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Shall I take the High Node?
Cross-linguistic Structural Priming of
Relative Clause Attachment in
Italian-English Late Bilinguals

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ABSTRACT

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The purpose of this study is to investigate whether late bilinguals have a single, integrated representation of syntactic information or whether syntactic representations and processing mechanisms in the first language are kept strictly separated from those of later acquired languages. I used a cross-linguistic syntactic priming paradigm with relative clauses with high attachment and low attachment modifiers. In the prime sentences the relative clause attachment site was disambiguated by means of noun-verb agreement: thus, in high attachment primes the verb of the relative clause agreed in number with the first host NP (the NP higher up in the syntactic tree), while in low attachment primes the verb agreed in number with the second host NP (the NP lower in the syntactic tree). The target fragments were unconstrained with respect to relative clause attachment, they were globally ambiguous as they allowed both high and low attachment. Italian-English late bilinguals with different levels of proficiency in English, read aloud full prime sentences and had to complete target fragments, generating NP-of-NP-RC constructions. RC attachment preferences in Italian were established in two additional studies: a sentence completion task, in which we collected attachment decisions on globally ambiguous materials, and an interpretation study replicating Grillo and Costa's (2014) experiment 2. The results showed that relative clause attachments can be primed from Italian to English, suggesting that Italian-English late bilinguals access an integrated representation of this type of syntactic information. Interestingly, I observed a clear evolution in speakers' processing strategies as a function of their second language proficiency, in that the production of low attachments was significantly modulated by participants' English proficiency. Less proficient bilinguals preferred high attachment, showing effects of transfer from their native language, while highly proficient bilinguals preferred low attachment, exhibiting a pattern of ambiguity resolution in their L2, which is highly similar to that of native speakers of English.

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INTRODUCTION

The present study is aimed to contribute to the area of psycholinguistic research on bilingualism which is interested in understanding the nature of the syntactic representations and mechanisms of bilinguals, and the extent to which these are shared between languages in the bilingual brain. The tool I used for this purpose is the syntactic priming paradigm, which originates from the tendency for speakers to reuse recently experienced syntactic structures across successive sentences (Levelt & Kelter, 1982; Bock, 1986; Branigan et al., 1995). Syntactic priming has been extensively studied as a way of gaining a better understanding of the processes that underlie language use, while cross-linguistically it has been increasingly used in order to investigate language integration in bilinguals. Two opposing theoretical views have been outlined, which are compatible with two different ways of organizing syntactic information in bilinguals: according to the shared-syntax account, bilinguals have a single integrated representation of syntactic information (Hartsuiker et al., 2004; Schoonbaert et al., 2007; Bernolet et al., 2013), on the other hand according to the separate-syntax account, syntactic representations and processing mechanisms in the first language are kept strictly separated from those of later acquired languages (De Bot, 1992; Ullman, 2001).

Within the scope of this study, we investigate the cross-linguistic syntactic priming of relative clause (RC) attachment in an NP-of-NP-RC sequence, as in (1). Therefore, we test Italian-English late bilinguals with different levels of proficiency in English, in order to ascertain whether the attachment of RCs can be primed from Italian (the participants' L1) to English (their L2).

(1) Someone shot [NP1 the servant] of [NP2 the actress] [RC who was on the balcony].

The syntactic structure presented above features a complex noun phrase and a modifying relative clause. The sentence is ambiguous because there are two potential attachment sites for the RC (i.e., “who was on the balcony”). Indeed, the latter can be subject to both high attachment (HA) and low attachment (LA): namely it can be attached

to the first host NP (i.e., “the servant”), alternatively, it can be attached to the second host NP (i.e., “the actress”).

This syntactic structure is particularly worthy of attention because RCs are modifiers, hence the syntactic representation of the two RC attachment alternatives (HA and LA) is not lexical but purely syntactic, namely it is not represented in the argument structure of the lexical items they modify (Scheepers, 2003). Moreover, both high and low attachment are generated by the same set of syntactic principles, they only differ in their hierarchical tree configuration: the rule “NP → NP RC” can modify the NP higher up in the tree, resulting in HA, or it can modify the NP that is lower in the tree configuration, resulting in LA. Therefore, the syntactic priming of RC attachments is not driven by residual activation of subcategorization frames, or the pre-activation of individual syntactic rules. Thus, it differs from the syntactic priming of structures such as transitives and datives, in which the syntactic information that is subject to priming is closely related to specific lexical entries, namely the verb argument structure.

