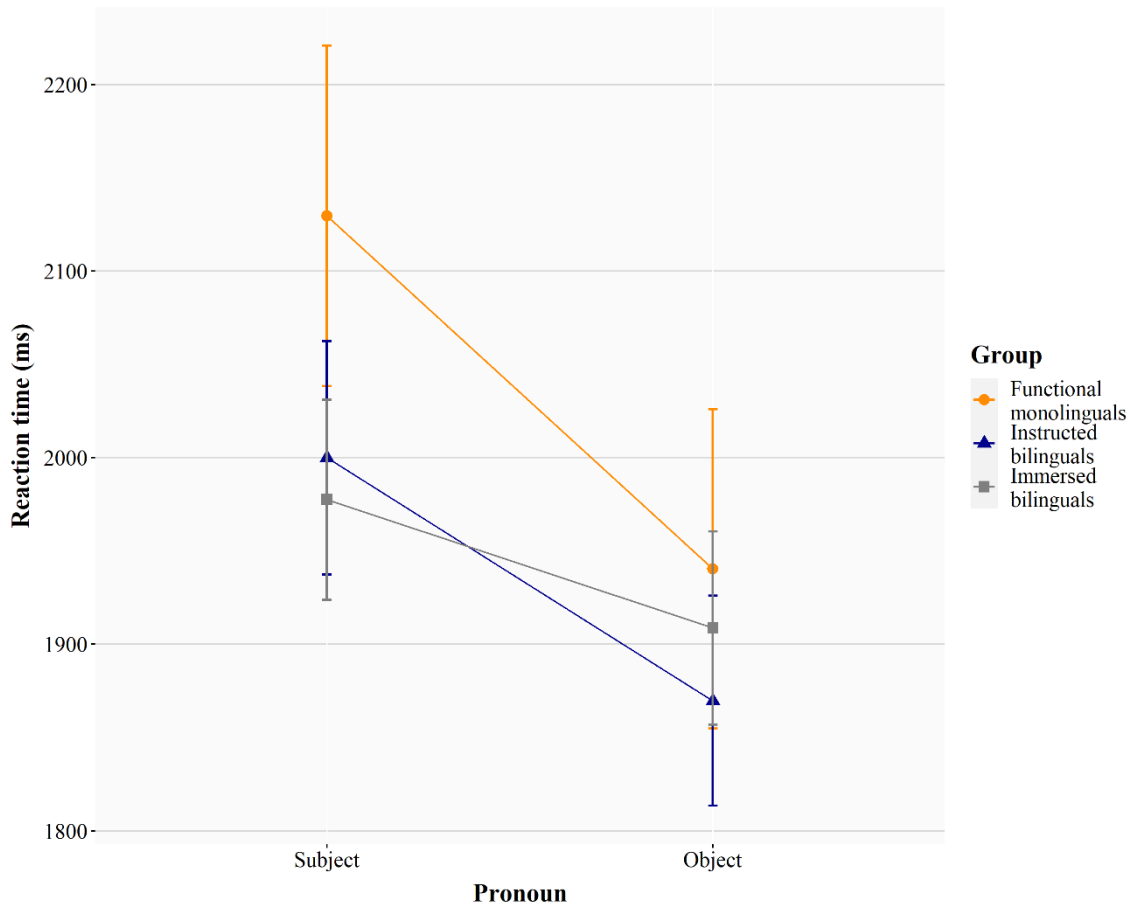
	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Subject	Object	Subject	Object	Subject	Object
Null	1383.4	1372.6	1226	1264	1255.7	1329.3
	(718.5)	(780)	(727)	(763.9)	(690.7)	(839.5)

As for the overt pronoun condition (Figure 52 and Table 53), all three groups' RTs are in line with the predictions formulated by the PAS in that they took less time to read segments with an overt pronoun where the picture biases towards an object interpretation as opposed to a subject interpretation.

¹⁵⁵ This arguably unexpected finding (i.e., no processing cost exhibited in functional monolinguals) will be addressed in the discussion section.

Figure 52

RTs in the overt pronoun condition



Table

53

RTs in the overt pronoun condition

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Subject	Object	Subject	Object	Subject	Object
Overt	2129.6	1940.4	2000	1869.8	1977.5	1908.7
	(1147)	(1072.4)	(1244.2)	(1117.5)	(1144)	(1114.1)

Regarding the RTs in the comprehension question, while all groups took less time to reply to the question when the sentence contained a null pronoun and the picture simultaneously presented biased towards the subject (Figure 53 and Table 54), the opposite pattern was attested in the overt pronoun condition (Figure 54 and Table 55): shorter RTs were shown when pictures depicted the object of the main clause performing the action of the verb in the subordinate clause.

Figure 53

RTs for the null pronoun condition in the comprehension question

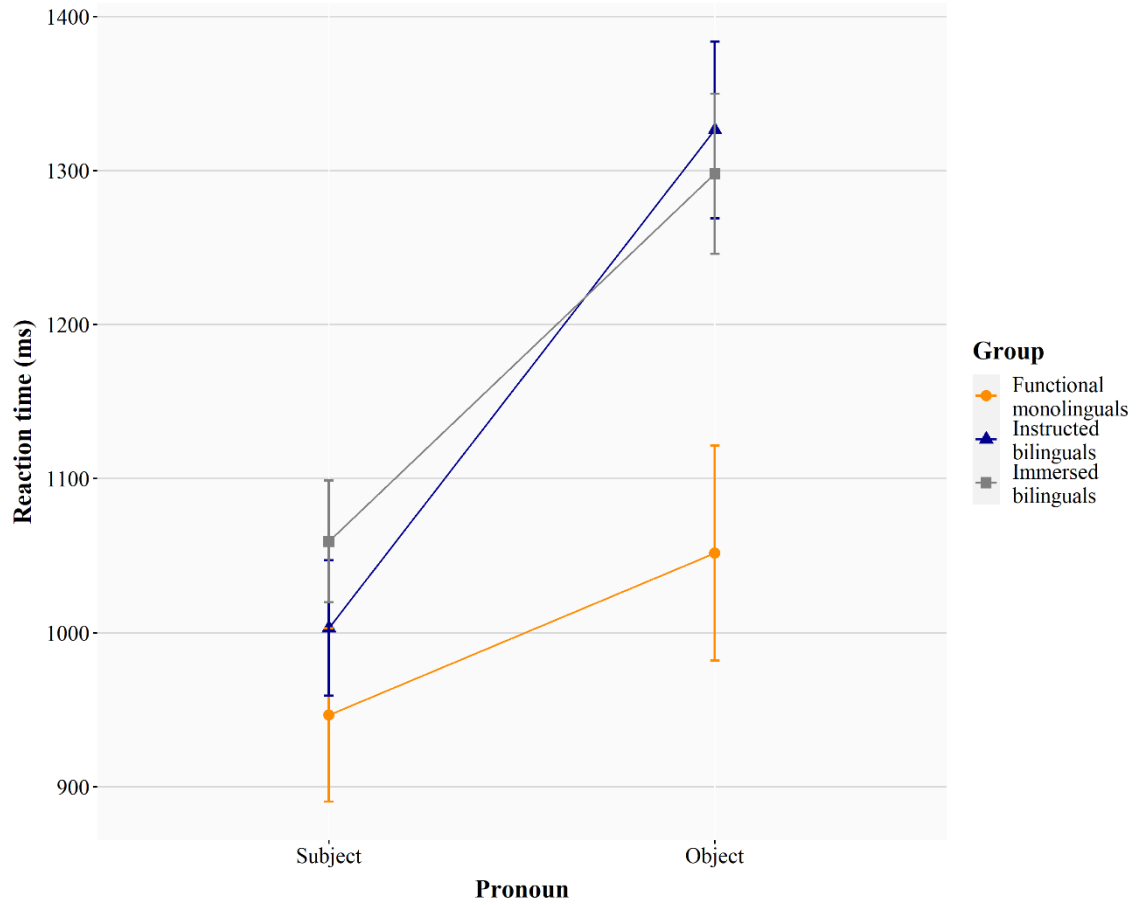


Table 54

RTs for the null pronoun condition in the comprehension question

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Subject	Object	Subject	Object	Subject	Object
Null	946.7 (709.7)	1051.7 (873.5)	1003 (877.9)	1326.4 (1140.6)	1059.3 (852.2)	1297.9 (1116)

Figure 54

RTs for the overt pronoun condition in the comprehension question

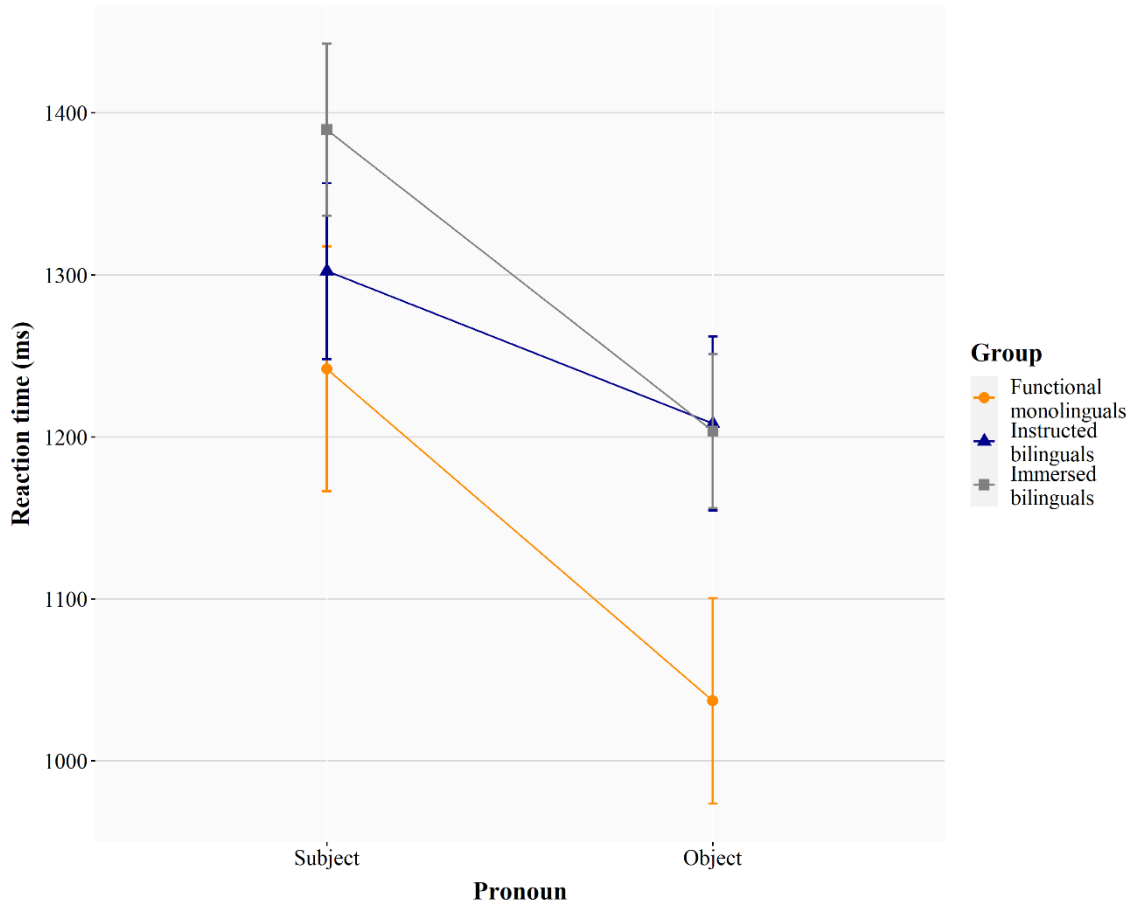


Table 55

RTs for the overt pronoun condition in the comprehension question

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Subject	Object	Subject	Object	Subject	Object
Overt	1242.1 (952)	1037.1 (795.2)	1302.4 (1072.1)	1208.3 (1057.6)	1389.7 (1132)	1203.6 (1016.1)

9.2.2 Reported models

Having reported the overall patterns of raw RTs in the segments analysed and the time taken to reply to the comprehension question, the model selection process to account for the processing data will be scrutinised. The resulting RTs after trimming were analysed fitting linear mixed-effect models using the *lmer* function of the *lme4* package (Bates et al., 2015) in R (R Core Team, 2021). Reading times were log-transformed to reduce skew and to normalise model residuals (Vasishth & Nicenboim, 2016). Considering the

aforementioned imbalance in the number of segments that were analysed in each pronoun condition, the following analyses were performed. First, two models were fit to the RT data from all participants in the summed segments for the null and overt pronoun condition separately. Second, we run another model on all participants' RTs on the comprehension question including both types of pronouns. Additionally, we further run models on the same measures for the two bilingual groups separately to explore the role played by variables that were exclusively relevant for these groups, e.g., length of residence in the L2 environment or length of intensive instructed exposure to address RQ12.

As fixed effects, the final models of best fit included Bias (subject, object) and Group (functional monolinguals, instructed bilinguals, and immersed bilinguals) and Pronoun (null, overt), the latter specifically for the model on the RTs in the comprehension question, as well as their interaction. In addition, several scaled continuous variables (e.g., BLP dominance score, Working memory, Length of residence in the L2 environment, and Length of intensive instructed exposure, among others) were added. These models were compared using likelihood ratio tests via the *anova* function of the *stats* package to explore whether they significantly contributed to improving the fit of the model. In order to explore pairwise contrasts, we used the *emmeans* package (Lenth et al., 2022). The models also included random intercepts for participants and items together with random slopes for the within-participants and within-items fixed effects that were supported by the design and which did not lead to convergence issues (Barr et al., 2013). Nevertheless, additional simpler models were tested using maximum likelihood ratio tests to check whether they improved the fit (Matuschek et al., 2017), following the same procedure described in the interpretation task. Each of the final models will be specified in the following sections.

9.2.3 RQ9 to RQ12: Processing of null and overt subject pronouns and the effect of modulating variables

As stated in the previous section, when required, the results will be presented by models and not focusing on the specific research questions, which will be scrutinised individually in the discussion section. The following subsections will introduce the main findings from

each of the three measures referred to, i.e., RTs in the summed segments, RTs in the comprehension question, and interpretation preferences.

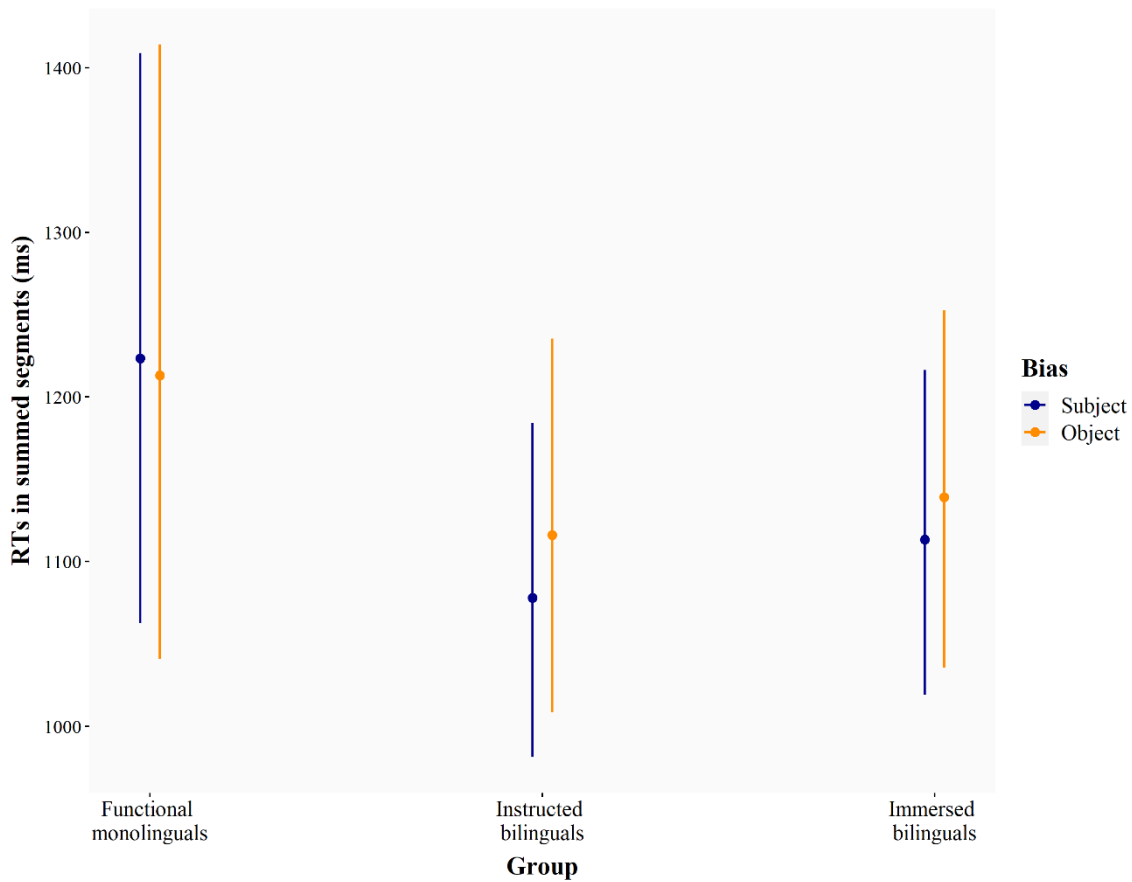
9.2.3.1 RTs in summed segments

This section will display the results from each of the models separately. Concerning the RTs in the summed segments for the null pronoun analysing the three groups together ($N = 207$), the final model of best fit included Bias (subject, object) and Group (functional monolinguals, instructed bilinguals, and immersed bilinguals), which were dummy-coded, and their interaction as fixed effects. The random-effects structure included varying intercepts for participant and item as well as a by-participant varying slope for the effect of Bias. The model's total explanatory power is substantial (conditional $R^2 = .55$), and the part related to the fixed effects alone (marginal R^2) is of .005. The model's intercept, corresponding to Bias = subject and Group = functional monolinguals, is at 7.11 ($SE = .07$, $t(2010) = 98.81$, $p < .001$). Importantly, neither the effect of Bias, Group or their interaction proved to be significant, which seems to suggest that RTs in this first type of analysis (i.e., summed segments) did not significantly differ by group or by type of bias, that is, whether the sentence was read simultaneously with a picture that biased towards the previous subject or object (see Figure 55).

Moreover, two additional models were run incorporating the effect of BLP dominance score and its interaction with Bias, keeping the same random structure, as well as another one that included the effect of Working memory span and its interaction with Bias. None of them significantly improved the fit of the model as indicated by likelihood ratio comparisons ($\chi^2(2) = 2.711$, $p = .26$ and $\chi^2(2) = .1723$, $p = .92$, for BLP dominance score and Working memory span, respectively). This seems to indicate that neither language dominance nor working memory span could significantly account for variance in the RTs analysed.

Figure 55

Predicted RT probabilities by group and bias type in the null pronoun condition



As for the overt pronoun condition, the model run on the RTs in the summed segments included the same fixed- and random-effects structure used in the previous model except that no by-participant varying slope for the effect of Bias was added due to convergence issues¹⁵⁶. The model's total explanatory power is substantial (conditional $R^2 = .53$), and the part related to the fixed effects alone (marginal R^2) is of .005. The model's intercept, corresponding to Bias = subject and Group = functional monolinguals, is at 7.54 (SE = .07, $t(2013) = 96.5$, $p < .001$). As illustrated in Figure 56, the only significant effect that was found was that of Bias for the functional monolinguals ($\beta = -.09$, SE = .04, $t(2013) = -2.15$, $p = .032$), which did not reach significance for the other two groups ($\beta = -.05$, SE

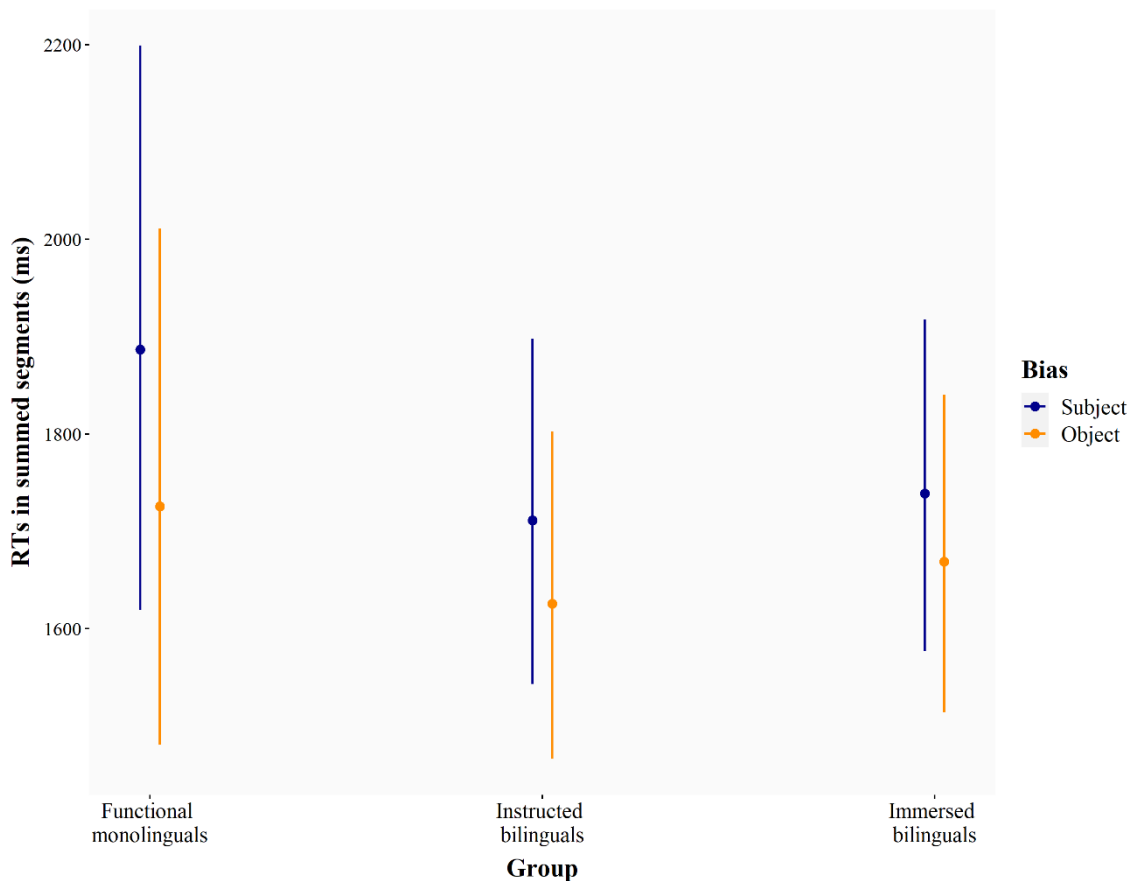
¹⁵⁶ It is worth mentioning that a further analysis was performed on segments 6 and 7 for both types of pronouns despite the aforementioned methodological consideration. While no effect of Bias was found for the null pronoun in any of the two segments, an effect of Bias was reported in segment 7 only for the overt pronoun. These results confirm the pattern displayed in this section but additionally suggest that the effect of Bias is attested in the overt pronoun in post-critical segments and not precisely in the critical pronoun segment.

= .026, $t(2013) = -1.95$, $p = .051$ and $\beta = -.04$, $SE = .024$, $t(2013) = -1.68$, $p = .092$, for instructed and immersed bilinguals, respectively).

Similarly to the null pronoun condition, two additional models which included the effect of BLP dominance score and its interaction with Bias and the effect of Working memory span and its interaction with Bias were run. None of them significantly improved the fit of the model as indicated by likelihood ratio tests ($\chi^2(4) = 6.4093$, $p = .17$ and $\chi^2(4) = 5.0319$, $p = .28$, for BLP dominance score and working memory span, respectively). Both models kept the same random-effects structure.

Figure 56

Predicted RT probabilities by group and bias type in the overt pronoun condition



To address RQ12a and RQ12b, two additional models were run on the RTs in the null and overt pronoun condition to explore the effect of Length of residence in the L2 environment and Length of intensive instructed exposure in explaining differences in RTs in immersed and instructed bilinguals, respectively. Firstly, a more complex model including Bias and Length of residence in the L2 environment along with their

interaction¹⁵⁷ was compared to a simpler model which only included Bias for the immersed bilinguals. The model including Length of residence was not significantly better in explaining variance than the simplest model ($\chi^2(2) = .3189$, $p = .85$), which seems to indicate that such continuous variable was not helpful enough in accounting for the variable attested patterns of RTs. Using the same procedure, a model on the RTs in the null pronoun condition for instructed bilinguals which included Bias and Length of intensive instructed exposure and their interaction as fixed effects and random intercepts for participants and items was compared against another model which only included Bias as fixed effect. The result from the likelihood ratio comparison showed that the most complex model did not significantly improve the fit ($\chi^2(2) = 3.9485$, $p = .14$). Hence, this indicates that Length of intensive instructed exposure could not significantly account for enough additional variance in the model.

The same procedure was followed for the overt pronoun condition. The most complex model run on the RTs from the immersed bilinguals, which included Length of residence in the L2 environment and its interaction with Bias did not significantly improve the fit of the simplest model ($\chi^2(2) = .8243$, $p = .66$)¹⁵⁸, just like the most complex model for the instructed bilinguals including the effect of Length of intensive instructed exposure proved to be significantly less explanatory than the simplest model ($\chi^2(2) = 5.6961$, $p = .06$).

9.2.3.2 RTs in comprehension question

On another note, the analysis of the RTs in the comprehension question was done considering both types of pronoun conditions simultaneously. The final model of best fit in this case included the effect of Bias (subject, object), Pronoun (null, overt), and Group (functional monolinguals, instructed bilinguals, and immersed bilinguals) as well as their interactions as fixed effects. Both participants and items were included as random effects. The model's total explanatory power is substantial (conditional $R^2 = .32$), and the part related to the fixed effects alone (marginal R^2) is of .02. The model's intercept,

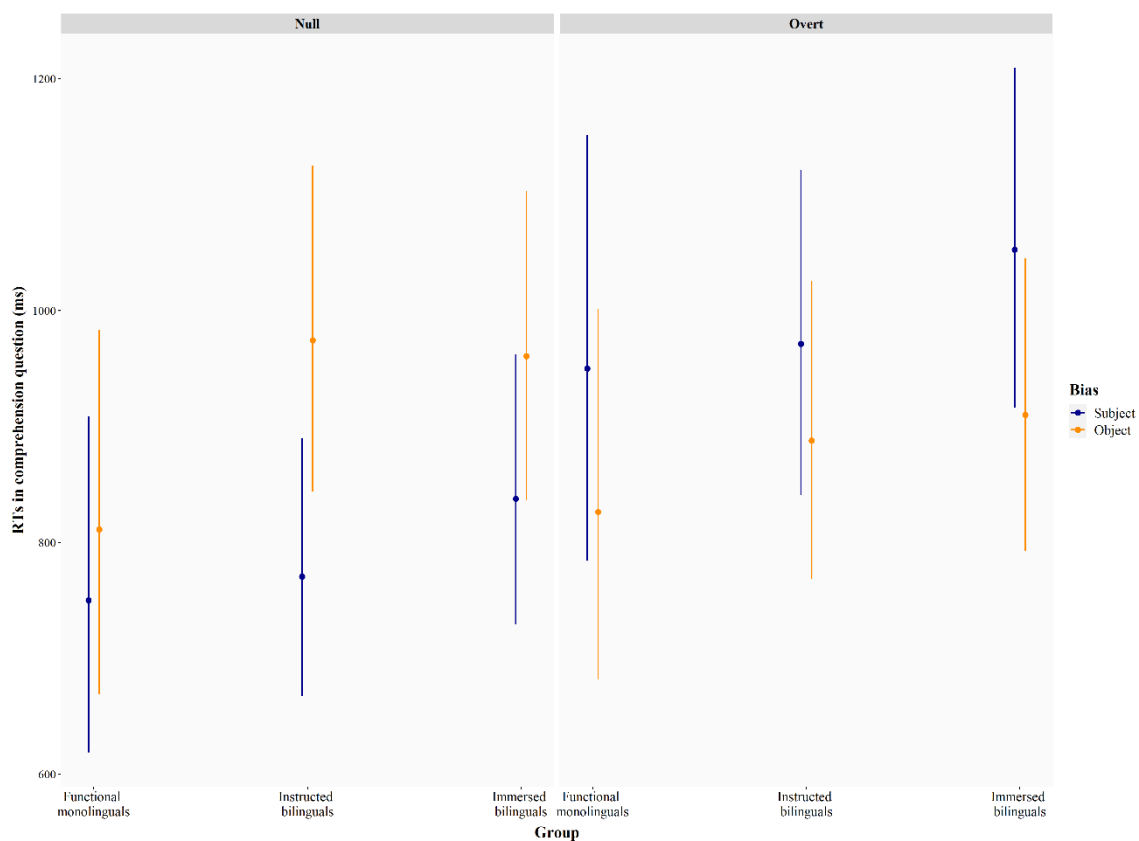
¹⁵⁷ The model included both participants and items as well as a by-participant varying slope for the effect of Bias as random effects.

¹⁵⁸ Even though the model run on the instructed bilinguals had the same fixed and random-effect structure, the model analysing immersed bilinguals' RTs did not converge with a by-participant varying slope for the effect of Bias and was simplified. Therefore, it only included random intercepts for participant and item.

corresponding to Bias = subject, Group = functional monolinguals and Pronoun = null, is at 6.62 (SE = .10, $t(4029) = 67.535$, $p < .001$). After exploring the pairwise contrasts from the three-way interaction Bias*Pronoun*Group (see Figure 57) using the *emmeans* package, it was revealed that all groups significantly differed in the time taken to reply to the comprehension question following the predictions from the PAS, except for the functional monolinguals in the null pronoun condition ($\beta = -.0786$, SE = 0.0699, $z = -1.124$, $p = .261$). However, even though the effect was not significant only in the null pronoun condition, the direction of such effect is the expected one, i.e., RTs with pictures biasing towards the subject are more likely to be lower than those with pictures that bias towards an object interpretation.

Figure 57

Predicted RT probabilities by group, bias and pronoun type for the comprehension question



To explore RQ10 and RQ11, two additional models were run: one including the interaction of the continuous BLP dominance score with Bias (subject, object) and Pronoun (null, overt) added to the three-way interaction Bias*Pronoun*Group and another one with the following interaction Working memory span*Bias*Pronoun added

again to the aforementioned three-way interaction. These two more complex models were compared to the first one which only contained the three-way interaction Bias*Pronoun*Group. None of them significantly improved the fit of the original model ($\chi^2(4) = 2.7997$, $p = .59$ and $\chi^2(4) = 3.11$, $p = .54$, for the language dominance and working memory score, respectively).

Similarly, the comparison of a simpler model which included the interaction Bias*Pronoun for immersed bilinguals with a more complex model containing the three-way interaction Bias*Pronoun*Length of residence in the L2 environment and the same simpler model compared against another one containing the three-way interaction Bias*Pronoun*Length of intensive instructed exposure for instructed bilinguals revealed that the simplest models were significantly better in accounting for variance in the RTs ($\chi^2(4) = 3.4441$, $p = .49$ and $\chi^2(4) = 5.159$, $p = .27$, respectively)¹⁵⁹. Hence, it appears that neither length of residence in the L2 environment nor length of intensive instructed exposure were significant predictors in accounting for the variability attested in the RTs in the comprehension question. The effect of length of residence in the L2 environment was, however, significant in the analysis in the interpretation task and in the following analysis on the interpretation preferences, a finding to which we will return while discussing the results.

9.2.3.3 Interpretation preferences

The final analysis from the self-paced reading task was performed on the interpretation preferences obtained from the comprehension question. Given that there was no right or wrong answer for each question, interpretation preferences were measured and coded following the predictions from the PAS (see Table 56 and Figure 58). On the one hand, if participants stated that the picture matched the sentence they had read when there was a match with the predictions from the PAS, i.e., when a picture biasing towards the subject was presented along with a null pronoun sentence or when a picture that biased towards the object was presented with an overt pronoun sentence, a score of 1 was provided. By contrast, if they said no to a matching option, the score assigned was 0. On the other hand, in cases of a mismatch between a picture and the sentence presented, when participants

¹⁵⁹ All models contained random intercepts for participants and items.

said there was a mismatch, the score provided was 1, and when they said they matched, 0 points were assigned.

Table 56

Scoring procedure for the answers from the comprehension question

	Pronoun	Bias	Answer provided	Score
PAS match	Null	Subject	Yes	1
			No	0
	Overt	Object	Yes	1
			No	0
PAS mismatch	Null	Object	Yes	0
			No	1
	Overt	Subject	Yes	0
			No	1

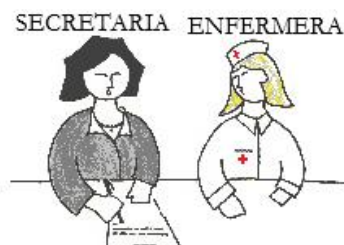
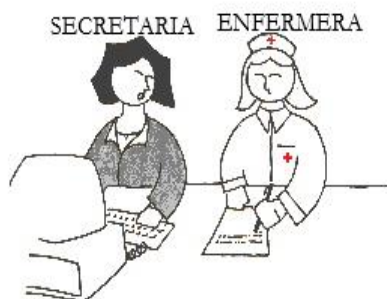
Figure 58

Illustration of scoring procedure for the answers from the comprehension question

*La secretaria ayudó a la enfermera mientras **ella** escribía una carta.*

‘The secretary helped the nurse while she was writing a letter’.

Comprehension question: Does the picture match the sentence you have read?



PAS match: overt-object		PAS mismatch: overt-subject	
Answer: Yes	Score: 1	Answer: Yes	Score: 0
Answer: No	Score: 0	Answer: No	Score: 1

Concerning the descriptive results from the comprehension question, as can be appreciated in Figure 59 and Table 57, most participants were highly accurate in detecting matching instances, both for the null and for the overt pronoun conditions. However, in the functional monolinguals and immersed bilinguals, it appears that more expected responses following the PAS are provided in matching cases in the null pronoun condition compared to the overt pronoun condition. By contrast, in mismatching scenarios, which

means that they did not identify null pronouns biasing towards the object of the previous clause or overt pronouns biasing towards the subject as mismatches, scores were much lower. This in turn implies that they accepted null pronouns potentially biasing towards the object and overt pronouns biasing towards the subject of the previous clause. These tendencies were stronger in the instances involving the presence of a null pronoun since mismatches in this condition were less frequently rejected and thus, the scores obtained are lower for the three groups compared to those involving overt pronouns.

Figure 59

Proportion of expected PAS responses by group, pronoun, and bias type

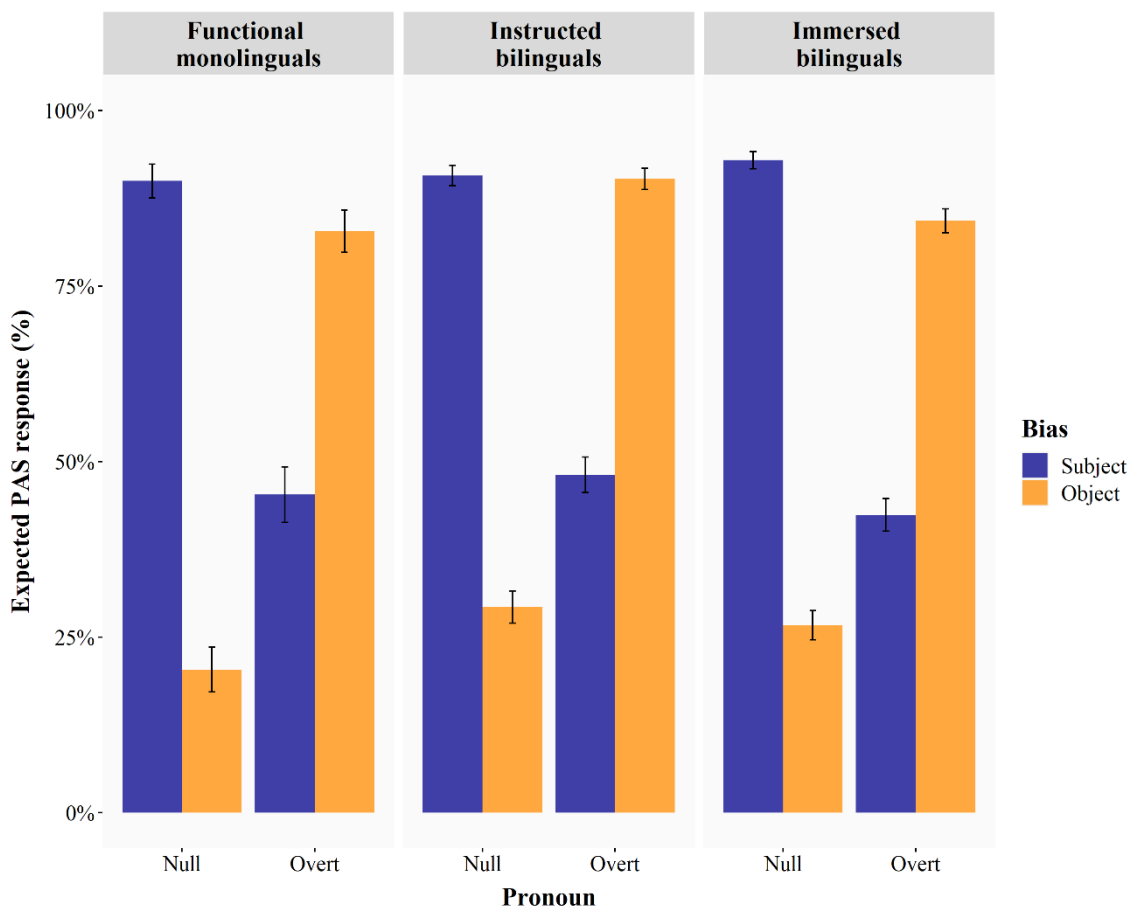


Table 57

Proportion of expected PAS responses by group, pronoun, and bias type

	Functional monolinguals		Instructed bilinguals		Immersed bilinguals	
	Subject	Object	Subject	Object	Subject	Object
Null	.90 (.30)	.20 (.40)	.91 (.29)	.29 (.46)	.93 (.26)	.27 (.44)
Overt	.45 (.50)	.83 (.38)	.48 (.50)	.90 (.30)	.42 (.49)	.84 (.36)

Once the score for each comprehension question was provided, a generalised linear mixed-effects model was run on the resulting data using the *glmer* function of the *lme4*

package (Bates et al., 2015) in the R programming environment (R Core Team, 2021). The selection of the model of best fit followed the same procedure described in the interpretation task (see section 8.2) to predict the log odds of an expected response following the PAS, which was coded as 1 (see Table 56 and Figure 58). Hence, the final model of best fit included the following dummy-coded fixed effects: Bias (subject, object) and Pronoun (null, overt), as well as their interaction¹⁶⁰. Considering random effects, only varying intercepts for both participants and items were added. The model's total explanatory power is substantial (conditional $R^2 = .46$), and the part related to the fixed effects alone (marginal R^2) is of .38. The model's intercept, corresponding to Bias = subject and Pronoun = null, is at 2.55 (SE = .1824, $z = 13.99$, $p < .001$). In this case, both the effect of Bias ($\beta = -3.65$, SE = .1433, $z = -25.48$, $p < .001$) and Pronoun ($\beta = -2.76$, SE = .2335, $z = -11.84$, $p < .001$) were significant, which indicated that less expected answers were provided overall when the picture biased towards the object and when the sentence that was read contained an overt pronoun. In addition, their interaction proved to be significant ($\beta = 5.8706$, SE = .19, $z = 30.740$, $p < .001$) and pairwise contrasts were therefore computed using the *emmeans* package (Lenth et al., 2022). Importantly, there were no significant differences in accuracy of the matching conditions, that is, where null pronouns were interpreted as coreferential with the subject of the previous clause and overt pronouns were interpreted as coreferential with the object of the previous clause ($\beta = .546$, SE = .242, $z = 2.257$, $p = .11$). Nevertheless, there were significant differences in the two mismatching conditions, that is, cases where overt pronouns were interpreted as coreferential with the previous subject were more likely to be identified as mismatches when compared to the opposite (i.e., object-null) combination ($\beta = -.88$, SE = .215, $z = -4.132$, $p < .001$). This pattern largely indicates that participants' responses were more in line with the PAS with overt pronouns than with null pronouns overall.

To address RQ12a and RQ12b, two additional models were run. A final model including the immersed bilinguals' scores on the comprehension question contained a three-way interaction Bias*Pronoun*Length of residence in the L2 environment and varying intercepts for participants and items as random effects. This model was significantly better in accounting for the data compared to a simpler model which did not include the continuous variable in the interaction ($\chi^2(4) = 10.25$, $p = .036$). The final

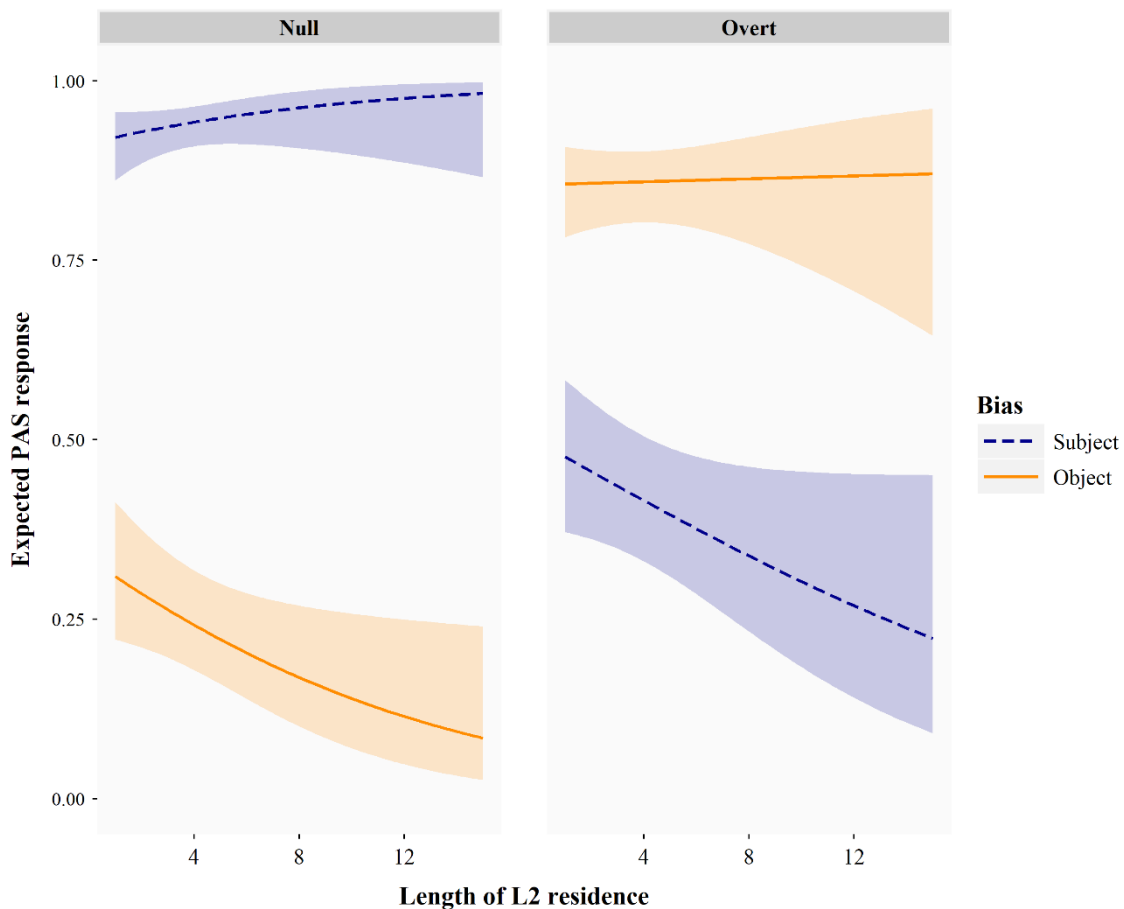
¹⁶⁰ Three more complex models including a three-way interaction of Bias*Pronoun with Group, with the BLP dominance score or with the Working memory span were tested but did not improve the fit of the model ($\chi^2(8) = 14.972$, $p = .06$, $\chi^2(4) = 6.481$, $p = .17$ and $\chi^2(4) = 8.2515$, $p = .08$, respectively).

model's total explanatory power is substantial (conditional $R^2 = .47$), and the part related to the fixed effects alone (marginal R^2) is of .41. The model's intercept, corresponding to Bias = subject, Pronoun = null and Length of residence in the L2 environment = 0, is at 2.77 (SE = .25, $z = 11.133$, $p < .001$). Both the effect of Bias ($\beta = -3.88$, SE = .23, $z = -16.852$, $p < .001$) and Pronoun ($\beta = -3.09$, SE = .30, $z = -10.185$, $p < .001$) were significant, indicating that both object-biasing pictures received lower scores as those containing overt pronouns did when compared to pictures biasing towards a subject interpretation and null pronoun sentences, respectively. A further significant two-way interaction Bias*Pronoun was revealed and after computing the pairwise comparisons using the *emmeans* package (Lenth et al., 2022), scores were again significantly higher when detecting the mismatch subject-overt compared to object-null ($\beta = -.79$, SE = .26, $z = -3.07$, $p = .01$).