Interestingly, a large body of empirical research has shown cross-linguistic variations in RC attachment preferences, with some languages exhibiting a preference for HA of RCs embedded with complex NPs, and others revealing a preference for LA instead (Cuetos & Mitchell, 1988; Mitchell et al., 1990; Ehrlich et al., 1999; Hemforth et al., 2000; Desmet et al., 2002; Sekerina, 2004; Shen, 2006). These findings sparked off an important debate in the psycholinguistic literature, as the universality of locality principles in language parsing, until then widely accepted, was brought into question, alongside the very existence of universal principles of language processing. Indeed, according to the prevailing theories of syntactic parsing at the time, the human language parser is guided by principles of locality or recency, consequently new incoming information should be attached to the last constituent that has been parsed.

The thesis is organized into three chapters as follows. Chapter 1 gives a review of the relevant literature on syntactic priming and RC attachment ambiguity, focusing on how the latter is resolved cross-linguistically and how it has been shown to be susceptible to structural priming. Chapter 2 presents two studies conducted in order to investigate whether Italian has a particular RC attachment preference: a sentence completion task, in which we collected attachment decisions on globally ambiguous materials, and an interpretation study replicating Grillo and Costa’s (2014) experiment 2. Chapter 3

discusses the cross-linguistic syntactic priming experiment conducted with the purpose of investigating whether Italian-English late bilinguals have an integrated representation of purely syntactic information, which is not directly related to lexical entries but to the hierarchical tree configuration.

CHAPTER 1

Literature Review

This chapter provides an overview of the available literature on the areas of psycholinguistic research on bilingualism, which constitute the object of the present thesis. The first section will shed light on the syntactic priming methodology, which is considered as a promising tool for the investigation of the mental representations of monolinguals and bilinguals. The following section will focus on reviewing studies on RC attachment ambiguity, by looking at how this is resolved by speakers of various native languages, and how it has been shown to be susceptible to structural priming.

1.1. The Syntactic Priming Paradigm: Evidence from the Literature

Syntax can be defined as the set of principles that control sentence structure in a given language. This important aspect of language has been studied through a variety of mechanisms, among which syntactic priming. This paradigm is based on the evidence that speakers have a tendency to repeat the same syntactic forms across successive sentences, a pattern revealed by speech errors analysis and the observation of normal speech use (Levelt & Kelter, 1982). The persistence of structural configuration in sentence production is a phenomenon language users are typically not aware of, which results in the facilitation of processing, as it reduces the cognitive efforts associated with generating a sentence. Syntactic priming is particularly informative about the processes that underlie language use. On one hand it provides us with important insights into the mechanisms of comprehension and production. For instance, it demonstrates that syntactic information of a previous sentence also affects the comprehension of the following sentence (Branigan et al. 1995). On the other hand, syntactic priming has become one of the preferred tools for investigating the mental representation of syntactic knowledge. Numerous studies have reported the effects of syntactic priming in different populations, such as adults, children, monolinguals, bilinguals and speech-impaired subjects (e.g., aphasic speakers), in order to get a better understanding of the way they represent and process language. In these experimental settings, syntactic priming has been

shown to occur when participants are exposed to a manipulated linguistic input (the prime) and are asked to process a structure containing the same, or similar syntactic properties (the target).

Additionally, the structural priming paradigm has been used in order to provide evidence in favor of the isolability of syntactic processing (Bock & Kroch, 1989). In other words, according to this theory, syntactic processing is functionally independent, as it can be manipulated irrespective of conceptual processes. Hence, it was in contrast to theories that state the interaction between syntactic and conceptual features. These competing accounts are perfectly represented by Garret (1976) and MacWhinney et al. (1984). Garret's (1976) assumption was that the most significant aspects of syntactic processing are unaffected by conceptual features, while according to the account proposed by MacWhinney et al. (1984), syntactic processing involves the interaction of conceptual features with grammatical structures, in order to determine the surface syntactic form of a sentence. Similarly, Bock & Kroch (1989) investigated the nature of the syntactic processing system and claimed that structural priming is not governed by communicative functions, in that it is not affected by the content it manipulates. As a result, in their opinion this syntactic process (as well as historical language change and language acquisition) demonstrates that there is a stage in language production completely dedicated to syntactic processing, independent of lexical content.