Furthermore, the three-way interaction Bias*Pronoun*Length of residence in the L2 environment proved to be significant ($\beta = .80$, SE = .31, $z = 2.572$, $p = .01$). In particular, the effect of Length of residence in the L2 environment was significant for all Bias*Pronoun combinations but the one where a null pronoun sentence was presented with a picture biasing towards the object of the main clause. Notably, while longer length of residence did not imply preferences contrary to the PAS in the null pronoun condition biasing towards the subject, it is remarkable that longer Length of residence in the L2 environment was associated with lower PAS-like interpretation patterns particularly in scenarios where an overt pronoun would bias towards a subject antecedent as shown in Figure 60. This indicates that longer immersed bilinguals tended to accept that overt pronouns could be linked back to subject antecedents, a finding which is in line with the results found for the interpretation of overt pronouns in immersed bilinguals in the offline task (see section 8.2.2.3) and which will be developed in the discussion section.

Figure 60

Predicted scores for the three-way interaction of bias, pronoun, and length of residence in the L2 environment in immersed bilinguals



The second model testing PAS-like interpretation preferences in instructed bilinguals included a three-way interaction Bias*Pronoun*Length of intensive instructed exposure and was compared against a model with a two-way interaction Bias*Pronoun. Both models included participant and item as random effects. The comparison between the two models using a likelihood ratio test revealed that the simpler model provided a better fit to the data ($\chi^2(4) = .6241, p = .96$), and hence, length of intensive instructed exposure could not significantly account for the variability that is present in the data.

9.2.4 Summary of processing results

After having analysed the three measures reported from the self-paced reading task (i.e., RTs in summed segments, RTs in the comprehension question, and interpretation preferences), different patterns of results emerge. Firstly, considering the RTs in the

summed segments in the null and overt pronoun condition separately, results suggest that, while RTs were not significantly different depending on the type of bias in the null pronoun condition in any of the groups, the effect of bias was only shown to be significant for functional monolinguals in the overt pronoun condition. In this case, none of the continuous variables additionally tested (i.e., BLP dominance score and Working memory span for all groups, or Length of residence in the L2 environment or Length of intensive instructed exposure for immersed and instructed bilinguals, respectively) could significantly account for additional variability in the attested patterns of RTs.

Secondly, the analysis of the second measure, i.e., RTs in the comprehension question, revealed that the RTs from all groups were largely significantly different as modulated by bias type, that is, RTs were significantly shorter for questions following subject-biasing pictures in the null pronoun condition and object-biasing pictures with sentences containing overt pronouns. However, although this difference did not reach significance for functional monolinguals only in the null pronoun condition, the direction of the effect of bias was the expected one. Similarly to the previous measure, no continuous predictor was found to be significant in modulating RTs in the comprehension question.

Finally, the results from the interpretation preferences add to the picture presented from the two previous RT measures. In this case, no significant group differences were exhibited. Nevertheless, a significant interaction between pronoun type and bias was attested. While both expected PAS-like patterns (i.e., subject-null and object-overt configurations) did not receive significantly different scores and these were indeed significantly higher when compared to the opposite unexpected ones, a significant difference was found in the scores obtained in the two non-PAS-like patterns. Notably, contexts where a null pronoun was interpreted as biasing towards the previous object were less likely to be interpreted as a mismatch than those where an overt pronoun was linked back to a subject antecedent. Moreover, length of residence in the L2 environment was found to additionally modulate interpretation preferences and it is worth highlighting the effect length of residence in the L2 environment had on contexts where an overt pronoun was understood as coreferential with the previous subject: longer immersed bilinguals tended to significantly accept a subject-overt pattern more predominantly, which relates to the findings from the interpretation task. Finally, no effect of length of intensive

instruction was reported for instructed bilinguals or an overall effect of the BLP dominance score or working memory capacity.

9.3 Discussion of processing results

This section will discuss the research questions formulated for the processing of null and overt subject pronouns in the two advanced bilingual groups compared to the functional monolinguals. The discussion will focus on each research question separately, using evidence from the three measures analysed, that is, RTs in the summed segments, RTs in the comprehension question, and results from the analysis of interpretation preferences.

First, RQ9 aimed at comparing the online processing of null and overt pronouns in the two bilingual groups against the group of functional monolinguals. Looking at null pronoun stimuli, no processing penalties were found in any of the three groups when forcing these sentences to corefer with object antecedents. This lack of a processing penalty attested in null pronouns is in line with previous research (Bel & García-Alcaraz, 2018; Chamorro, Sorace, et al., 2016; Schimke et al., 2018) but contrasts with the pattern null pronouns exhibit in other studies where they clearly bias towards the previous subject antecedent (Bel, Sagarra, et al., 2016; Filiaci, 2010; Filiaci et al., 2014; Gelormini-Lezama & Almor, 2011; Keating et al., 2016). As pointed out in Bel, Sagarra, et al. (2016), divergence found in the aforementioned studies could arguably be explained in terms of clausal order differences. Whereas the studies that do not replicate the expected processing costs for null pronouns have used main-subordinate syntactic configurations similarly to ours, most of the studies that have reported the opposite result have used subordinate-main stimuli. This finding is also in line with the pattern attested in our production results (see Chapter 7), whereby more subject pronouns were significantly produced in main clauses embedded in subordinate-main syntactic configurations compared to those used in subordinate clauses in main-subordinate ones. Therefore, even though this has not been experimentally manipulated in our self-paced reading study, this difference in results could arguably be partly addressed considering clause order differences.

By contrast, considering overt pronouns, the only group that manifested processing costs associated with forcing coreferential patterns between overt pronoun sentences and subject antecedents were functional monolinguals. The two bilingual

groups were not found to be affected by this experimental manipulation. Overall, both the null and overt pronoun results are in line with Chamorro, Sorace, et al. (2016) in that no group distinguished between the two bias conditions (subject vs. object) in null pronoun sentences and only the functional monolinguals significantly distinguished between the two biases in the overt pronoun condition in online processing. These results are then compatible with accounts such as the ATH in that attrition effects were exhibited in the two bilingual groups in the processing of overt pronouns, particularly considering they have a competing element in the L2 and have an increased activation threshold, which makes them more vulnerable. Moreover, these results also confirm the predictions from the IH in that both groups of bilinguals appear to have lost sensitivity to pronoun mismatches when processing overt pronouns in real time and no differences are attested in the null pronoun condition between functional monolinguals and the two advanced bilingual groups.

When looking at the RTs in the comprehension question, the pattern reported proves to be different. In relation to this measure, which informs about later stages of processing (Keating & Jegerski, 2015; Marsden et al., 2018), all groups significantly exhibited the expected processing costs when forcing coreference with the unexpected bias following the PAS, i.e., when null pronouns were forced to be interpreted as coreferential with object antecedents and overt pronouns with subject antecedents. While the trend was the same in all groups, this effect was not significant for the functional monolinguals in line with previous studies (Kaltsa et al., 2015) for L1 Greek. Hence, it appears that, while the earlier stages of online processing of overt pronouns become vulnerable in L1 attrition settings in line with the IH (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016), both bilingual groups exhibit the expected PAS bias in later stages of online processing, where metalinguistic awareness is more likely involved. Thus, these results emphasise the temporary nature of L1 attrition effects in line with previous research (Chamorro, Sorace, et al., 2016; Köpke & Genevska-Hanke, 2018).

Finally, in line with the findings on the RTs in the summed segments and in the comprehension question, the analysis of the interpretation preferences shows that all groups more clearly distinguished the interpretation of overt pronouns than that of null pronouns, although the preferences were not as clear-cut as the ones presented in the offline picture selection task (see Chapter 8). Even though all groups were highly accurate in detecting matching conditions following the PAS, that is, when null pronouns were

presented with subject-biasing pictures and overt pronouns with object-biasing pictures, mismatching instances were less likely to be correctly identified. While no significant differences were found between the two matching conditions (i.e., subject-null and object-overt), all groups significantly rejected more those conditions where overt pronouns were forced to bias towards subject antecedents than the opposite ones (i.e., object-null). Therefore, these results from the offline preferences for null pronouns are in line with the absence of processing costs revealed in the analysis of the RTs in the summed segments for the three groups.

However, the null and overt pronoun patterns reported in the preferences from this task clearly contrast with the very clear subject and object preference found in the offline interpretation experiment addressed in Chapter 8. Arguably, differences in the bias strength of null and overt pronouns within the same participants might be due to the nature of the tasks used. While pronoun biasing preferences were gauged in the offline picture selection through a forced-choice task, i.e., participants had to choose between a subject or an object interpretation, the preferences from this task are more similar to those observed in an acceptability judgement task, where preferences are less clear-cut and particularly for null pronouns (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015; de Rocafiguera, 2023; de Rocafiguera & Bel, 2022). Importantly, we will return to this issue in the general discussion in the following chapter.

Turning now to RQ10 and RQ11, the results from the three analyses performed did not confirm our initial hypotheses. Despite the effect reported of language dominance and working memory in the offline picture selection task, such variables were not found to account for additional variability in any of the measures explored in this task, a finding that will be further addressed in the general discussion.

RQ12 was formulated to investigate whether online processing of null and overt pronouns was modulated by Length of residence in the L2 environment or Length of intensive instructed exposure in immersed and instructed bilinguals, respectively. In addition, a further question addressed whether the effect of these variables would be similar in the two pronoun conditions. Similarly to the results reported in the interpretation task, no effect was found for length of intensive instructed exposure. Nevertheless, length of residence in the L2 environment was shown to modulate interpretation preferences of overt subject pronouns exclusively in line with the ATH, and not RTs in any of the two measures explored. Higher length of residence in the L2

environment was associated with a higher likelihood to accept overt pronoun sentences which were forced to be understood as coreferential with subject antecedents. These findings then largely pattern with those from the interpretation task presented in Chapter 8.

In sum, the results from this self-paced reading task reveal that overt pronouns are vulnerable in both instructed and immersed bilinguals when being processed in real time. This processing penalty is however not evident in later stages of processing, which supports the claims on the temporary nature of L1 attrition. The vulnerability of overt pronouns in bilinguals is clearly connected with the increased production of overt REs in TC exhibited in the production task, as well as the increased likelihood of selecting subject antecedents for overt pronouns in more L2-dominant bilinguals in line with the IH and the ATH. Furthermore, from the continuous variables included in the models, the only factor that could account for variability in the dependent variables analysed was Length of residence in the interpretation preferences obtained from the answers to the comprehension question. Bilinguals who had been immersed in the L2 environment for longer more readily accepted null pronoun sentences that were forced to bias towards an object interpretation. After having discussed the results from the self-paced reading task partly in combination with the production and interpretation tasks, the next chapter will discuss the main findings from the three tasks jointly to address the three general research questions presented in section 5.4.

CHAPTER 10. General discussion: Bringing together the results from the production, interpretation, and processing tasks

Having discussed the three tasks separately, the aim of this overall section is to bring all the results together to address whether L1 attrition effects were most likely reported in online processing of null and overt subject pronouns as hypothesised by the Interface Hypothesis (Chamorro & Sorace, 2019; Sorace, 2011, 2012, 2016) as well as how they related to the other theoretical models discussed. In addition, this section will discuss whether L1 attrition effects can also manifest in instructed bilinguals and the main factors that contribute to variation in the tasks analysed.

Firstly, the results from the corpus-based production task indicated that both bilingual groups significantly employed more explicit overt forms (i.e., overt pronouns and NPs) than functional monolinguals in TC. Significant differences were also found between the two bilingual groups in that the immersed bilinguals exhibited the highest overproduction rates in TC. Notably, this difference largely emerged in the analysis of Task 2 in the corpus-based video retellings, that is, when the task required selecting among multiple antecedents that were activated, which either matched or did not match in gender. In this task, where there is an increase in the necessary processing resources to complete it given that the presence of multiple antecedents might require additional computations to avoid ambiguity, as Sorace (2016) argues, bilinguals might exhibit more vulnerability in interface structures. This may be interpreted as due to the need to allocate some of these processing resources to inhibit the language not in use. By contrast, in Task 1, where only one character is present, selecting different subject forms to recover it does not prove to be such a demanding endeavour and therefore, differences between bilinguals and functional monolinguals were not attested since most TC contexts were expectedly encoded via null pronouns. Importantly, the results are also in line with the predictions from the ATH in that more attrition effects are attested in bilinguals with decreased frequency and recency in L1 use, that is, immersed bilinguals. A decrease in the frequency of use of the L1 raises its activation threshold, which makes the L1 more vulnerable in attrition settings. Moreover, confirming the predictions from the PPVH, bilinguals were found to be more redundant, arguably in an attempt to avoid potential ambiguity.

It is important to mention that attrition effects were thus attested both in immersed bilinguals, following previous studies (Chamorro, Sorace, et al., 2016; Köpke & Genevska-Hanke, 2018; Tsimpli et al., 2004), but also in instructed bilinguals, in line with previous limited research investigating other domains (Długosz, 2021; Requena & Berry, 2021). Instructed bilinguals patterned with functional monolinguals in some analyses and with immersed bilinguals in others in the production tasks and thus, a similar picture to the one presented in Chamorro, Sorace, et al. (2016) emerged. Notably, instructed bilinguals show attrition effects, although these are considerably less pronounced than those attested in immersed bilinguals. This situation is then similar to the diminished effects exhibited in re-immersed bilinguals in their study. Therefore, frequency and recency of L1 use, which are clearly different in instructed and immersed bilinguals appear to modulate the effect of L1 attrition in the two groups of bilinguals analysed in this dissertation.

In line with these results, both instructed and immersed bilinguals appeared to select more subject interpretations for overt pronouns in the offline interpretation task, which patterns with an increase in the use of more overt forms in TC. Although these results exhibited no significant differences at the group level between functional monolinguals and instructed vs. immersed bilinguals, the interpretation patterns were modulated by the language dominance score provided by the BLP. Hence, those bilinguals that were more L2 English dominant were more likely to select subject antecedents for overt pronouns, and this effect was replicated in the two bilingual groups, again providing evidence of L1 attrition in instructed bilinguals. In addition, these results are also compatible with the claims made by the ATH. Only overt pronouns were found to be vulnerable (also confirming the predictions from the IH), arguably since they have a competing element in L2 English. Additionally, this variability was accounted for by the language dominance score, which ties in with patterns of recency and frequency of L1 use. More L2-dominant bilinguals used the L1 less frequently, which is one of the factors hypothesised by the ATH to account for variability in L1 attrition. Moreover, particularly in immersed bilinguals, the interaction of language dominance and pronoun type was further modulated by length of residence in the L2 environment in that the effect was more prominent in bilinguals who had lived in an L2 setting for longer, which again supports the ATH. On another note, the interpretation results are also related to the predictions from the PPVH. More L2-dominant bilinguals largely disobey the

Informativeness/Economy Principle in that they select more prolix forms (overt pronouns) to refer to prominent subject antecedents, which clearly leads to redundancy. Hence, this largely indicates that the predictions from the PPVH can also be accommodated in L1 attrition settings.

Finally, the results from the online self-paced reading task display L1 attrition effects in the RTs obtained while reading ambiguous sentences in line with the predictions from the IH, the ATH, and the PPVH. Overt pronouns display no processing bias in either instructed or immersed bilinguals, which contrasts with the processing cost functional monolinguals manifest when forced to interpret overt pronouns as coreferential with subject antecedents. Therefore, these findings suggest that only overt pronouns are processed differently in instructed and immersed bilinguals compared to functional monolinguals, as hypothesised by the IH and the ATH, the latter based on increased vulnerability of the L1 when it is used less frequently and recently and particularly in forms that have a competing counterpart in the L2. Again, these findings relate to the overproduction of overt forms attested in TC, which was further explained by the PPVH in terms of principles such as ambiguity avoidance, and the increased likelihood of interpreting overt pronouns as coreferential with subject antecedents since overt pronouns appear to be processed similarly when they are forced to bias towards a subject or an object interpretation. In addition, an effect of length of residence in the L2 environment was found in the group of immersed bilinguals, which indicated that longer immersed bilinguals significantly accepted more subject interpretations for overt pronouns in line with the offline picture selection results. It is also important to mention that in the RTs of the comprehension question, that is, following the reading of the sentence, all groups significantly distinguished between the two overt pronoun conditions. Therefore, L1 attrition in processing appears to largely manifest within the earlier stages of online processing as evidenced by the findings from this task, whereas later stages tend to arguably be more similar in bilinguals when compared to functional monolinguals. By contrast, even though no processing costs were reported in the null pronoun condition in any of the three groups, these results, which are in line with previous studies (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015), could possibly be due to the employment of main-subordinate syntactic configurations, where a less clear subject-null association has been reported in both online and offline studies (Chamorro, 2018; Chamorro, Sorace, et

al., 2016; de Rocafiguera, 2023; de Rocafiguera & Bel, 2022; Giannakou & Sitaridou, 2020; Schimke et al., 2018).

On another note, comparing the results from the picture selection task and the interpretation preferences exhibited in the comprehension question of the self-paced reading task, notable differences were observed. While clear PAS interpretation preferences were found in the picture selection task for both null and overt pronouns, the results from the interpretation preferences from the comprehension question revealed a less clear-cut pattern. Although matching instances following the PAS were largely interpreted as such, i.e., subject-null and object-overt patterns, mismatching scenarios were not clearly recognised as mismatches, which indicated that the three groups also accepted null pronouns as referring back to object antecedents and overt pronouns understood as coreferential with subject antecedents. Notably, these differences could indeed account for the variability that has been evidenced in previous studies testing the interpretation of null and overt pronouns where clearer patterns have been found in forced-choice tasks (e.g., Alonso-Ovalle et al., 2002) when compared to acceptability judgements tasks (e.g., Bel, García-Alcaraz, et al., 2016), which has also been pointed out in previous studies (de Rocafiguera, 2023; de Rocafiguera & Bel, 2022).

Overall, the results from the three tasks might indicate that the [+topic shift] feature of overt pronouns appears to have been weakened or is less easily accessed in the two bilingual groups when compared against the functional monolinguals. Supporting the claims made by Sorace (2011, 2012, 2016) within the IH, vulnerability in overt pronouns is attested in both processing tasks that require real time integration in interface structures. Nevertheless, our results also reveal L1 attrition effects in offline tasks when considering individual variability of bilingual profiles through the use of continuous measures such as the BLP. Hence, taking into consideration the variability that is explained by a factor such as language dominance as measured by the BLP, future hypotheses which put forth testable predictions should also consider not only differences between functional monolinguals and bilinguals at the group level but also variables within the bilingual continuum that are more likely to account for variability in L1 attrition settings.

Regarding the overall research question that tries to account for the main factors that modulate the production, interpretation, and processing of subject REs, the following findings are to be highlighted. The first factor that was shown to trigger the use of more explicit forms in TC was cognitive antecedent distance. In contexts where the cognitive

antecedent was more distant from the RE that recovers it, an increase in the use of overt forms was found. It appears that, in line with the predictions from the PPVH (Lozano, 2016, 2018), bilinguals largely resort to the use of more explicit and arguably redundant forms in an attempt to avoid potential ambiguity. A more distant antecedent might be weakened in working memory, and thus, its recovery through overt forms is more likely to relieve processing demands. Notably, this factor exerted a bigger influence in the two bilingual groups when compared to the functional monolinguals, which might suggest the presence of an enhanced awareness in L1 attriters to prevent ambiguity.

Another factor that was associated with different patterns of production of null and overt subject REs in the three groups analysed was syntactic configuration. As initially hypothesised, a significantly higher production of null pronouns was attested in coreferential coordination scenarios as opposed to intersentential and subordinated contexts. This increase in the use of null pronouns could be explained considering the similarity between English and Spanish in contexts involving coreferential coordination, since they are characterised by the lack of use of explicit material. Furthermore, another relevant finding from this analysis reveals that, within subordinated contexts, a significantly higher production of null pronouns in TC was displayed when the subject RE was embedded in the main clause (e.g., within subordinate-main configurations) than in the subordinate clause (e.g., in main-subordinate ones). Hence, these results are in line with the findings from interpretation studies that have found a stronger association of null pronouns towards subject antecedents in subordinate-main clausal configurations than main-subordinate ones (Bel, García-Alcaraz, et al., 2016; Bel & García-Alcaraz, 2015; de Rocafiguera & Bel, 2022). As suggested in section 3.3.2, citing Bever and Townsend (1979) and Garnham et al. (1998), de Rocafiguera and Bel (2022) state that the referents that are introduced in the subordinate clause in subordinate-main configurations are largely more accessible since they must be interpreted in connection with the subsequent main clause. Alternatively, those referents that are embedded in main clauses in main-subordinate scenarios are generally interpreted in an isolated way and further additional information as well as short-term memory demands are released. Therefore, more null pronouns might be found in the main clause in subordinate-main contexts given that the referents are more easily retrieved and thus need less explicit material to be recovered.

The last relevant factor that was considered was the number of both activated and intervening antecedents. An increase in the number of activated and intervening

antecedents could arguably decrease the salience of referents due to competition (Arnold, 2010; Torregrossa et al., 2019) and increase the likelihood of potential ambiguity that might arise when using less explicit forms. Thus, more explicit forms were significantly employed when the number of activated antecedents was higher and when comparing contexts with no and 1 intervening antecedent. Although this effect was found in the three groups analysed, it was more pronounced in the two advanced bilingual groups considering more nuanced subtleties were attested, which again goes in line with the predictions from the PPVH (Lozano, 2016, 2018). By contrast, the effect of gender differences and similarities of the antecedents was not found to be a modulator of the type of overt forms used contrary to our initial predictions and should perhaps be addressed experimentally in future studies.

Considering the factors that modulated both the interpretation and processing of null and overt subject pronouns, differences emerged. The interpretation of null pronouns was modulated by language internal factors such as the type of subordinating conjunction, with *mientras* ‘while’ favouring a stronger subject-null association, as well as language external factors such as working memory capacity. Again a stronger subject-null association was found in bilinguals with a high working memory capacity (Bel, Sagarra, et al., 2016; Vogelzang et al., 2021), which will be addressed below. By contrast, overt pronoun interpretation was more malleable to factors such as language dominance and length of residence in the L2 environment in immersed bilinguals in particular. Therefore, these findings are in line with accounts such as the Form-Specific Multiple-Constraints approach (Kaiser & Trueswell, 2008) in that different cues appear to be relevant for different pronominal forms as well as to different degrees. These accounts then appear to provide more relevant predictions to account for the variability that is attested in pronoun interpretation in null-subject languages rather than merely structural ones such as the PAS (Carminati, 2002).

A final point that deserves attention relates to the effects that were found in the processing task. The only factor that could account for additional variability was length of residence in the interpretation preferences obtained from the answers to the comprehension question in immersed bilinguals. In line with the findings from the offline picture selection task, the likelihood of interpreting an overt pronoun as coreferential with subject antecedents increased in bilinguals that had been immersed in the L2 environment for longer. Nevertheless, neither working memory nor the language dominance score

provided by the BLP could significantly explain differences in any of the measures analysed. Therefore, one might wonder whether the potential effect of working memory exhibited in the offline picture selection task was indeed a matter of working memory span differences or whether it more generally reflected enhanced cognitive abilities which favoured more clear-cut interpretation patterns for null pronouns, a factor which future studies should address.

In sum, the findings from this dissertation have revealed that L1 attrition in interface structures manifests both in online and offline tasks, although particularly when taking into consideration individual variability in bilingualism profiles in the latter. Moreover, some factors have been found to modulate both production (e.g., cognitive antecedent distance, syntactic configuration, number of activated and intervening antecedents), interpretation (e.g., working memory, type of subordinating conjunction, language dominance, and length of residence), and processing (e.g., length of residence in the L2 environment) of null and overt subject REs. Finally, while findings on L1 attrition have been replicated in immersed bilinguals, and particularly in early immersed bilinguals, L1 morphosyntactic attrition has also been evidenced in instructed bilinguals. This suggests that immersion is not a necessary condition for attrition effects to become observable and future studies should further investigate differences between immersed and instructed bilinguals.

CHAPTER 11. Conclusions

This dissertation examined L1 morphosyntactic attrition in the production, interpretation, and processing of subject REs in L1 Spanish-L2 English advanced instructed vs. immersed bilinguals. Production was investigated using two corpus-based oral retellings. Both interpretation and processing were gauged using a picture selection task and a self-paced reading task modelled after Tsimpli et al. (2004) and Kaltsa et al. (2015), respectively.

In particular, the corpus-based oral production tasks explored whether bilinguals would be more overexplicit in TC than functional monolinguals and whether this overexplicitness would manifest in both bilingual groups. In addition, we controlled the potential effect of L2 English, which requires subjects to be overtly realised in TC, on L1 Spanish in possibly accounting for the overexplicitness that is exhibited in L1 attrition settings by introducing two oral-retelling tasks. The first task exclusively included one main character, which would require its recovery through null pronouns in L1 Spanish. Notably, an increase in the use of overt forms (both overt pronouns and NPs) in this task, which are mandatory in L2 English, would perhaps be attributed to L2 influence on the L1. By contrast, a second video retelling task was added which maintained the main character but included other characters with the same and different gender to explore whether an increase in the use of overt forms could be explained by factors such as the number and gender of potential antecedents, the distance between a given subject RE and its antecedent, or the syntactic configuration where a given subject RE was embedded. Notably, some of these factors would increase the processing demands of the task, which could, as hypothesised by the IH, trigger the use of more explicit forms in bilinguals considering additional resources are needed to inhibit the language not in use. As hypothesised, the results revealed that both bilingual groups significantly employed more overt forms in TC, particularly in the task that increased the processing demands (Task 2) due to the presence of multiple antecedents and their distance, whereas no differences were exhibited in Task 1. Moreover, significant differences were found between the two bilingual groups, the instructed bilingual group being placed between functional monolinguals and immersed bilinguals. These results then confirmed the predictions from both the IH and the ATH. Furthermore, the results confirmed and further extended the predictions from the PPVH to L1 attrition settings in that bilinguals appear to also be more redundant in their L1 in an attempt to avoid ambiguity or arguably due to an

enhanced sensitivity to others' perspectives. More overt forms were employed in the presence of a higher number of both activated and intervening antecedents and in contexts that do not involve coreferential coordination, confirming previous findings. A further relevant factor such as the distance between a given RE and its cognitive antecedent was added to the variables that contribute to grading the type of violation (mild or strong) of the Informativeness/Economy principle, which results in redundancy. However, it is also important to highlight that bilinguals also produced significantly more overt forms in contexts where no ambiguity would be at stake.

Secondly, potential L1 attrition effects in the interpretation of null and overt subject pronouns were explored by further extending the original study by Tsimpli et al. (2004), which investigated L1 morphosyntactic attrition in L1 Greek and L1 Italian. Tsimpli et al.'s (2004) original stimuli were carefully adapted and modified for our study. We examined differences in the bias of null and overt subject pronouns towards either subject or object antecedents following the predictions from the PAS in advanced bilinguals and functional monolinguals. Moreover, we explored the effect of several variables, particularly the effect of the subordinating conjunction used to link main and subordinate clause, working memory, language dominance, length of residence in the L2 environment, and length of intensive instructed L2 exposure. Confirming the predictions from the IH and the ATH on the vulnerability of overt pronouns in L1 attriters, those bilinguals who were more L2-dominant and thus used the L1 less frequently and recently were found to select more subject antecedents for overt pronouns. These differences were, however, not manifested at the group level but modulated by language dominance as measured by the BLP, an effect that reached significance in both instructed and immersed bilinguals. Moreover, higher length of residence in the L2 environment further modulated the interaction of pronoun and language dominance, which indicated that this effect was more pronounced the longer bilinguals had been immersed in the L2 environment. On another note, both the type of subordinating conjunction used in the stimuli and working memory capacity modulated the interpretation of null pronouns since a stronger subject-null association was exhibited in sentences linked by *mientras* 'while' as opposed to *cuando* 'when' and in those participants with increased working memory spans. This difference in the effects that trigger variability in interpretation of null and overt subject pronouns are in line with accounts such as the FSMC approach and hence call for the use of multifactorial accounts to pronoun resolution.

Thirdly, differences in the processing of null and overt subject pronouns between advanced bilinguals and functional monolinguals were explored using an adaptation of Tsimpli et al. (2004) and Kaltsa et al. (2015), which also tested the predictions from the PAS. In this task, we also analysed how the online processing of null and overt subject pronouns would vary considering differences in language dominance, working memory capacity, length of residence in the L2 environment, and length of intensive instructed L2 exposure. Overall, no processing cost was found in any of the three groups when forcing null pronouns to be coreferential with object antecedents in line with previous findings (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015), arguably due to the inclusion of main-subordinate clausal configurations. By contrast, only the group of functional monolinguals took significantly longer to read sentences with overt pronouns that were presented with a subject-biasing picture. Therefore, the two bilingual groups showed indeterminacy in the processing of overt pronouns in line with the predictions from the IH and the ATH. It is also worth mentioning that L1 morphosyntactic attrition effects in processing in the two bilingual groups were only attested at earlier stages, given that the expected biases emerged when analysing RTs in the comprehension question. Additionally, interpretation preferences from the answers to the comprehension question revealed that, while all groups clearly signalled the expected PAS contexts (i.e., subject-null and object-overt) as matching, the opposite mismatching scenarios were not clearly recognised as such, and particularly and significantly less when null pronouns were presented with object-biasing pictures. Finally, the only continuous variable that was found to modulate the results was length of residence in the L2 environment in line with the results from the offline picture selection task: longer immersed bilinguals accepted more subject interpretations for overt pronouns.

Overall, our findings provide evidence of L1 morphosyntactic attrition in both instructed and immersed bilinguals, which suggests that vulnerability in L1 Spanish-L2 English bilinguals manifests both in online and offline components of language, the latter particularly when exploring continuous factors such as language dominance. The results from the three studies point in the direction that the [+topic shift] feature of overt pronouns appears to have been weakened in bilinguals or access to it, obtaining as a result an increase in the production of overt pronouns in TC, a higher selection of subject antecedents for overt pronouns, and a lack of processing cost when interpreting overt pronouns as coreferential with subject antecedents. In addition, some of the effects

reported were modulated by continuous variables such as language dominance, working memory, or length of residence in the L2 environment. Some of these variables shed light on the inconclusive results from previous studies in L1 attrition whereas others contribute new evidence in research conducted on L1 attrition. Given that some of the effects were not reported at the group level but only when considering individual variability, further research should include measures that gauge variability within the bilingual continuum rather than falling into dichotomous comparisons, which prevent the field from advancing into a better understanding of L1 attrition and bilingualism considering the heterogeneity of profiles in bilinguals.

11.1 Limitations

One of the limitations of this dissertation relates to the nature of the data collection method that was eventually followed. Considering the restrictions and limitations imposed by the COVID-19 pandemic, the final data had to be collected online through Open Sesame via JATOS, Lime Survey, and Google Forms. Even though the data from the offline picture selection task and the oral video retellings should pose no major problems, collecting RT data online can be accompanied by several drawbacks. For instance, variability in the hardware used, Internet connection speed differences as well as the potential presence of multiple distractions while performing the task outside a lab setting could threaten the reliability of the RT data collected. However, the participants included in this dissertation were instructed to complete the task in a quiet room that would mimic the lab conditions. In addition, differences in the use of distinct devices have not been found to be a major problem when collecting online data compared to a lab setting (Mathôt & March, 2022), and preliminary recent studies have found no differences at all when comparing data obtained in the lab and via the web (Gastmann et al., 2022). Nevertheless, future research should be conducted in a lab setting to compare whether the results from this study can be replicated in the optimal data collection conditions.

Regarding the experimental stimuli used, several limitations need to be highlighted considering the replication or extension nature of two of the tasks included, i.e., offline picture selection and self-paced reading tasks. Firstly, the stimuli included in interpretation and processing tasks, modelled after Tsimpli et al. (2004) and Kaltsa et al. (2015), were not lexically matched across pronoun conditions. Although the results from

the equipotentiality study revealed that the semantic biases created by the sentences included were rather similar in the two pronoun conditions, including a balanced design with the same sentences for null and overt pronouns would provide more reliable results as to the specific interpretation preferences of each type of pronoun. Moreover, the results from the equipotentiality study revealed that some sentences were not ideal to test the PAS given that the semantic bias they arguably created was aligned with the expected PAS preferences for that pronoun, i.e., participants selected the subject (e.g., the teacher) of a sentence over the object (e.g., the student) as the most likely antecedent to perform the action included in the subordinate clause (e.g., shout in the classroom) for overt pronoun sentences. If this was the case, selecting a given antecedent could be confounded potentially by the semantic bias of the sentence and the likelihood of a given type of pronoun to select either the object or the subject. A possible solution for future studies would be to create several lists in which subject and object antecedents are counterbalanced, one list presenting ‘the teacher’ from the previous instance as the subject and the other one displaying it in object position in that given stimulus. Alternatively, an equipotentiality study could be run before designing the full set of stimuli and only those showing no bias should be included.

Another limitation of this dissertation concerns the number of experimental items that were included in each condition in the self-paced reading task. While Keating and Jegerski (2015) recommend including from 8 to 12 items to ideally keep 6 to 10 items per condition after data trimming and outlier deletion, in order to be consistent with the initial design that was partially replicated, the number of experimental items was kept the same as in the original, i.e., 5 items per condition. Even though the number of participants included was considerable to increase statistical power, future studies should aim to include a higher number of items per condition to obtain more reliable and replicable results.

Another potential limitation could be the fact that participants included within the instructed bilingual group could arguably have enhanced metalinguistic awareness compared to the other two groups considering they are pursuing a degree in language. While this compromise was necessary in order to keep some other factors such as age and education constant, differences in metalinguistic awareness have argued to be relevant in accounting for different outcomes in pronoun resolution tasks (Miličević & Kraš, 2017). To address this, future research could make a comparison between functional

monolinguals who are pursuing a degree in a non-language related subject and university students pursuing a degree in Spanish Philology, both of which should not exhibit high proficiency in an L2.

11.2 Recommendations for further research

Having discussed some of the limitations of this dissertation, some recommendations for further research will be proposed. Firstly, to address whether the effects attested are explained in terms of L2 influence or due to a more general bilingualism effect, we should include two groups with different L1-L2 configurations, i.e., a null-subject L2 such as L1 Spanish-L2 Greek or L1 Spanish-L2 Italian bilinguals together with a non-null subject L2 such as L1 Spanish-L2 English or L1 Spanish-L2 German bilinguals. Exploring L1 vulnerability establishing comparisons between, for instance, L1 Spanish-L2 Greek and L1 Spanish-L2 English speakers would provide key insights as to whether differences attested in the L1 are similar in the two groups and can be accounted for by a more general bilingualism effect or whether they differ and could be explained simply by L2 influence.

Considering the promising findings this thesis offers in terms of the changes experienced in instructed bilinguals in their L1 environment, future research should explore whether differences are found between functional monolinguals and advanced instructed bilinguals in other domains, e.g., relative clause attachment, direct object marking, or lexical richness, among others. Moreover, research exploring this group of bilinguals should aim to disentangle which additional variables can account for meaningful variability within the group to add to language dominance, which was found to be a relevant predictor of differential outcomes within this thesis.

Another point that this thesis has not addressed but that would be interesting to investigate would be to explore whether bilinguals' redundancy is also connected to their increased sensitivity to the hearers' or interlocutors' point of view. Using more explicit forms in TC in bilinguals could also be the result of an enhanced awareness of others' point of view and the willingness to potentially reduce ambiguity for the hearer.

Finally, future neurological studies could also be conducted to explore brain reactions separately from behavioural responses, which will help disentangle whether L1 attrition affects linguistic representations, or whether it is more an issue of processing.

CHAPTER 11. Conclusiones

Esta tesis examina la atrición morfosintáctica de la L1 en la producción, interpretación y el procesamiento de expresiones referenciales (ER) de sujeto en bilingües L1 español-L2 inglés de nivel avanzado tanto instruidos como inmersos. La producción se ha investigado mediante dos narraciones orales basadas en corpus. Tanto la interpretación como el procesamiento se han evaluado mediante una tarea de selección de imágenes y una tarea de lectura autodirigida siguiendo los diseños experimentales de Tsimpli et al. (2004) y Kaltsa et al. (2015), respectivamente.

En concreto, las tareas de producción oral basadas en corpus exploraron si los bilingües serían más sobreexplícitos que los monolingües funcionales en continuidad de tópico (CT), y si esta sobreexplicitación se manifestaría en ambos grupos de bilingües. Además, se controló el posible efecto del inglés como L2, que requiere que los sujetos se realicen de forma explícita en CT, sobre el español como L1 a la hora de explicar la sobreexplicitación que se aprecia en entornos de atrición de la L1 mediante la introducción de dos tareas de narración oral. La primera tarea incluía exclusivamente un personaje principal, lo que requeriría su recuperación mediante pronombres nulos en español de L1. Un aumento en el uso de ER explícitas (tanto pronombres explícitos como sintagmas nominales) en esta tarea, que son obligatorias en inglés L2, podría atribuirse a la influencia de la L2 sobre la L1. Por el contrario, se añadió una segunda tarea de producción en la que se mantuvo el personaje principal, pero además se incluyeron otros personajes con el mismo y distinto género para explorar si un aumento en el uso de formas explícitas podría explicarse por factores como el número y el género de los antecedentes potenciales, la distancia entre un determinado sujeto referencial y su antecedente, o la configuración sintáctica en la que se encontraba un determinado sujeto. Cabe destacar que algunos de estos factores aumentarían las exigencias de procesamiento de la tarea, lo que podría desencadenar, según la Hipótesis de la Interfaz, el uso de más formas explícitas en los bilingües al considerar que se necesitan recursos adicionales para inhibir la lengua que no están utilizando. Tal y como se hipotetizó, los resultados revelaron que ambos grupos bilingües emplearon significativamente más formas explícitas en CT, particularmente en la tarea que incrementó las demandas de procesamiento (Tarea 2) debido a la presencia de múltiples antecedentes y a su distancia, mientras que no se apreciaron diferencias en la Tarea 1. Además, se encontraron diferencias significativas entre los dos grupos bilingües, situándose el grupo de bilingües instruidos entre los

monolingües funcionales y los bilingües inmersos. Estos resultados confirmaron las predicciones tanto de la HI como de la Hipótesis del Umbral de Activación (HUA). Además, los resultados confirmaron y ampliaron las predicciones de la Hipótesis de la Violación de los Principios Pragmáticos (HVPP) en contextos de atrición de la L1, en el sentido de que los bilingües también parecen ser más redundantes en su L1 en un intento de evitar la ambigüedad o, posiblemente, debido a una mayor sensibilidad a las perspectivas de los demás. Se emplearon más formas explícitas en presencia de un mayor número de antecedentes tanto activados como intervinientes y en contextos que no implican coordinación correferencial, lo que confirma hallazgos anteriores. A las variables que contribuyen a graduar el tipo de violación (leve o fuerte) del principio de Informatividad/Economía se añadió otro factor relevante como es la distancia entre una ER y su antecedente cognitivo. Sin embargo, cabe destacar que los bilingües también produjeron un número significativamente mayor de formas explícitas en contextos en los que no existía ambigüedad.

En segundo lugar, se exploraron los posibles efectos de la atrición de la L1 en la interpretación de los pronombres sujetos nulos y explícitos ampliando el estudio original de Tsimpli et al. (2004), que investigó la atrición morfosintáctica de la L1 en griego e italiano como L1. Los estímulos originales de Tsimpli et al. (2004) se han adaptado y modificado cuidadosamente para nuestro estudio. Por tanto, se examinan las diferencias en el sesgo de los pronombres de sujeto nulo y explícito hacia los antecedentes de sujeto u objeto siguiendo las predicciones del Hipótesis de la Posición del Antecedente (HPA) en bilingües avanzados y monolingües funcionales. Además, se explora el efecto de diversas variables, en particular el efecto de la conjunción subordinante utilizada para enlazar la cláusula principal y la subordinada, la memoria de trabajo, la dominancia lingüística, el tiempo de residencia en el entorno de la L2 y el tiempo de exposición a instrucción intensiva en la L2. Confirmando las predicciones de la HI y el HUA sobre la vulnerabilidad de los pronombres explícitos en los *attriters*, se observó que los bilingües que eran más dominantes en la L2 y, por tanto, utilizaban la L1 con menos frecuencia y de forma menos reciente, seleccionaban más antecedentes de sujeto para los pronombres explícitos. Sin embargo, estas diferencias no se manifestaban a nivel de grupo, sino que se veían moduladas por la dominancia lingüística medida por el *BLP*, un efecto que alcanzó significación tanto en bilingües instruidos como en bilingües inmersos. Además, el mayor tiempo de residencia en el entorno de la L2 moduló a su vez la interacción del

pronombre y la dominancia lingüística, lo que indicó que este efecto era más pronunciado cuanto más tiempo llevaban los bilingües inmersos en el entorno de la L2. Por otra parte, tanto el tipo de conjunción subordinante empleada en los estímulos como la capacidad de memoria de trabajo modularon la interpretación de los pronombres nulos, manifestándose así una asociación sujeto-nulo más fuerte en las oraciones enlazadas por *mientras* frente a *cuando* y en aquellos participantes con mayor capacidad de memoria de trabajo. Esta diferencia en los efectos que desencadenan la variabilidad en la interpretación de los pronombres nulos y los pronombres explícitos está en consonancia con el enfoque de FSMC, que aboga por el uso de modelos multifactoriales de resolución de pronombres.

En tercer lugar, se exploraron las diferencias en el procesamiento de pronombres de sujeto nulos y explícitos entre bilingües avanzados y monolingües funcionales mediante una adaptación de Tsimpli et al. (2004) y Kaltsa et al. (2015), que también testeaba las predicciones de la HPA. En esta tarea, también se analizó cómo variaría el procesamiento en línea de los pronombres de sujeto nulos y explícitos teniendo en cuenta las diferencias en la dominancia lingüística, la capacidad de la memoria de trabajo, el tiempo de residencia en el entorno de la L2 y la duración de la exposición intensiva instruida. En general, no se encontró ningún coste de procesamiento en ninguno de los tres grupos cuando se forzaba a los pronombres nulos a ser correferenciales con antecedentes de objeto, en línea con hallazgos previos (Chamorro, Sorace, et al., 2016; Kaltsa et al., 2015), posiblemente debido a la inclusión de configuraciones principal-subordinada. Por el contrario, solo el grupo de monolingües funcionales tardó significativamente más en leer oraciones con pronombres explícitos que se presentaban con una imagen que sesgaba al sujeto. Por tanto, los dos grupos bilingües mostraron indeterminación en el procesamiento de los pronombres explícitos de acuerdo con las predicciones de la HI y de la HUA. También cabe mencionar que los efectos de atrición morfosintáctica de la L1 en el procesamiento en los dos grupos bilingües sólo se atestiguaron en etapas tempranas, dado que los sesgos esperados surgieron al analizar los tiempos de reacción en la pregunta de comprensión. Además, las preferencias de interpretación que se obtuvieron a partir de las respuestas a la pregunta de comprensión revelaron que, mientras que todos los grupos señalaron claramente los contextos esperados de la HPA (es decir, sujeto-nulo y objeto-explícito) como coincidentes, los escenarios opuestos de falta de coincidencia no se reconocieron claramente como tales, y en particular y de forma significativamente menor cuando los pronombres nulos se

presentaron con imágenes que sesgaban hacia el objeto. Por último, la única variable continua que moduló los resultados fue el tiempo de residencia, en consonancia con los resultados de la tarea de selección de imágenes offline: los bilingües con mayor tiempo de inmersión aceptaron más interpretaciones de sujeto para los pronombres explícitos.