According to Bock (1986), the syntactic persistence effect results from the activation or strengthening of the syntactic processes responsible for the creation of previously produced or perceived sentences. Thus, being more activated than alternative forms, they affect the syntactic form of subsequent sentences. From this perspective, structural priming may be considered as a limit to the productivity of syntax in actual language use, or it may be seen as a communicative strategy, which reducing the demands of message formulation contributes to fluency in spontaneous speech. Bock (1986) was the first scholar to provide evidence for the existence of syntactic priming in three separate experiments, in which participants first heard and repeated a priming sentence in a particular syntactic form, subsequently, they saw an unrelated picture and were asked to describe the depicted event. The priming trails involved two types of priming sentences and target pictures: transitives (active or full passive sentences), as in (2), and datives (prepositional or double-object dative sentences), as in (3).

- (2) a. Active:
One of the fans punched the referee.
- b. Passive:
The referee was punched by one of the fans.

(Bock, 1986, p.361)



Figure 1. *Example of transitive target picture used in Bock's (1986) Experiment 1*

- (3) a. Prepositional:
A Rockstar sold some cocaine to an undercover agent.
- b. Double object:
A Rockstar sold an undercover agent some cocaine.

(Bock, 1986, p. 361)



Figure 2. *Example of dative target picture used in Bock's (1986) Experiment 1*

It was observed that the occurrence of prepositional utterances increased after prepositional primes, while double object utterances increased after double object primes, and similar results were found for active and passive utterances. Interestingly, Bock (1986) observed that this pattern of priming effects occurs even in the absence of lexical or conceptual overlap between the priming sentences and the targets, proving that syntactic processes are largely isolated from conceptual processes. These results were thus consistent with Garret's (1976) notion of the syntactic processing system. Moreover, Bock's (1986) findings showed that this effect of structural repetition was not the result of a lexical priming, since priming for prepositional datives persisted even when prime and target involved different prepositions, contra Garrett (1982) according to whom prepositions are intrinsic features of the sentence frame. In a later study, Pickering and Branigan (1998) provided further evidence that the magnitude of the priming is not dependent on the identity of prepositions and inflectional elements.

Pickering & Branigan (1998) used the syntactic priming paradigm so as to confirm their extension of Roelofs' (1992,1993) model of language production, which differentiates between three types of information associated with a verb's lemma: a node representing the verb's syntactic category; nodes representing syntactic features (i.e., tense, aspect, number); nodes representing the verb's combinatorial information. In their opinion, combinatorial nodes are activated when a verb is used in a particular syntactic structure and they are linked directly to the lemma nodes. Consequently, they supported the phrasal nature of combinatorial information, namely the fact that combinatorial information is associated with the verb's lemma, rather than with a particular instance of the verb, and that it is shared between different verb lemmas. Accordingly, they hypothesized that syntactic priming originates at the lemma stratum, where activation spreads from a lemma node to its associated nodes, among which the combinatorial node. Since the activation of a node only disappears gradually, the combinatorial node activated in a previous sentence, being more highly activated than normal, is more likely to be selected in successive sentences. Hence, the priming of a sentence like "The girl handed the paintbrush to the man" after "The rock star sold some cocaine to an undercover agent" would be the result of residual activation of the 'NP_PP' node, which has been activated in the prime. Interestingly, they further predicted a stronger priming effect between instances of the same verb, because in this case not only the combinatorial node may

retain residual activation, but also the link between lemma and combinatorial node. In order to investigate these issues, Pickering & Branigan (1998) adopted a sentence completion methodology and carried out five experiments, in which the prime and the target sentences had either the same verb, or different verbs, or they only differed in a feature of the same verb (i.e., tense, aspect and number). The experiments confirmed their hypothesis, in that the results showed that their participants repeated the syntactic structure to which they were previously exposed regardless of the verb-type or the lexical information of the sentences. Nonetheless, a lexical boost effect was observed, since priming between verbs was weaker than priming between two instances of the same verb. Therefore, this finding is in contrast with Bock (1986) according to whom syntactic priming is unaffected by verb repetition. They further demonstrated that the magnitude of priming is not affected by features properties of the verb, namely tense, aspect and number differences between prime and target sentences. Lastly, Pickering & Branigan (1998) also showed that priming is not a mere repetition brought about by an episodic representation of the priming sentence, as it occurred also when target and prime differed in their internal syntactic structure, hence confirming Bock and Loebell's (1990) claim.