En conjunto, nuestros hallazgos proporcionan evidencias de atrición morfosintáctica en la L1 tanto en bilingües instruidos como en bilingües inmersos, lo que sugiere que la vulnerabilidad en bilingües de L1 español y L2 inglés se manifiesta tanto en componentes online como offline del lenguaje, estos últimos particularmente cuando se exploran factores continuos como la dominancia lingüística. Los resultados de los tres estudios apuntan en la dirección de que el rasgo [+cambio de tópico] de los pronombres explícitos parece haberse debilitado en los bilingües o el acceso al mismo, obteniéndose como resultado un aumento en la producción de pronombres explícitos en CT, una mayor selección de antecedentes de sujeto para estos pronombres y una ausencia de coste de procesamiento al interpretar los pronombres explícitos como correferenciales con antecedentes de sujeto. Además, algunos de los efectos observados estaban modulados por variables continuas como la dominancia lingüística, la memoria de trabajo o el tiempo de residencia en el entorno de la L2. Algunas de estas variables arrojan luz sobre los resultados no concluyentes de estudios anteriores sobre la atrición de la L1, mientras que otras aportan nueva evidencia en la investigación realizada sobre este campo. Dado que algunos de los efectos no se registraron a nivel de grupo, sino sólo cuando se consideró la variabilidad individual, la investigación futura debería incluir medidas que evalúen la variabilidad dentro del continuo bilingüe en lugar de caer en comparaciones dicotómicas, que impiden que el campo avance hacia una mejor comprensión de la atrición de la L1 y el bilingüismo teniendo en cuenta la heterogeneidad de perfiles en los bilingües.

11.1 Limitaciones

Una de las limitaciones de esta tesis viene dada por la naturaleza del proceso de recogida de datos que finalmente se siguió. Teniendo en cuenta las restricciones y limitaciones impuestas por la pandemia de la COVID-19, los datos finales tuvieron que recogerse en línea a través de Open Sesame, JATOS, Lime Survey y Google Forms. Aunque los datos de la tarea offline de selección de imágenes y los relatos orales en vídeo no deberían plantear mayores problemas, la recogida de datos de tiempos de lectura online puede ir

acompañada de varios inconvenientes. Por ejemplo, la variabilidad en el hardware utilizado, las diferencias en la velocidad de conexión a Internet, así como la posible presencia de múltiples distracciones durante la realización de la tarea fuera de un entorno de laboratorio podrían poner en entredicho la fiabilidad de los datos de tiempo de lectura recogidos. Sin embargo, a los sujetos experimentales incluidos en esta tesis se les indicó que completarían la tarea en una sala silenciosa que imitara las condiciones del laboratorio. Además, no se ha encontrado de forma preliminar que las diferencias en el uso de dispositivos distintos sean un problema importante cuando se recogen datos en línea en comparación con aquellos que se recogen en el laboratorio (Mathôt & March, 2022), y en estudios recientes no se han encontrado diferencias cuando se comparan los datos obtenidos en el laboratorio y a través de la web (Gastmann et al., 2022). No obstante, deberían realizarse estudios en el futuro en un entorno de laboratorio para comparar si los resultados de este estudio pueden reproducirse en las condiciones óptimas de recogida de datos.

En cuanto a los estímulos experimentales utilizados, hay que destacar varias limitaciones teniendo en cuenta la naturaleza de réplica o extensión de dos de las tareas incluidas, es decir, la de selección de imágenes offline y la tarea de lectura autodirigida. En primer lugar, los estímulos incluidos en las tareas de interpretación y procesamiento, modelados según Tsimpli et al. (2004) y Kaltsa et al. (2015), no se equipotencializaron léxicamente en todas las condiciones. Aunque los resultados del estudio de equipotencialidad revelaron que los sesgos semánticos creados por las oraciones incluidas eran bastante similares en las dos condiciones de pronombre, incluir un diseño equilibrado con las mismas oraciones para los pronombres nulos y explícitos proporcionaría resultados más fiables en cuanto a las preferencias de interpretación específicas de cada tipo de pronombre. Además, los resultados del estudio de equipotencialidad revelaron que algunas oraciones no eran ideales para poner a prueba la HPA dado que el sesgo semántico que posiblemente creaban estaba alineado con las preferencias esperadas de la HPA para ese pronombre, es decir, los participantes seleccionaban el sujeto (p. ej., el profesor) de una oración frente al objeto (p. ej., el alumno) como el antecedente más probable para realizar la acción incluida en la oración subordinada (p. ej., gritar en el aula) para las oraciones con pronombre explícito. Si este fuera el caso, la selección de un antecedente determinado podría verse confundida por el sesgo semántico de la oración y la probabilidad de que un determinado tipo de pronombre

seleccione el objeto o el sujeto. Una posible solución para futuros estudios sería la creación de varias listas en las que los antecedentes de sujeto y objeto estuvieran contrabalanceados: una lista presentaría "el profesor" del caso anterior como sujeto y la otra lo mostraría en posición de objeto en ese estímulo concreto. Otra posibilidad sería realizar un estudio de equipotencialidad antes de diseñar el conjunto completo de estímulos e incluir solo aquellos que no muestren ningún sesgo.

Otra limitación de esta tesis se refiere al número de ítems experimentales que se incluyeron en cada condición en la tarea de lectura autodirigida. Aunque Keating y Jegerski (2015) recomiendan incluir de 8 a 12 ítems para mantener idealmente de 6 a 10 ítems por condición tras la limpieza de datos y la eliminación de valores atípicos. Para ser coherentes con el diseño inicial que se replicó parcialmente, el número de ítems experimentales se mantuvo igual que en el original, es decir, 5 ítems por condición. Aunque el número de participantes incluidos fue considerable para aumentar la potencia estadística, los estudios futuros deberían tratar de incluir un mayor número de ítems por condición para obtener resultados más fiables y replicables.

Otra posible limitación podría ser el hecho de que los participantes incluidos en el grupo bilingüe instruido podrían tener una mayor conciencia metalingüística en comparación con los otros dos grupos, teniendo en cuenta que están cursando una carrera de idiomas. Aunque este compromiso fue necesario para mantener constantes otros factores como la edad y el nivel educativo, se ha argumentado que las diferencias en la conciencia metalingüística son relevantes para explicar los diferentes resultados en las tareas de resolución de pronombres (Miličević y Kraš, 2017). Para abordar esta cuestión, en futuras investigaciones se podría realizar una comparación entre monolingües funcionales que cursan una licenciatura en una materia no relacionada con la lengua y estudiantes universitarios que cursan una licenciatura en Filología Hispánica que no contasen con alto dominio de la L2.

11.2 Recomendaciones para posibles líneas de investigación futuras

Una vez discutidas algunas de las limitaciones de esta tesis, se propondrán algunas recomendaciones para futuras investigaciones. En primer lugar, para abordar si los efectos atestiguados se explican en términos de influencia de la L2 o se deben a un efecto más general del bilingüismo, se deberían incluir dos grupos con configuraciones L1-L2

diferentes, es decir, una L2 de sujeto nulo como los bilingües L1 español-L2 griego o L1 español-L2 italiano junto con una L2 de sujeto no nulo como los bilingües L1 español-L2 inglés o L1 español-L2 alemán. Explorar la vulnerabilidad de la L1 estableciendo comparaciones entre, por ejemplo, hablantes de L1 español-L2 griego y hablantes de L1 español-L2 inglés proporcionaría información clave sobre si las diferencias observadas en la L1 son similares en los dos grupos y pueden explicarse por un efecto más general del bilingüismo o si difieren y podrían explicarse simplemente por la influencia de la L2.

Teniendo en cuenta los prometedores hallazgos que esta tesis ofrece en cuanto a los cambios experimentados en bilingües instruidos en su entorno de la L1, futuros estudios deberían explorar si se encuentran diferencias entre monolingües funcionales y bilingües instruidos avanzados en otros dominios, por ejemplo, la adjunción sintáctica de cláusulas de relativo, la marcación diferencial de objeto directo o la riqueza léxica, entre otros. Además, las investigaciones que exploren este grupo de bilingües deberían tratar de descubrir qué variables pueden explicar la variabilidad adicional dentro del grupo para añadirla a la dominancia lingüística, que resultó ser un predictor relevante de los resultados diferenciales dentro de esta tesis.

Otro punto que esta tesis no ha abordado pero que sería interesante investigar sería explorar si la redundancia de los bilingües también está relacionada con su mayor sensibilidad al punto de vista de los oyentes o interlocutores. El uso de formas más explícitas en CT en bilingües también podría ser el resultado de una mayor conciencia del punto de vista de los demás y de la voluntad de reducir potencialmente la ambigüedad para el oyente.

Por último, se podrían llevar a cabo futuros estudios neurológicos para explorar las reacciones cerebrales por separado de las respuestas conductuales, lo que ayudaría a desentrañar si la pérdida de la L1 afecta a las representaciones lingüísticas o si se trata más bien de una cuestión de procesamiento.

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Appendix A. Participation requirements

Functional monolinguals

“Se buscan participantes para una investigación lingüística que se está llevando a cabo desde la Universidad de Granada (dentro del proyecto ANACOR):

- Cuya lengua materna sea el español de España
- Que tengan entre 18 y 35 años
- Que no sean estudiantes de una carrera de lenguas
- Que NO sean bilingües de nacimiento
- Que no sean competentes en inglés, no lo usen diariamente y no lo estén estudiando actualmente
- Que NO sean bastante competentes en una tercera lengua (C1) ni la usen diariamente
- Que no hayan estudiado un año en el extranjero
- Que no hayan estudiado en un colegio/instituto bilingüe

ESTUDIO:

El estudio consta de varias pruebas en español excepto el test de nivel:

- 1. **TEST DE NIVEL:** La primera prueba será un test de nivel en inglés para comprobar que vuestro nivel de inglés es el requerido para el estudio (nivel bajo). El test de nivel se hará online, y os llevará unos 10 minutos. Tiene 60 preguntas de elección múltiple, y al final del test podréis ver vuestra puntuación y las preguntas que habéis tenido bien.
- 2. **CUESTIONARIO LINGÜÍSTICO+CHAPLIN (SPAIN_MON):** La segunda prueba será un cuestionario online con diferentes preguntas en español sobre vuestro historial lingüístico (p. ej. edad a la que se comenzó a aprender inglés o uso diario, entre otros). Además, se incluyen dos pequeñas tareas en las que tendréis que narrar lo que habéis visto en dos pequeños vídeos de Charlie Chaplin.
- 3. **EXPERIMENTO DE LECTURA:** La tercera tarea será un breve experimento online de alrededor de 10 minutos en el que se medirá vuestra comprensión de unas frases.

- 4. TAREA DE MEMORIA+FLUIDEZ VERBAL: La cuarta prueba es una pequeña tarea de memoria y otra de fluidez verbal, que no os llevarán más de 20 minutos. Para estas tareas, concertaremos una cita por Google Meet en algún momento que os venga bien.

- 5. EXPERIMENTO DE SELECCIÓN DE IMÁGENES: La última tarea consiste en un pequeño experimento en el que tendréis que seleccionar la imagen que mejor se corresponde con frases que aparecerán en pantalla. Este experimento no os llevará más de 10 minutos.

POR TU PARTICIPACIÓN RECIBIRÁS:

1. Compensación económica al finalizar tu participación (15 euros) y cumpliendo con todos los requisitos.

TEN EN CUENTA QUE:

- Esto no es un examen.
- Solo nos interesa tu lenguaje espontáneo y natural.
- Toda la información proporcionada es anónima y se tratará confidencialmente para fines de investigación.

La investigación ha recibido informe favorable de la Comisión de Ética en Investigación de la Universidad de Granada, registrada con el nº. 1212/CEIH/2020”.

Instructed bilinguals

“Se buscan participantes para una investigación sobre el bilingüismo que se está llevando a cabo desde la Universidad de Granada (dentro del proyecto ANACOR):

- Cuya lengua materna sea el español de España
- Que tengan entre 18 y 35 años
- Que sean estudiantes de Estudios Ingleses
- Que NO sean bilingües de nacimiento
- Que sean competentes en inglés: C1 o superior (esto se comprobará con un test de nivel estandarizado, así que no se necesita certificado), y que hayan comenzado a aprenderlo a partir de los 5 años
- Que asistan a clase regularmente
- Que NO sean bastante competentes en una tercera lengua (C1) ni la usen diariamente
- Que no hayan estudiado un año en el extranjero
- Que no hayan estudiado en un colegio/instituto bilingüe en el que la mayoría de las asignaturas se impartían en inglés

ESTUDIO:

El estudio consta de varias pruebas en español excepto el test de nivel:

- 1. TEST DE NIVEL: La primera prueba será un test de nivel en inglés para comprobar que tenéis el nivel mínimo requerido para poder participar (C1). El test de nivel se hará online, y os llevará unos 10 minutos. Tiene 60 preguntas de elección múltiple, y al final del test podréis ver vuestra puntuación y las preguntas que habéis tenido bien.
- 2. CUESTIONARIO BILINGÜISMO+CHAPLIN (SPAIN): La segunda prueba será un cuestionario online con diferentes preguntas en español sobre vuestro historial lingüístico (p. ej. edad a la que se comenzó a aprender inglés o uso diario, entre otros). Además, se incluyen dos pequeñas tareas en las que tendréis que narrar lo que habéis visto en dos pequeños vídeos de Charlie Chaplin.

- 3. EXPERIMENTO DE LECTURA: La tercera tarea será un breve experimento online de alrededor de 10 minutos en el que se medirá vuestra comprensión de unas frases.

- 4. TAREA DE MEMORIA+FLUIDEZ VERBAL: La cuarta prueba es una pequeña tarea de memoria y otra de fluidez verbal, que no os llevarán más de 20 minutos. Para estas tareas, concertaremos una cita por Google Meet en algún momento que os venga bien.

- 5. EXPERIMENTO DE SELECCIÓN DE IMÁGENES: La última tarea consiste en un pequeño experimento en el que tendréis que seleccionar la imagen que mejor se corresponde con frases que aparecerán en pantalla. Este experimento no os llevará más de 10 minutos.

POR TU PARTICIPACIÓN RECIBIRÁS:

1. Tu nivel de inglés en gramática
2. Compensación económica al finalizar tu participación (15 euros) y cumpliendo con todos los requisitos

TEN EN CUENTA QUE:

- Esto no es un examen.
- Solo nos interesa tu lenguaje espontáneo y natural.
- Toda la información proporcionada es anónima y se tratará confidencialmente para fines de investigación.

La investigación ha recibido informe favorable de la Comisión de Ética en Investigación de la Universidad de Granada, registrada con el nº. 1212/CEIH/2020”.

Immersed bilinguals

“Se buscan participantes para una investigación sobre el bilingüismo que se está llevando a cabo desde la Universidad de Granada (dentro del proyecto ANACOR):

- Cuya lengua materna sea el español de España
- Que tengan entre 18 y 35 años
- Que lleven de 1 a 4 años en Reino Unido o Irlanda
- Que NO sean bilingües de nacimiento
- Que sean competentes en inglés: C1 o superior (esto se comprobará con un test de nivel estandarizado, así que no se necesita certificado), y que hayan comenzado a aprenderlo a partir de los 5 años
- Que estén expuestos y usen el inglés diariamente
- Que NO sean bastante competentes en una tercera lengua
- Que no hayan estado de vuelta en España durante una semana o más en el mes previo a realizar las tareas de este estudio

ESTUDIO:

El estudio consta de varias pruebas en español excepto el test de nivel:

- 1. **TEST DE NIVEL:** La primera prueba será un test de nivel en inglés para comprobar que tenéis el nivel mínimo requerido para poder participar (C1). El test de nivel se hará online, y os llevará unos 10 minutos. Tiene 60 preguntas de elección múltiple, y al final del test podréis ver vuestra puntuación y las preguntas que habéis tenido bien.
- 2. **CUESTIONARIO BILINGÜISMO+CHAPLIN (UK):** La segunda prueba será un cuestionario online con diferentes preguntas en español sobre vuestro historial lingüístico (p. ej. edad a la que se comenzó a aprender inglés o uso diario, entre otros). Además, se incluyen dos pequeñas tareas en las que tendréis que narrar lo que habéis visto en dos pequeños vídeos de Charlie Chaplin.
- 3. **EXPERIMENTO DE LECTURA:** La tercera tarea será un breve experimento online de alrededor de 10 minutos en el que se medirá vuestra comprensión de unas frases.

- 4. TAREA DE MEMORIA+FLUIDEZ VERBAL: La cuarta prueba es una pequeña tarea de memoria y otra de fluidez verbal, que no os llevarán más de 20 minutos. Para estas tareas, concertaremos una cita por Google Meet en algún momento que os venga bien.

- 5. EXPERIMENTO DE SELECCIÓN DE IMÁGENES: La última tarea consiste en un pequeño experimento en el que tendréis que seleccionar la imagen que mejor se corresponde con frases que aparecerán en pantalla. Este experimento no os llevará más de 10 minutos.

POR TU PARTICIPACIÓN RECIBIRÁS:

1. Tu nivel de inglés en gramática
2. Compensación económica al finalizar tu participación (15 euros) y cumpliendo con todos los requisitos

TEN EN CUENTA QUE:

- Esto no es un examen.
- Solo nos interesa tu lenguaje espontáneo y natural.
- Toda la información proporcionada es anónima y se tratará confidencialmente para fines de investigación.

La investigación ha recibido informe favorable de la Comisión de Ética en Investigación de la Universidad de Granada, registrada con el nº. 1212/CEIH/2020”.

Appendix B. Instructions for BLP and oral recordings

“En el siguiente cuestionario, vas a contestar una serie de preguntas que recogen información sobre tu historial de aprendizaje de lenguas y sobre tu contexto de aprendizaje actual.

Además, vas a realizar dos tareas simples en las que tendrás que narrar en español lo que ves en dos pequeños vídeos usando lenguaje natural y espontáneo. Para estas tareas tendrás que utilizar tu micrófono y subir archivos de audio, así que, por favor, prepara tu programa de grabación antes de comenzar. (Si tienes un equipo de Windows, puedes usar la aplicación ‘Grabadora de Voz’ y si tienes un equipo Mac, la app 'Notas de Voz').

Los datos recogidos serán tratados de forma confidencial y anónima. Además, con tu previo consentimiento, dichos datos serán compartidos con el resto de la comunidad investigadora en la interfaz de CEDEL2 (<http://cedel2.learnercorpora.com/>), igualmente conservando el anonimato de los mismos.

¡Muchas gracias por tu ayuda!

Por favor, presiona 'Siguiente' para continuar.

NOTA: Los datos asociados a tu cuenta de Google (Nombre/Apellidos) se registrarán al proporcionar tus grabaciones. Sin embargo, tu dirección de correo no será accesible a los investigadores responsables de este proyecto.

Este formulario recoge datos de hablantes nativos de español que aprenden inglés como segunda lengua. El formulario consta de varias secciones entre las que se incluyen:

- (1) datos personales básicos,
- (2) preguntas sobre tu perfil lingüístico,
- (3) dos tareas donde te pediremos que produzcas un texto en formato oral,

Antes de comenzar, por favor lee el documento de consentimiento:

¿QUÉ PRETENDEMOS?

Estamos investigando ciertos aspectos del aprendizaje de una lengua extranjera. Concretamente, nos interesa descubrir de qué forma se aprenden ciertas estructuras, así como su dificultad.

¿CÓMO RECOGEMOS DATOS?

En este estudio, cada participante deberá rellenar de forma anónima los apartados mencionados arriba. No se tardará más de 45 minutos.

¿QUÉ HAREMOS CON LOS DATOS APORTADOS?

Los datos lingüísticos que aquí se recojan se añadirán de forma anónima a una base de datos electrónica (=corpus) y se utilizarán exclusivamente con fines académicos y de investigación. El corpus estará disponible en línea para su utilización por la comunidad investigadora.

GARANTÍAS PARA EL PARTICIPANTE:

1. Tu participación es totalmente voluntaria.
2. Puedes retirarte del estudio en cualquier momento y sin consecuencias.
3. Puedes pedir en cualquier momento que los datos aportados por ti sean retirados de la base de datos.
4. Toda la información que aportes se tratará de forma anónima y en ninguna fase del estudio se vinculará tu nombre completo con el resto de tus datos.
5. Por tanto, no podrás ser identificado de ninguna manera por futuros usuarios del corpus.
6. No se te someterá a ningún tipo de presión o coacción emocional, física, psicológica o de cualquier otra índole como resultado de este estudio.

La investigación ha recibido informe favorable de la Comisión de Ética en Investigación de la Universidad de Granada, registrada con el nº. 1212/CEIH/2020.

TAREA. CHAPLIN VIDEO CLIP 1:

Reproduce el siguiente video de Charles Chaplin (2 minutos).

Una vez lo hayas visto y usando tu grabadora, narra en ESPAÑOL la historia/secuencia que has visto imaginando que lo estás contando a una persona que no haya visto el vídeo. Una vez hayas acabado, guarda la grabación y súbela en el apartado indicado debajo del vídeo.

Recuerda que puedes ver el vídeo cuantas veces necesites.

Nos interesa tu lenguaje natural y espontáneo.

TAREA. CHAPLIN VIDEO CLIP 2:

Reproduce el siguiente video de Charles Chaplin (4 minutos).

Una vez lo hayas visto y usando tu grabadora, narra en ESPAÑOL la historia/secuencia que has visto imaginando que lo estás contando a una persona que no haya visto el vídeo. Una vez hayas acabado, guarda la grabación y súbela en el apartado indicado debajo del vídeo.

Recuerda que puedes ver el vídeo cuantas veces necesites.

Nos interesa tu lenguaje natural y espontáneo”.

Appendix C. Oxford Quick Placement Test

Questions 1 – 5

Where can you see these notices?

For questions 1 to 5, mark one letter A, B or C on your Answer Sheet.

1.

Please leave your room key at Reception.

 A) in a shop
B) in a hotel
C) in a taxi

2.

Foreign money changed here

 A) in a library
B) in a bank
C) in a police station

3.

AFTERNOON SHOW BEGINS AT 2PM

 A) outside a theatre
B) outside a supermarket
C) outside a restaurant

4.

CLOSED FOR HOLIDAYS Lessons start again on the 8 th January

 A) at a travel agent's
B) at a music school
C) at a restaurant

5.

Price per night: £10 a tent £5 a person
--

 A) at a cinema
B) in a hotel
C) on a campsite

Questions 6 – 10

In this section you must choose the word which best fits each space in the text below.

For questions 6 to 10, mark one letter A, B or C on your Answer Sheet.

Scotland

Scotland is the north part of the island of Great Britain. The Atlantic Ocean is on the west and the North Sea on the east. Some people (6) Scotland speak a different language called Gaelic.

There are (7) five million people in Scotland, and Edinburgh is (8) most famous city.

Scotland has many mountains; the highest one is called 'Ben Nevis'. In the south of Scotland, there are a lot of sheep. A long time ago, there (9) many forests, but now there are only a (10)

Scotland is only a small country, but it is quite beautiful.

- | | | | |
|-----|----------|------------|----------|
| 6. | A) on | B) in | C) at |
| 7. | A) about | B) between | C) among |
| 8. | A) his | B) your | C) its |
| 9. | A) is | B) were | C) was |
| 10. | A) few | B) little | C) lot |

Questions 11 – 20

In this section you must choose the word which best fits each space in the texts.

For questions 11 to 20, mark one letter A, B, C or D on your Answer Sheet.

Alice Guy Blaché

Alice Guy Blaché was the first female film director. She first became involved in cinema whilst working for the Gaumont Film Company in the late 1890s. This was a period of great change in the cinema and Alice was the first to use many new inventions, (11) sound and colour.

In 1907 Alice (12) to New York where she started her own film company. She was (13) successful, but, when Hollywood became the centre of the film world, the best days of the independent New York film companies were (14) When Alice died in 1968, hardly anybody (15) her name.

- | | | | | |
|-----|---------------|--------------|----------------|----------------|
| 11. | A) bringing | B) including | C) containing | D) supporting |
| 12. | A) moved | B) ran | C) entered | D) transported |
| 13. | A) next | B) once | C) immediately | D) recently |
| 14. | A) after | B) down | C) behind | D) over |
| 15. | A) remembered | B) realised | C) reminded | D) repeated |

UFOs – do they exist?

UFO is short for ‘unidentified flying object’. UFOs are popularly known as flying saucers, (16) that is often the (17) they are reported to be. The (18) "flying saucers" were seen in 1947 by an American pilot, but experts who studied his claim decided it had been a trick of the light.

Even people experienced at watching the sky, (19) as pilots, report seeing UFOs. In 1978 a pilot reported a collection of UFOs off the coast of New Zealand. A television (20) went up with the pilot and filmed the UFOs. Scientists studying this phenomenon later discovered that in this case they were simply lights on boats out fishing.

16. A) because B) therefore C) although D) so
17. A) look B) shape C) size D) type
18. A) last B) next C) first D) oldest
19. A) like B) that C) so D) such
20. A) cameraman B) director C) actor D) announcer

Questions 21 – 40

In this section you must choose the word or phrase which best completes each sentence.

For questions 21 to 40, mark one letter A, B, C or D on your Answer Sheet.

21. The teacher encouraged her students to an English penfriend.
A) should write B) write C) wrote D) to write
22. They spent a lot of time at the pictures in the museum.
A) looking B) for looking C) to look D) to looking
23. Shirley enjoys science lessons, but all her experiments seem to
wrong.
A) turn B) come C) end D) go
24. from Michael, all the group arrived on time.
A) Except B) Other C) Besides D) Apart
25. She her neighbour’s children for the broken window.
A) accused B) complained C) blamed D) denied

26. As I had missed the history lesson, my friend went the homework with me.
A) by B) after C) over D) on
27. Whether she's a good actress or not is a of opinion.
A) matter B) subject C) point D) case
28. The decorated roof of the ancient palace was up by four thin columns.
A) built B) carried C) held D) supported
29. Would it you if we came on Thursday?
A) agree B) suit C) like D) fit
30. This form be handed in until the end of the week.
A) doesn't need B) doesn't have C) needn't D) hasn't got
31. If you make a mistake when you are writing, just it out with your pen.
A) cross B) clear C) do D) wipe
32. Although our opinions on many things, we're good friends.
A) differ B) oppose C) disagree D) divide
33. This product must be eaten two days of purchase.
A) by B) before C) within D) under
34. The newspaper report contained important information.
A) many B) another C) an D) a lot of
35. Have you considered to London?
A) move B) to move C) to be moving D) moving
36. It can be a good idea for people who lead an active life to increase their of vitamins.
A) upturn B) input C) upkeep D) intake
37. I thought there was a of jealousy in his reaction to my good fortune.
A) piece B) part C) shadow D) touch
38. Why didn't you that you were feeling ill?
A) advise B) mention C) remark D) tell
39. James was not sure exactly where his best interests
A) stood B) rested C) lay D) centred
40. He's still getting the shock of losing his job.
A) across B) by C) over D) through

Questions 41 – 50

In this section you must choose the word or phrase which best fits each space in the texts.

For questions 41 to 50, mark one letter A, B, C or D on your Answer Sheet.

The tallest buildings - SKYSCRAPERS

Nowadays, skyscrapers can be found in most major cities of the world. A building which was many (41) high was first called a skyscraper in the United States at the end of the 19th century, and New York has perhaps the (42) skyscraper of them all, the Empire State Building. The (43) beneath the streets of New York is rock, (44) enough to take the heaviest load without sinking, and is therefore well-suited to bearing the (45) of tall buildings.

- | | | | | |
|-----|---------------|--------------|---------------|---------------|
| 41. | A) stages | B) steps | C) storeys | D) levels |
| 42. | A) first-rate | B) top-class | C) well-built | D) best-known |
| 43. | A) dirt | B) field | C) ground | D) soil |
| 44. | A) hard | B) stiff | C) forceful | D) powerful |
| 45. | A) weight | B) height | C) size | D) scale |

SCRABBLE

Scrabble is the world's most popular word game. For its origins, we have to go back to the 1930s in the USA, when Alfred Butts, an architect, found himself out of (46) He decided that there was a (47) for a board game based on words and (48) To design one. Eventually he made a (49) from it, in spite of the fact that his original (50) was only three cents a game.

- | | | | | |
|-----|------------|-------------|-------------|--------------|
| 46. | A) earning | B) work | C) income | D) job |
| 47. | A) market | B) purchase | C) commerce | D) sale |
| 48. | A) took up | B) set out | C) made for | D) got round |
| 49. | A) wealth | B) find | C) cash | D) fortune |
| 50. | A) receipt | B) benefit | C) profit | D) allowance |

Questions 51 – 60

In this section you must choose the word or phrase which best completes each sentence.

For questions 51 to 60, mark one letter A, B, C or D on your Answer Sheet.

51. Roger's manager to make him stay late if he hadn't finished the work.
A) insisted B) warned C) threatened D) announced
52. By the time he has finished his week's work, John has hardly energy left for the weekend.
A) any B) much C) no D) same
53. As the game to a close, disappointed spectators started to leave.
A) led B) neared C) approached D) drew
54. I don't remember the front door when I left home this morning.
A) to lock B) locking C) locked D) to have locked
55. I to other people borrowing my books: they always forget to return them.
A) disagree B) avoid C) dislike D) object
56. Andrew's attempts to get into the swimming team have not with much success.
A) associated B) concluded C) joined D) met
57. Although Harry had obviously read the newspaper article carefully, he didn't seem to have the main point.
A) grasped B) clutched C) clasped D) gripped
58. A lot of the views put forward in the documentary were open to
A) enquiry B) query C) question D) wonder
59. The new college for the needs of students with a variety of learning backgrounds.
A) deals B) supplies C) furnishes D) caters
60. I find the times of English meals very strange – I'm not used dinner at 6pm.
A) to have B) to having C) having D) have

Appendix D. Bilingual Language Profile

Note. The information in italics has been added and was not originally included in the initial BLP template.

I. Información básica

Iniciales (Indica tus iniciales en mayúscula y sin signos de puntuación siguiendo el ejemplo: Jon Snow – JS)

Edad

Género

M

F

Prefiero no decirlo

Lugar de residencia actual: ciudad

País de residencia actual

Tiempo que llevas en dicho país. (Por favor, indica el número de años y meses que has pasado en dicho país)

Durante los últimos 12 meses, si has interrumpido tu residencia para ir a otro país por una duración de 2 semanas o mayor, indica dónde, cuándo y la duración. Si no ha sido así, indica NO

Nivel más alto de formación académica completada:

- Menos de la escuela secundaria
- Escuela secundaria
- Un poco de universidad
- Universidad (diplomatura/licenciatura/grado)
- Un poco de escuela graduada
- Máster
- Doctorado

Ocupación actual. Si estás realizando estudios, por favor, indica el campo de estudio (p. ej. ingeniería, lingüística) y curso (primero, segundo, tercero y cuarto)

II. Historial lingüístico

En esta sección, tendrás que contestar algunas preguntas sobre tu historial lingüístico.

Por favor contesta a cada pregunta seleccionando la respuesta apropiada en el menú desplegable o con una respuesta corta según se indique.

Indica tu lengua materna (Si eres bilingüe de nacimiento, indica tus lenguas maternas)

1. ¿A qué edad empezaste a aprender las siguientes lenguas?

Indica, además, si tu modo de aprendizaje se corresponde con aprendizaje mediante instrucción (p. ej. clases, academia) o sin ella, es decir, fuera de clase.

¿A qué edad empezaste a aprender ESPAÑOL?

Desde el nacimiento 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

Modo de aprendizaje de ESPAÑOL (Si tu aprendizaje se corresponde con ambos contextos, por favor, marca los dos)

Instrucción

Inmersión (fuera de clase)

¿A qué edad empezaste a aprender INGLÉS?

Desde el nacimiento 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

Modo de aprendizaje de INGLÉS (Si tu aprendizaje se corresponde con ambos contextos, por favor, marca los dos)

Instrucción

Inmersión (fuera de clase)

2. ¿A qué edad empezaste a sentirte cómodo usando las siguientes lenguas?

¿A qué edad empezaste a sentirte cómodo usando ESPAÑOL?

Tan pronto como recuerdo Aún no me siento cómodo 1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20+

¿A qué edad empezaste a sentirte cómodo usando INGLÉS?

Tan pronto como recuerdo Aún no me siento cómodo 1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20+

3. ¿Cuántos años de clases (gramática, historia, matemáticas, etc.) has tenido en las siguientes lenguas (desde la escuela primaria a la universidad)?

¿Cuántos años de clases (gramática, historia, matemáticas, etc.) has tenido en ESPAÑOL?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

¿Cuántos años de clases (gramática, historia, matemáticas, etc.) has tenido en INGLÉS?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

Número de años con instrucción combinada en inglés y español. Por favor, indica el porcentaje de instrucción en cada una de las lenguas (Indica, por favor, en el caso de haber recibido instrucción en ambas lenguas durante un cierto periodo de tiempo, el porcentaje de clases que se enseñaban en español y en inglés, e indica además, el número de años durante los que se mantuvo esta situación. Por ejemplo, en un programa bilingüe donde 5 de las 10 asignaturas se enseñan en inglés, indicarías: Español 50%, Inglés 50% durante 4 años. En caso contrario, indica NO).

4. ¿Cuántos años has pasado en un país/región donde se hablan las siguientes lenguas?

¿Cuántos años has pasado en un país/región donde se habla ESPAÑOL?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

¿Cuántos años has pasado en un país/región donde se habla INGLÉS?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

5. ¿Cuántos años has pasado en familia/hogar/casa hablando las siguientes lenguas?

¿Cuántos años has pasado en familia/casa/hogar hablando ESPAÑOL?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

¿Cuántos años has pasado en familia/casa/hogar hablando INGLÉS?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

6. ¿Cuántos años has pasado en un ambiente de trabajo donde se hablan las siguientes lenguas?

¿Cuántos años has pasado en un ambiente de trabajo donde se habla ESPAÑOL?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

¿Cuántos años has pasado en un ambiente de trabajo donde se habla INGLÉS?

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

Número de años/meses en contexto de trabajo bilingüe y lengua(s) que usas/usabas. (En el caso en el que ambas lenguas se hablen en tu trabajo, por favor, indica durante cuánto tiempo se ha mantenido esta situación, y la lengua que solías/sueles utilizar).

7. ¿Cuál de tus lenguas consideras más dominante actualmente y al inicio de tu contexto de inmersión (IMMERSED BILINGUALS)/ (primer año de carrera universitaria (INSTRUCTED BILINGUALS))?

Indica la lengua que consideras dominante actualmente.

Español

Inglés

Otra

Indica la lengua que considerabas dominante en el momento en el que comenzaste tu inmersión (IMMERSED BILINGUALS)/ (primer año de carrera universitaria) (INSTRUCTED BILINGUALS)

Español

Inglés

III. Uso de lenguas

En esta sección, nos gustaría que contestaras algunas preguntas sobre tu uso de lenguas marcando la casilla apropiada.

Por favor, contesta a cada pregunta seleccionando la respuesta apropiada en el menú desplegable.

En una semana normal, ¿qué porcentaje del tiempo pasas con amigos, con la familia/hogar/casa (en el caso de no vivir con la familia), o en la universidad/trabajo? (El total sumando las respuestas debe llegar al 100%)

En una semana normal, ¿qué porcentaje del tiempo pasas con tus amigos?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

En una semana normal, ¿qué porcentaje del tiempo pasas con tu familia/hogar/casa (en el caso de no vivir con la familia)?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

En una semana normal, ¿qué porcentaje del tiempo pasas en la universidad/trabajo?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8. En una semana normal, ¿qué porcentaje del tiempo usas las siguientes lenguas con tus amigos? Indica, además, si tus amigos son hablantes nativos de esa lengua o si son aprendices de la misma. (El total sumando las respuestas del uso de ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%).

En una semana normal, ¿qué porcentaje del tiempo usas ESPAÑOL con tus amigos? (Recuerda que el total de las respuestas para ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Indica si la mayoría de tus amigos con los que hablas ESPAÑOL son:

Nativos

Aprendices

Indica de forma aproximada el número de personas con las que te relacionas cuya lengua materna sea el ESPAÑOL:

0-5 5-10 10-15 15-20 >20

En una semana normal, ¿qué porcentaje del tiempo usas INGLÉS con tus amigos?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Indica si la mayoría de tus amigos con los que hablas INGLÉS son:

Nativos

Aprendices

Indica de forma aproximada el número de personas con las que te relacionas cuya lengua materna sea el INGLÉS:

0-5 5-10 10-15 15-20 >20

En una semana normal, ¿qué porcentaje del tiempo usas OTRAS LENGUAS con tus amigos?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

9. En una semana normal, ¿qué porcentaje del tiempo usas las siguientes lenguas con tu familia? (El total sumando las respuestas del uso de ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%).

En una semana normal, ¿qué porcentaje del tiempo usas ESPAÑOL con tu familia? (Recuerda que el total de las respuestas para ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

En una semana normal, ¿qué porcentaje del tiempo usas INGLÉS con tu familia?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

En una semana normal, ¿qué porcentaje del tiempo usas OTRAS LENGUAS con tu familia?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

10. En una semana normal, ¿qué porcentaje del tiempo usas las siguientes lenguas en la universidad/el trabajo? Indica, además, si tus compañeros son hablantes nativos de esa lengua o si son aprendices de la misma. (El total sumando las respuestas del uso de ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%).

En una semana normal, ¿qué porcentaje del tiempo usas ESPAÑOL en la universidad/el trabajo? (Recuerda que el total de las respuestas para ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Indica si la mayoría de tus compañeros con los que hablas ESPAÑOL son:

Nativos

Aprendices

En una semana normal, ¿qué porcentaje del tiempo usas INGLÉS en la universidad/el trabajo?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Indica si la mayoría de tus compañeros con los que hablas INGLÉS son:

Nativos

Aprendices

En una semana normal, ¿qué porcentaje del tiempo usas OTRAS LENGUAS en la universidad/el trabajo?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

11. Cuando te hablas a ti mismo, ¿con qué frecuencia te hablas en las siguientes lenguas? (El total sumando las respuestas del uso de ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%).

Cuando te hablas a ti mismo, ¿con qué frecuencia te hablas en ESPAÑOL?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Cuando te hablas a ti mismo, ¿con qué frecuencia te hablas en INGLÉS?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Cuando te hablas a ti mismo, ¿con qué frecuencia te hablas en OTRAS LENGUAS?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

12. Cuando haces cálculos contando, ¿con qué frecuencia cuentas en las siguientes lenguas? (El total sumando las respuestas del uso de ESPAÑOL, INGLÉS y OTRAS LENGUAS debe llegar al 100%).

Cuando haces cálculos contando, ¿con qué frecuencia cuentas en ESPAÑOL?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Cuando haces cálculos contando, ¿con qué frecuencia cuentas en INGLÉS?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Cuando haces cálculos contando, ¿con qué frecuencia cuentas en OTRAS LENGUAS?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Cuando hablas en ESPAÑOL, ¿con qué frecuencia introduces palabras, expresiones o estructuras del inglés?

Nunca

A veces

A menudo

Cuando hablas en INGLÉS, ¿con qué frecuencia introduces palabras, expresiones o estructuras del español?

Nunca

A veces

A menudo

IV. Competencia lingüística

En esta sección, nos gustaría que consideraras tu competencia/nivel de lengua marcando la casilla de 0 a 6, *tanto actualmente como en el momento de inmersión en el país de*

habla inglesa (IMMERSED BILINGUALS)/tanto actualmente como en el momento en el que comenzaste la carrera universitaria (inmersión) (INSTRUCTED BILINGUALS).

Por favor, contesta a cada pregunta seleccionando el botón apropiado.

13. HABLA: ¿Cómo hablas/hablabas en las siguientes lenguas?

¿Cómo hablas en ESPAÑOL ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo hablabas en ESPAÑOL en el momento de inmersión? (IMMERSED BILINGUALS)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo hablas en INGLÉS ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo hablabas en INGLÉS en el momento de inmersión? (IMMERSED BILINGUALS)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

Indica cuál es tu TERCERA LENGUA: (Si no hablas una TERCERA LENGUA, indica 'NO' y marca 0 en las siguientes preguntas referentes a la TERCERA LENGUA).

¿Cómo hablas en TU TERCERA LENGUA ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo hablabas en TU TERCERA LENGUA en el momento de inmersión?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

14. COMPRENSIÓN: ¿Cómo entiendes/entendías en las siguientes lenguas?

¿Cómo entiendes en ESPAÑOL ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo entendías en ESPAÑOL en el momento de inmersión? (IMMERSED BILINGUALS)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo entiendes en INGLÉS ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo entendías en INGLÉS en el momento de inmersión? (*IMMERSED BILINGUALS*)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo entiendes en TU TERCERA LENGUA ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo entendías en TU TERCERA LENGUA en el momento de inmersión? (*IMMERSED BILINGUALS*)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

15. LECTURA: ¿Cómo lees/leías en las siguientes lenguas?

¿Cómo lees en ESPAÑOL ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo leías en ESPAÑOL en el momento de inmersión? (*IMMERSED BILINGUALS*)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo lees en INGLÉS ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo leías en INGLÉS en el momento de inmersión? (*IMMERSED BILINGUALS*)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo lees en TU TERCERA LENGUA ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo leías en TU TERCERA LENGUA en el momento de inmersión? (*IMMERSED BILINGUALS*)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

16. ESCRITURA: ¿Cómo escribes/escribías en las siguientes lenguas?

¿Cómo escribes en ESPAÑOL ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo escribías en ESPAÑOL en el momento de inmersión? (IMMERSED BILINGUALS)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo escribes en INGLÉS ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo escribías en INGLÉS en el momento de inmersión? (IMMERSED BILINGUALS)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo escribes en TU TERCERA LENGUA ahora?

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

¿Cómo escribías en TU TERCERA LENGUA en el momento de inmersión? (IMMERSED BILINGUALS)

(no muy bien) 0 1 2 3 4 5 6 (muy bien)

V. Actitudes lingüísticas

En esta sección, nos gustaría que contestes a las siguientes afirmaciones sobre actitudes lingüísticas.

Por favor, responde a cada frase seleccionando la opción apropiada.

17. Me siento "yo mismo" cuando hablo en las siguientes lenguas

Me siento "yo mismo" cuando hablo en ESPAÑOL.

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

Me siento "yo mismo" cuando hablo en INGLÉS.

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

18. Yo me identifico con las siguientes culturas.

Me identifico con una cultura HISPANOHABLANTE

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

Me identifico con una cultura ANGLOHABLANTE

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

19. Es importante para mí usar (o llegar a usar) las siguientes lenguas como un hablante nativo.

Es importante para mí usar (o llegar a usar) ESPAÑOL como un hablante nativo.

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

Es importante para mí usar (o llegar a usar) INGLÉS como un hablante nativo.

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

20. Quiero que los demás piensen que soy un hablante nativo de las siguientes lenguas

Quiero que los demás piensen que soy un hablante nativo de ESPAÑOL

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

Quiero que los demás piensen que soy un hablante nativo de INGLÉS

(no estoy de acuerdo) 0 1 2 3 4 5 6 (estoy de acuerdo)

Appendix E. Instructions working memory task

“Como enseguida verás, van a ir apareciendo en la pantalla, sucesivamente, frases que tendrás que leer en voz alta. Cuando aparezca una interrogación significa que una serie de frases ha terminado, y tu tarea consiste en recordar en voz alta la ÚLTIMA palabra de cada una de las frases en el orden en que fueron presentadas.

Por ejemplo, si aparecen sucesivamente las frases: 'Era tanto el ruido que venía de la calle que tuvimos que cambiarnos de sitio' y 'Mi madre nos hizo un bizcocho de chocolate para llevarlo a la fiesta', al aparecer la interrogación tendrás que decir en voz alta las palabras SITIO y FIESTA, porque 'sitio' es la última palabra de la primera frase y 'fiesta' es la última palabra de la segunda. Este es el orden correcto.

Si no recuerdas las palabras en el orden exacto, trata de decirlas en el orden en que las recuerdes, siempre que no empieces por la última palabra de la última frase. La prueba comenzará con series de dos frases, pero el número de frases de cada serie irá aumentando progresivamente durante el desarrollo de la prueba. Esto se te indicará cada vez que ocurra.

No importa la rapidez con que leas las frases, lo que sí importa es que comiences a leer cada frase tan pronto como aparezca en la pantalla.

Vamos a hacer algunos ejercicios de práctica para que te familiarices con la tarea.

Empezamos con una serie de dos frases: (ensayos prácticos)

Como acabas de ver, esta prueba requiere mucha atención. Ten en cuenta que las series serán cada vez más largas y, por tanto, más difíciles; así que no debes desanimarte si no puedes recordar todas las palabras de las frases.

En cualquier caso, di las palabras que recuerdes, aunque no estés completamente seguro. ¿Estás preparado/a?... Pues comenzamos. Al cambiar de nivel se avisa diciendo:

AHORA PASAMOS A OTRA SERIE CON UNA FRASE MÁS.

El experimento ha concluido.

¡Muchas gracias por tu participación!”

Appendix F. Working memory task

Practice trials

- | |
|--|
| 1. Estaba tan distraído que tuvimos que llamarle varias veces para que nos hiciera caso. |
| 2. Se tapó los oídos con las manos porque no podía soportar aquellos gritos. |
| 3. Aunque el profesor explicó el problema, todos nos quedamos con bastantes dudas. |
| 4. Después de terminar todos los exámenes, tuvimos vacaciones durante casi una semana. |
| 5. Debido a la lluvia y el fuerte viento no pudimos seguir mucho tiempo en moto. |
| 6. Estábamos paseando por la Casa de Campo cuando nos encontramos a tus padres. |

2 sentences

- | |
|--|
| 2.1. Según todas las encuestas, Robert Redford es el actor más famoso del cine. |
| 2.2. Aquel verano hizo tanto frío que mucha gente tuvo que cambiar sus planes. |
| 2.3. Ayer todo el pueblo acudió al ayuntamiento para escuchar el discurso del alcalde. |
| 2.4. Por haber aprobado todo el curso su abuelo le regaló una preciosa pluma. |
| 2.5. Sus bonitos y expresivos ojos se volvieron hacia mí con una profunda mirada. |
| 2.6. Cuando nos dimos cuenta de que tenía fiebre, fuimos corriendo a avisar al médico. |

3 sentences

- | |
|---|
| 3.1. Aunque estuvimos toda la tarde estudiando, no encontramos la solución del problema. |
| 3.2. Como no tengamos cuidado es posible que agotemos todos los recursos de la tierra. |
| 3.3. Ahora que un hombre había muerto, la policía no tendría más remedio que actuar. |
| 3.4. Cansada del mal comportamiento de la clase, la profesora fue a quejarse al director. |
| 3.5. Después del concierto los músicos salieron a saludar mientras el público aplaudía y cantaba. |
| 3.6. Con el fin de realizar los análisis médicos el doctor hospitalizó al enfermo. |
| 3.7. El jefe de policía informó al presidente de que los terroristas planeaban matarle. |
| 3.8. Los monumentos históricos son numerosos y están bien presentados en la nueva guía. |
| 3.9. Su mujer le regañaba con frecuencia porque no se preocupaba de los niños. |

4 sentences

- | |
|--|
| <p>4.1. Las películas no muestran las cosas tal y como ocurren en la vida real.</p> <p>4.2. Con gran interés Pedro contempló muy detenidamente todos los cuadros del museo.</p> <p>4.3. Cuando el abogado terminó de interrogar al testigo, el juez levantó la sesión.</p> <p>4.4. En la ciudad en la que vivo amanece muchos días con una ligera niebla.</p> |
| <p>4.5. La anciana señora estuvo charlando con su nueva vecina mientras daban un paseo.</p> <p>4.6. Los leñadores trabajaron mucho hasta que consiguieron toda la madera para la casa.</p> <p>4.7. Muchos campesinos pensaron que el reparto de los terrenos no había sido justo.</p> <p>4.8. En comparación con sus primeros trabajos, Dalí llegó a tener un estilo muy personal.</p> |
| <p>4.9. El tremendo alboroto que provocaba el juego de los niños molestaba a algunos vecinos.</p> <p>4.10. El sonido de un tren que se aproximaba lo despertó y comenzó a caminar.</p> <p>4.11. Los obreros decidieron alargar la jornada de trabajo para conseguir una paga extra.</p> <p>4.12. Los alumnos que presentaron algún trabajo no tuvieron que hacer el examen.</p> |

5 sentences

- | |
|--|
| <p>5.1. A pesar del frío que hacía, los jóvenes continuaron su excursión en canoa.</p> <p>5.2. Antes de acabar la fiesta pasamos un buen rato mirando nuestro álbum de fotos.</p> <p>5.3. Se pidió a los fumadores que se aguantaran hasta que terminara la reunión.</p> <p>5.4. No quiso echar mucha cebolla a la ensalada porque no le gustaba su olor.</p> <p>5.5. Sin la rehabilitación mi rodilla no se habría recuperado en tan poco tiempo.</p> |
| <p>5.6. Cuando los niños tienen problemas siempre cuentan con la intervención de su héroe.</p> <p>5.7. Me gusta su manera de comportarse, pero no estoy de acuerdo con sus ideas.</p> <p>5.8. Al final del largo pasillo me encontré frente a una gran puerta de madera.</p> <p>5.9. No entiendo por qué se enfadó Andrés, aunque creo que fue por mi culpa.</p> <p>5.10. El joven estudiante decidió leer el libro antes de que terminara el año.</p> |
| <p>5.11. Supongo que te habrán informado de cuál es el verdadero motivo de mi visita.</p> <p>5.12. En un momento de la discusión, Jaime recordó detalles que no venían al caso.</p> |

- 5.13. El niño fue castigado severamente por su falta de respeto a los mayores.
- 5.14. Los exámenes se adelantaron a mayo para hacer el viaje de fin de curso.
- 5.15. Para olvidarse de los problemas de la oficina comenzó a leer una novela.

6 sentences

- 6.1. Cuando terminó la actuación de la orquesta, el público aplaudió durante varios minutos.
- 6.2. El artículo sobre los dinosaurios me pareció aburrido, confuso y excesivamente largo.
- 6.3. Los efectos devastadores de la inundación no se notaron realmente hasta meses después.
- 6.4. Descansó un momento en el puente mientras los dos policías le vigilaban a distancia.
- 6.5. A las dos horas de iniciarse el incendio, los bomberos pudieron controlar la situación.
- 6.6. No podía evitar que los recuerdos volvieran una y otra vez a su mente.
- 6.7. No consiguió llegar muy lejos porque, sin darse cuenta, había dado un gran rodeo.
- 6.8. Cuando levanté la moto del suelo vi que no había sufrido demasiados daños.
- 6.9. Durante el tiempo que duró la operación todos permanecimos en la sala de espera.
- 6.10. Varios leños ardían lentamente en la chimenea, ya que la noche era fría.
- 6.11. Como no contestaban al teléfono decidí ir a verle personalmente a su despacho.
- 6.12. Juan se enfadó con Carmen debido a su mala costumbre de comerse las uñas.
- 6.13. Todavía faltaba una hora para el desayuno y la casa estaba silenciosa y dormida.
- 6.14. La mejor forma de aprovechar las vacaciones es irse a conocer nuevos lugares.
- 6.15. Afortunadamente, el nuevo plan de paz fue apoyado por todos los países.
- 6.16. El profesor nos dijo muy enfadado que en el futuro no admitiría más errores.
- 6.17. Quisimos avisarles pero nos volvimos atrás cuando vimos que les habíamos cogido.
- 6.18. Su hijo no era buen estudiante pero demostraba tener una gran voluntad.

Appendix G. Instructions picture selection task

“En el siguiente cuestionario, vas a contestar una serie de preguntas generales sobre ti y realizarás una tarea lingüística de selección de imágenes.

Los datos se recogen dentro del proyecto ANACOR (FFI2016-75106-P) financiado por MINECO y cuyo investigador principal es el Dr. Cristóbal Lozano (Universidad de Granada). Estos datos serán tratados de forma confidencial y anónima, y se utilizarán exclusivamente para fines de investigación. La investigación ha recibido informe favorable de la Comisión de Ética en Investigación de la Universidad de Granada, registrada con el nº. 1212/CEIH/2020.

Tu participación es completamente voluntaria y te puedes retirar del estudio en el momento que desees.

¡Muchas gracias por tu ayuda!

*Se mantendrá la seguridad de los datos de acuerdo al Reglamento de la Unión Europea 2016/679 y la Ley Orgánica 3/2018 de 5 de diciembre sobre Protección de Datos Personales y garantía de los derechos digitales.

A modo de práctica, a continuación, tendrás que seleccionar CUÁL (SOLO UNA) de las imágenes se corresponde con la frase que aparece encima de las dos opciones.

A continuación, se te presentará una frase y dos imágenes debajo. Tu tarea consiste en señalar CUÁL de las dos imágenes se corresponde con la frase que has leído.

Muchas gracias por tu tiempo colaborando en este estudio.

Si tienes cualquier duda, ponte en contacto con los investigadores responsables de esta investigación: Fernando Martín-Villena (fmartinvillena@ugr.es) y Cristóbal Lozano (cristoballozano@ugr.es)”.

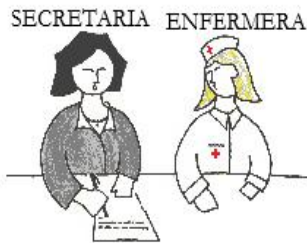
Appendix H. Picture selection task: stimuli

Experimental items

1. La anciana saludó a la mujer cuando/mientras ella cruzaba la calle.



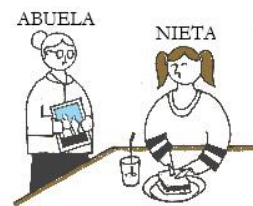
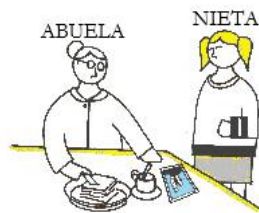
2. La secretaria ayudó a la enfermera cuando/mientras ella escribía una carta.



3. El abuelo habló rápido al nieto cuando/mientras leía el libro.



4. La abuela mostró la foto a la nieta cuando/mientras tomaba el desayuno.



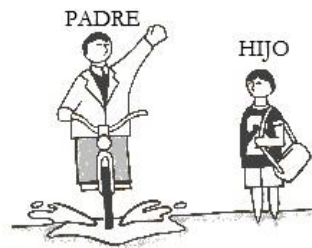
5. La mujer dio el papel a la secretaria cuando/mientras entraba en la oficina.



-
6. La madre besó a la hija cuando/mientras ella se ponía el abrigo.



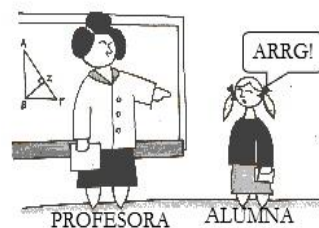
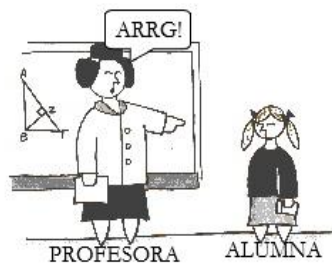
-
7. El padre saludó al hijo cuando/mientras él montaba en bicicleta.



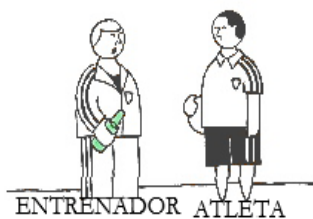
-
8. El policía silbó al ladrón cuando/mientras él corría por la calle.



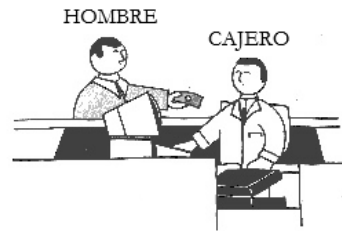
-
9. La profesora señaló a la alumna cuando/mientras ella gritaba en la clase.



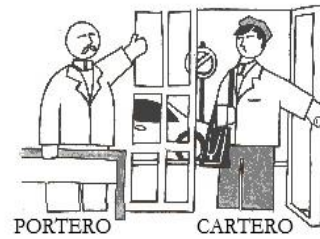
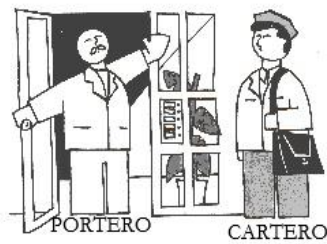
-
10. El entrenador habló alto al atleta cuando/mientras sujetaba la botella.



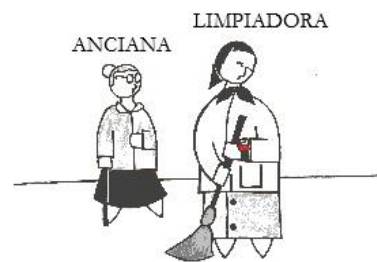
11. El hombre pagó al cajero cuando/mientras él cerraba la maleta.



12. El portero saludó de prisa al cartero cuando/mientras abría la puerta.



13. La anciana se acercó a la limpiadora cuando/mientras ella miraba su reloj.



14. El policía vio de repente al ladrón cuando/mientras giraba la esquina.



15. El cliente pagó al camarero cuando/mientras él echaba vino en la copa.



16. El revisor pidió el ticket al hombre cuando/mientras bostezaba intensamente.



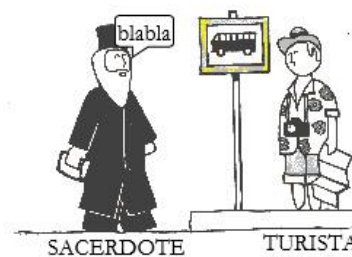
17. La enfermera empujó a la limpiadora cuando/mientras ella salía del ascensor.



18. El guardia vio de repente al mendigo cuando/mientras andaba en el parque.



19. El sacerdote habló continuamente al turista cuando/mientras esperaba al autobús.



20. El padre dio las felicidades al hijo cuando/mientras abría la puerta.



Distractor items

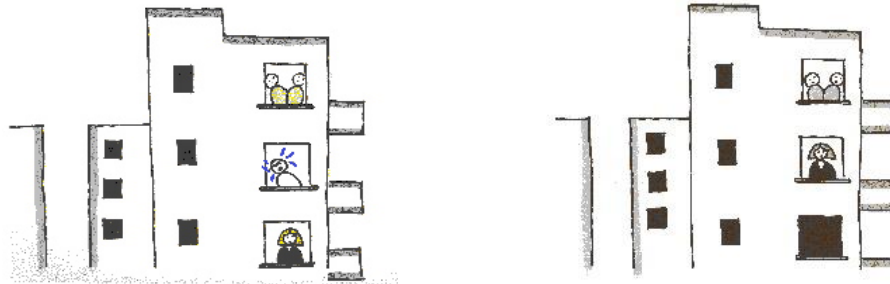
1. Uno de los cuatro barcos empezó a hundirse.



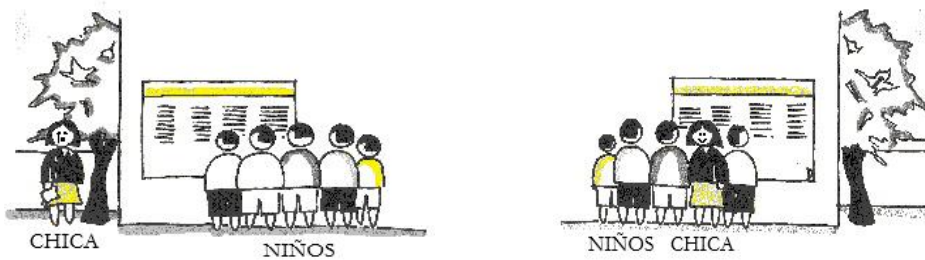
2. Uno de los tres barcos empezó a hundirse.



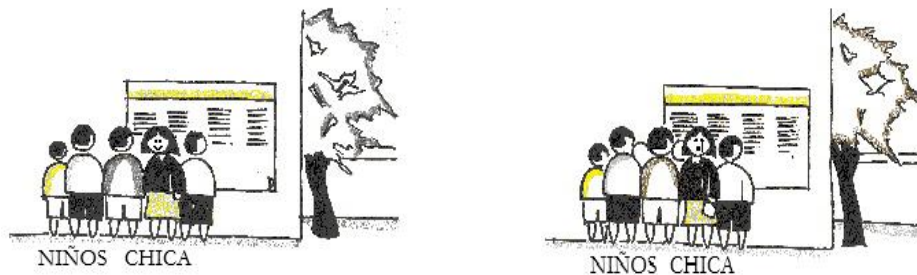
3. En la ventana de la segunda planta hay solo una chica llorando.



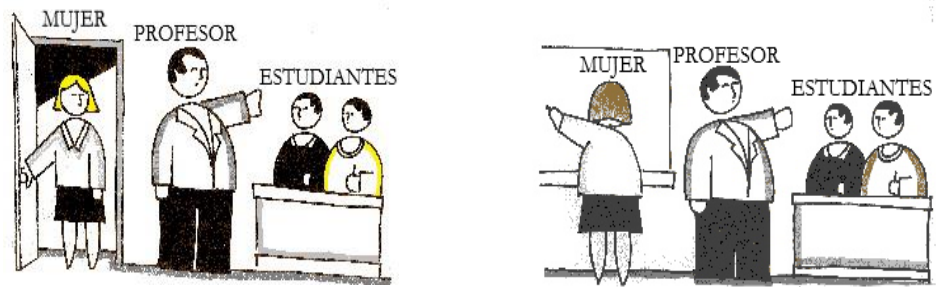
4. La chica que está de pie al lado del árbol llora.



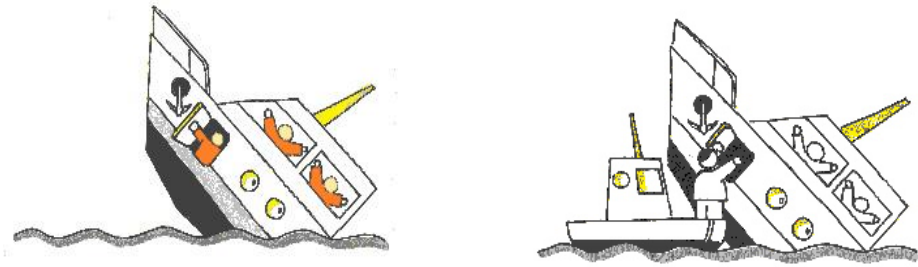
5. La chica que está delante de los niños se ríe.



6. La mujer abre la puerta mientras el profesor habla a dos estudiantes.



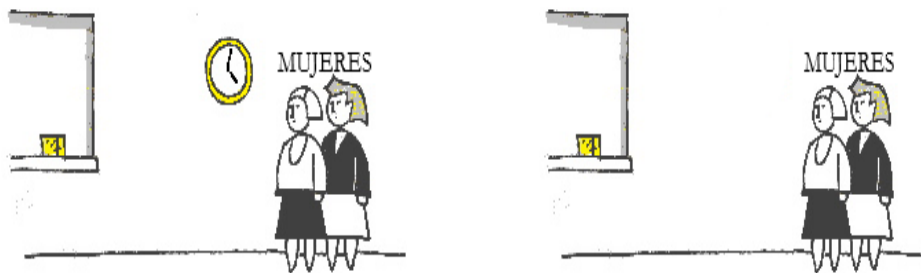
7. Tres personas piden ayuda mientras el barco se hunde.



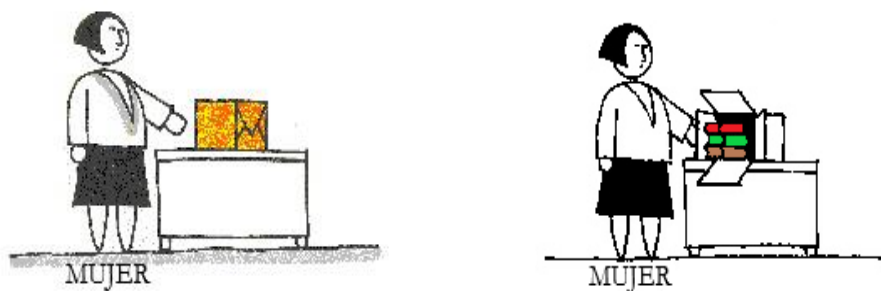
8. Dos niños están fuera de la ventana y están gritando.



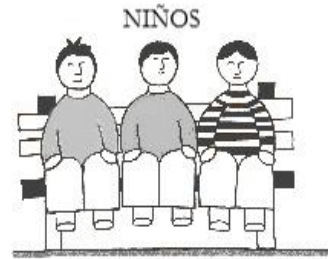
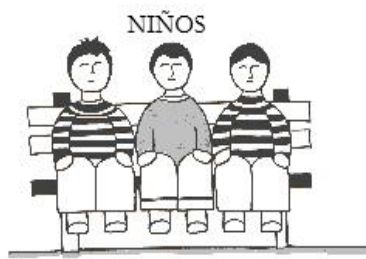
9. En la pared detrás de las dos mujeres hay un reloj.



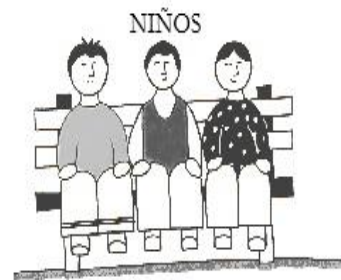
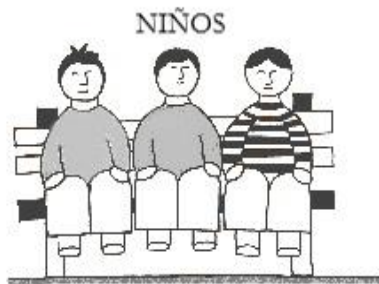
10. En la mesa hay una caja cerrada.



11. Dos de los niños que están sentados en el banco llevan jersey de rayas.



12. Uno de los niños que están sentados en el banco lleva jersey de rayas.



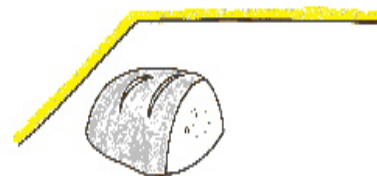
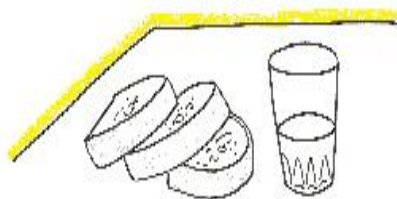
13. El profesor que dio los libros a la estudiante lleva gafas.



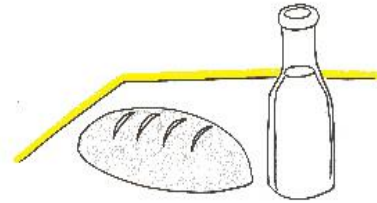
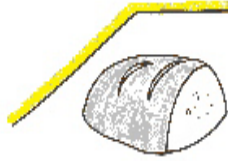
14. El profesor que no lleva gafas dio un libro a la estudiante.



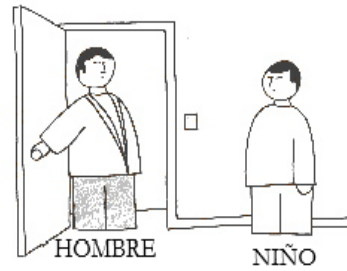
15. Encima de la mesa solo hay leche y poco pan.



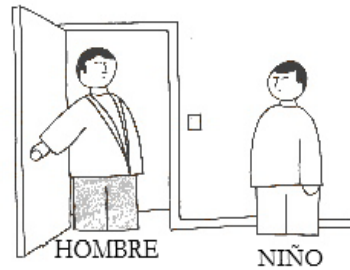
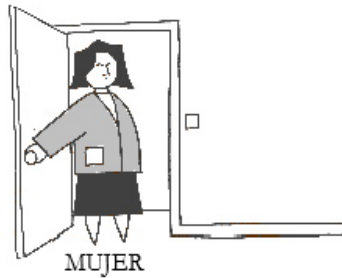
16. Hay un poco de pan encima de la mesa y nada de leche.



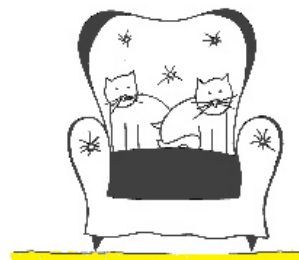
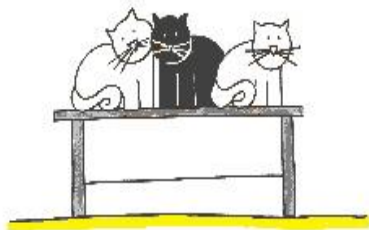
17. Cuando el hombre abrió la puerta no había nadie en la habitación.



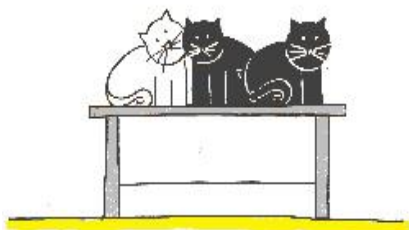
18. Cuando la mujer abrió la puerta no había nadie en la habitación.



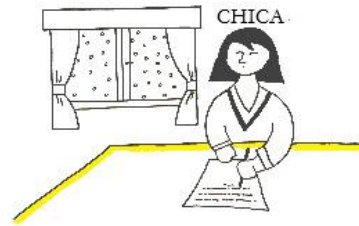
19. Dos de los tres gatos encima de la mesa son blancos.



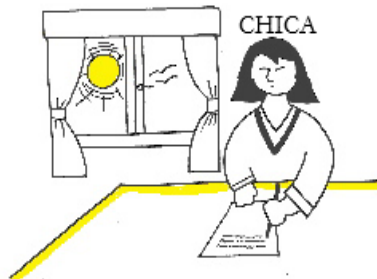
20. Dos de los tres gatos encima de la mesa son negros.



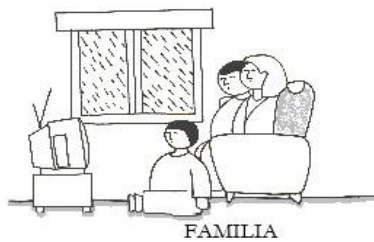
21. La chica había empezado a escribir una carta cuando oscureció.



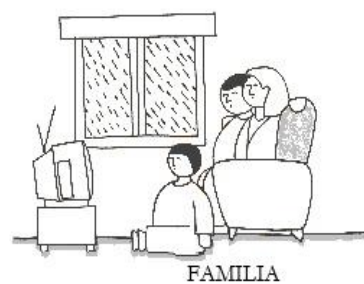
22. La chica había empezado a escribir una carta cuando amaneció.



23. Toda la familia veía la televisión cuando empezó a llover.



24. Tres niños veían la televisión cuando empezó a llover.



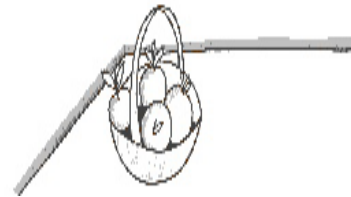
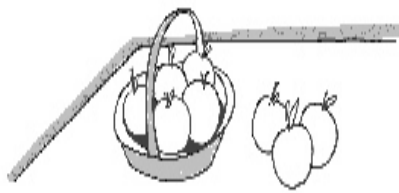
25. Cuando la mujer llegó a la parada el autobús había salido ya.



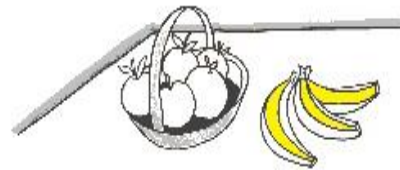
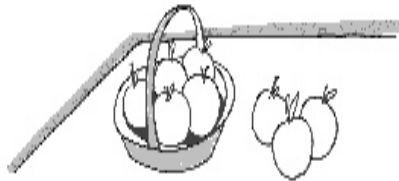
26. Cuando el hombre llegó a la parada el autobús había salido ya.



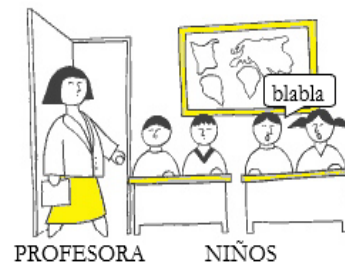
27. Algunas manzanas están encima de la mesa y unas pocas en la cesta.



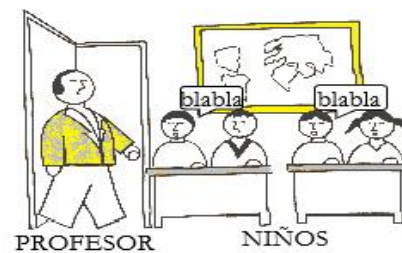
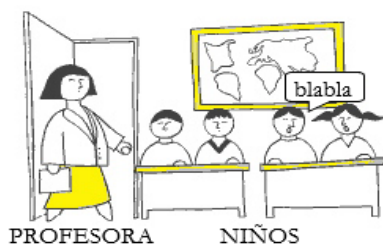
28. Tres manzanas están encima de la mesa y algunas en la cesta.



29. Cuando entró la profesora en la clase los niños pararon de hablar.



30. La profesora entró en la clase pero los niños seguían hablando.



Appendix I. Instructions self-paced reading task

“¡Bienvenido/a al experimento!

Instrucciones- El experimento contiene las siguientes tres partes:

1. IMAGEN:

Primero verás una imagen que tendrás que recordar, y la podrás ver durante el tiempo que desees. Pulsarás el ESPACIO para continuar.

2. FRASE DE FORMA FRAGMENTADA:

A continuación, debajo de la imagen aparecerá un pequeño punto de fijación al pulsar el ESPACIO, y cuando desaparezca, leerás una frase de forma fragmentada pulsando el ESPACIO con el dedo pulgar para pasar al siguiente fragmento. Esto es muy importante hacerlo en el MENOR TIEMPO que te sea posible.

3. PREGUNTA DE COMPRENSIÓN:

Por último, responderás a la MAYOR BREVEDAD posible a una pregunta que medirá tu comprensión de esa frase. Para responder que SÍ, pulsarás la tecla S. Para responder que NO, la N, ambas con tus dedos índices.

Pulsa cualquier tecla para continuar.

A continuación, harás una práctica con 8 frases y una vez concluida, comenzará el experimento. Te guiaremos en todo momento, así que no tendrás de lo que preocuparte.

Te recomendamos que mantengas tus dedos índices en las teclas S y N, y el pulgar sobre el ESPACIO.

Recuerda que el experimento deberás de realizarlo en las siguientes condiciones:

- Un lugar sin ruido y sin distracciones.

Pulsa una tecla para comenzar con la práctica.

Este es el final de la práctica. Si tienes cualquier pregunta, por favor, consulta con el investigador.

Por favor, coloca tus dedos índices sobre las teclas S (SÍ) y N (NO) y utiliza el pulgar para pulsar el ESPACIO.

El experimento deberás completarlo sin pausa. Si necesitas descansar, lo podrás hacer durante la visualización de la imagen, antes de comenzar a leer cada frase.

¡Pulsa el ESPACIO para comenzar el experimento!

El experimento ha concluido.

¡Muchas gracias por tu participación!

Pulsa el ESPACIO para finalizar”.

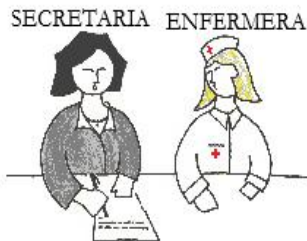
Appendix J. Self-paced reading task: stimuli

Experimental items

1. La anciana / saludó / a la mujer / cuando / ella / cruzaba / la calle.



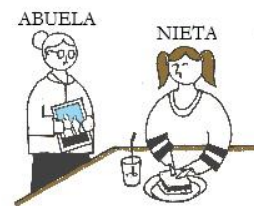
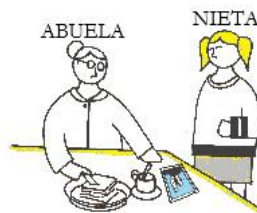
2. La secretaria / ayudó / a la enfermera / mientras / ella / escribía / una carta.



3. El abuelo / habló / rápido / al nieto / mientras / leía / el libro.



4. La abuela / mostró / la foto / a la nieta / mientras / tomaba / el desayuno.



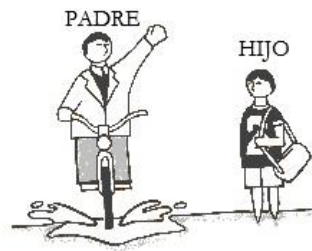
5. La mujer / dio / el papel / a la secretaria / cuando / entraba / en la oficina.



6. La madre / besó / a la hija / mientras / ella / se ponía / el abrigo.



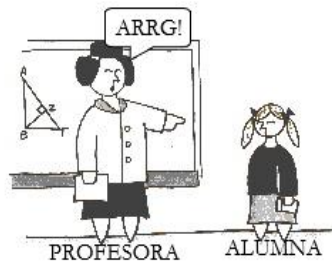
7. El padre / saludó / al hijo / mientras / él / montaba / en bicicleta.



8. El policía / silbó / al ladrón / cuando / él / corría / por la calle.



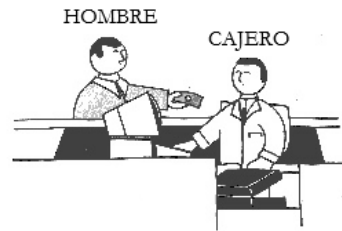
9. La profesora / señaló / a la alumna / cuando / ella / gritaba / en la clase.



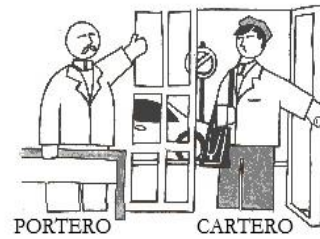
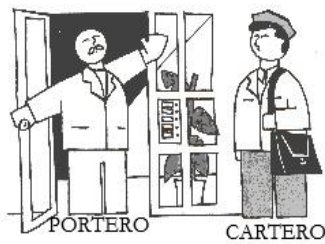
10. El entrenador / habló / alto / al atleta / mientras / sujetaba / la botella.



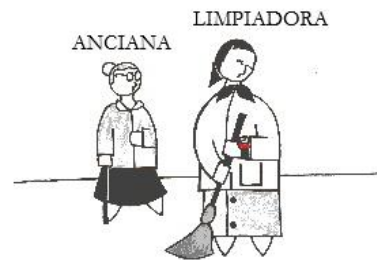
11. El hombre / pagó / al cajero / cuando / él / cerraba / la maleta.



12. El portero / saludó / de prisa / al cartero / mientras / abría / la puerta.



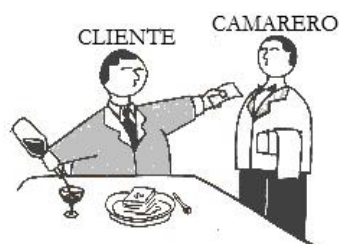
13. La anciana / se acercó / a la limpiadora / mientras / ella / miraba / su reloj.



14. El policía / vio / de repente / al ladrón / cuando / giraba / la esquina.



15. El cliente / pagó / al camarero / cuando / él / echaba / vino en la copa.



16. El revisor / pidió / el ticket / al hombre / mientras / bostezaba / intensamente.



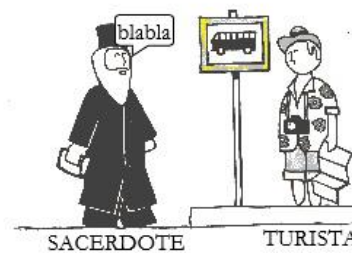
17. La enfermera / empujó / a la limpiadora / mientras / ella / salía / del ascensor.



18. El guardia / vio / de repente / al mendigo / cuando / andaba / en el parque.



19. El sacerdote / habló / continuamente / al turista / cuando / esperaba / al autobús.

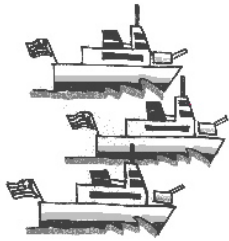


20. El padre / dio / las felicidades / al hijo / cuando / abría / la puerta.

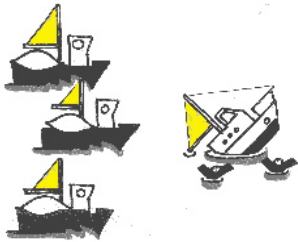


Distractor items

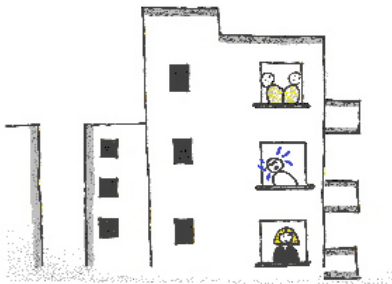
-
1. Uno / de los / cuatro / barcos / empezó / a / hundirse.



-
2. Uno / de los / tres / barcos / empezó / a / hundirse.



-
3. En la ventana / de la / segunda / planta / hay solo / una chica / llorando.



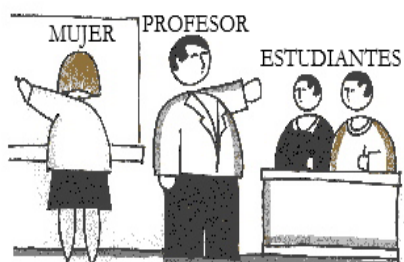
-
4. La / chica / que / está de pie / al lado / del árbol / llora.



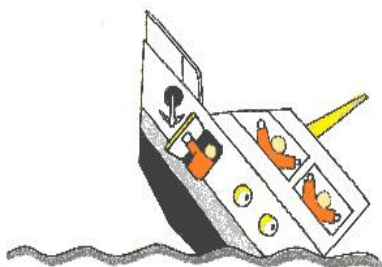
-
5. La / chica / que / está / delante / de los niños / se ríe.



6. La mujer / abre / la puerta / mientras / el profesor / habla / a dos estudiantes.



7. Tres / personas / piden / ayuda / mientras / el barco / se hunde.



8. Dos / niños / están / fuera / de la ventana / y / están gritando.



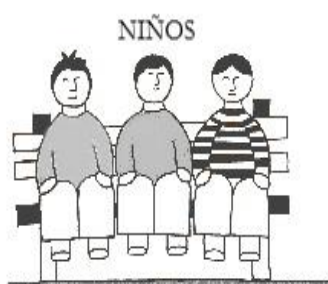
9. En la pared / detrás / de / las dos / mujeres / hay / un reloj.



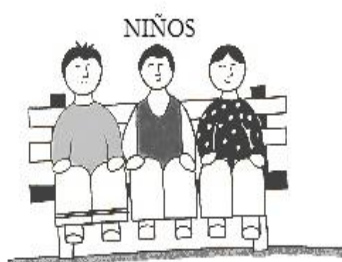
10. En / la / mesa / hay / una / caja / cerrada.



11. Dos / de los niños / que / están sentados / en el banco / llevan / jersey de rayas.



12. Uno / de los niños / que / están sentados / en el banco / lleva / jersey de rayas.



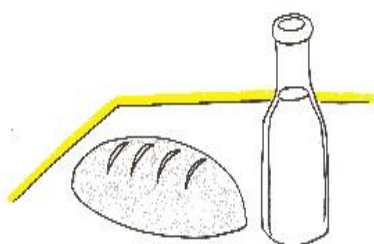
13. El profesor / que / dio / los libros / a la estudiante / lleva / gafas.



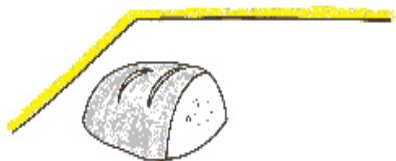
14. El profesor / que / no lleva / gafas / dio / un libro / a la estudiante.



15. Encima / de la mesa / solo hay / leche / y / poco / pan.



16. Hay / un poco de pan / encima / de la mesa / y / nada / de leche.



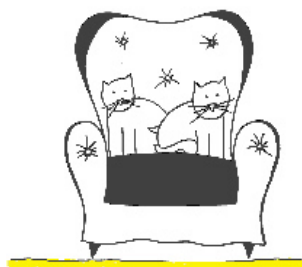
17. Cuando / el hombre / abrió / la puerta / no había / nadie / en la habitación.



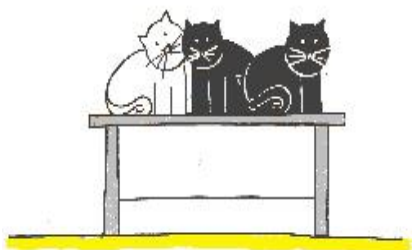
18. Cuando / la mujer / abrió / la puerta / no había / nadie / en la habitación.



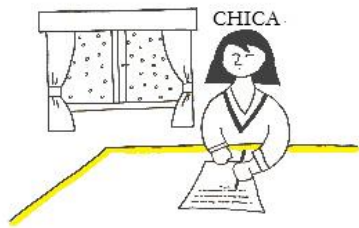
19. Dos / de los / tres gatos / encima / de la mesa / son / blancos.



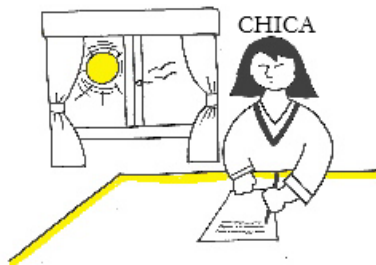
20. Dos / de los / tres gatos / encima / de la mesa / son negros.



21. La chica / había / empezado / a escribir / una carta / cuando / oscureció.



22. La chica / había / empezado / a escribir / una carta / cuando / amaneció.



23. Toda / la familia / veía / la televisión / cuando / empezó / a llover.



24. Tres / niños / veían / la televisión / cuando / empezó / a llover.



25. Cuando / la mujer / llegó / a la parada / el autobús / había / salido ya.



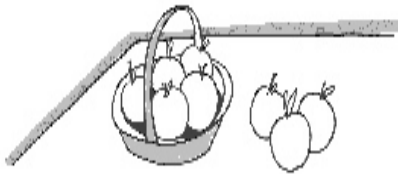
26. Cuando / el hombre / llegó / a la parada / el autobús / había / salido ya.



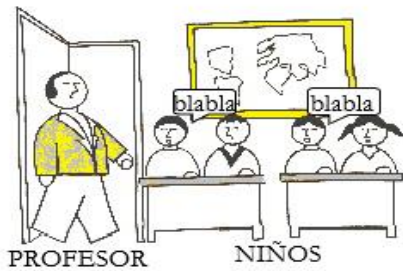
27. Algunas manzanas / están / encima / de la mesa / y unas pocas / en / la cesta.



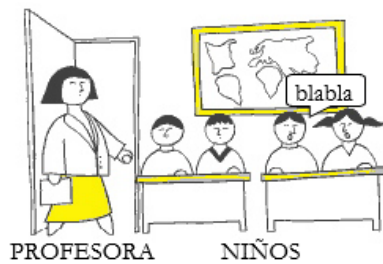
28. Tres manzanas / están / encima / de la mesa / y algunas / en / la cesta.



29. Cuando / entró / la profesora / en la clase / los niños / pararon / de hablar.



30. La profesora / entró / en la clase / pero / los niños / seguían / hablando.



Appendix K. Background information and statistical analyses

Link to Open Science Framework:

https://osf.io/4yj5w/?view_only=3cc886cdf3d4276b4c88f35f26fe7f2