Bencini & Valian (2008) investigated for the first time the nature of syntactic representations of 3-years-olds', comparing their production of passives, using the syntactic priming paradigm, with their comprehension of the same syntactic structure. Before then, Savage et al. (2003) did not find abstract priming of passives in children younger than four years of age. Conversely, they provided evidence for the Early abstraction hypothesis (Gertner, Fisher & Eisengart, 2006), according to which children's syntactic representations are abstract and not bound to specific lexical items, as stated by the Lexical specificity account, proposed by Tomasello (2000). Therefore, Bencini & Valian (2008) tested 53 English-speaking children with a mean of 3;2 of age, in two comprehension tasks and a production-priming task, using alternating transitive sentences (i.e., transitive active and passive sentences). They had three main goals: to verify if young children exhibit abstract syntactic priming with passives, to examine the interaction between production and comprehension within the priming task, and finally to observe whether learning takes place during priming. Results showed that children produced abstract syntactic priming, since those who were primed with passives produced significantly more passive sentences than children who were primed with actives.

Moreover, controls (who did not receive any priming) did not produce any passive, which proved that the comprehension task did not induce any priming by itself, a finding consistent with Shrimpi et al. (2007). Hence, their results suggested that 3-year-olds do represent the passive structure abstractly, in that supporting Early Abstraction assumptions of language acquisition. As to the relation between comprehension and production, results showed that the comprehension of passives before and after priming was above chance, and that it did not improve as a result of priming. The latter finding is inconsistent with the production-to-comprehension priming hypothesis, which is still open to debate. Finally, Bencini & Valian (2008) further demonstrated that the occurrence of abstract priming of passives underlies an implicit learning of this syntactic structure, which 3-year-olds have not mastered yet, and which is rarely used in English normal speech production.

1.2. Cross-linguistic Syntactic Priming: The Representation of Syntactic Knowledge in Bilinguals

The syntactic priming paradigm has been extensively studied as a way of gaining a better understanding of the mental representations of native speakers of several languages. Nonetheless, the priming methodology has also been increasingly used in order to explore the nature of the syntactic representations and mechanisms of bilinguals.

An intriguing discussion in psycholinguistics concerns the question of whether bilinguals share representations and mechanisms across the languages they speak (the interactive view), or whether they are kept strictly separated, therefore implying that they use separate representations and mechanisms for each language (the modular view). Initially, this theoretical question has been empirically investigated mostly focusing on the conceptual, lexical level of language processing, so as to understand to what extent lexical information is shared between languages in the bilingual brain.

In more recent years, language integration in bilinguals has been investigated from the point of view of syntactic processing as well, with the aim of grasping how syntax is represented and processed by bilinguals. Two opposing theoretical views have been outlined, which are compatible with two different ways of organizing syntactic information in bilinguals: according to the shared-syntax account bilinguals share

syntactic representations across languages, if the representations of the corresponding syntactic structures are similar enough (Hartsuiker et al., 2004; Schoonbaert et al., 2007; Bernolet et al., 2013), on the other hand the separate-syntax account predicts separate syntactic representations for each language in bilingual memory (De Bot, 1992; Ullman, 2001). A number of cross-linguistic syntactic priming studies have been conducted in order to test these hypotheses with speakers of various languages, whereby the prime is presented in one language and the target in another language. This method is considered particularly effective, because it allows to directly investigate the way the activation of a syntactic structure in one language can facilitate or interfere with the activation of a similar syntactic structure in a different language.

Hartsuiker Pickering and Veltkamp (2004) proposed a lexical-syntactic model of bilingual sentence production, which supported the integrated view of bilingual syntactic-lexical processing. In this model the syntactic representations and processes of bilinguals are shared between languages as much as possible. Indeed, under the assumption of a single integrated lexicon, the lemma nodes of both languages are represented at the lemma stratum, sharing the same categorical and combinatorial nodes, which capture syntactic information. Therefore, since similar grammatical structures share the same representation, the activation of a combinatorial node (that is shared by the lemma nodes of different languages) does not determine the language of the utterance, which is dependent instead on the choice of the lexical items inserted within this structure. Figure 3 exemplifies Hartsuiker et al.'s (2004) integrated account of bilingual processing:

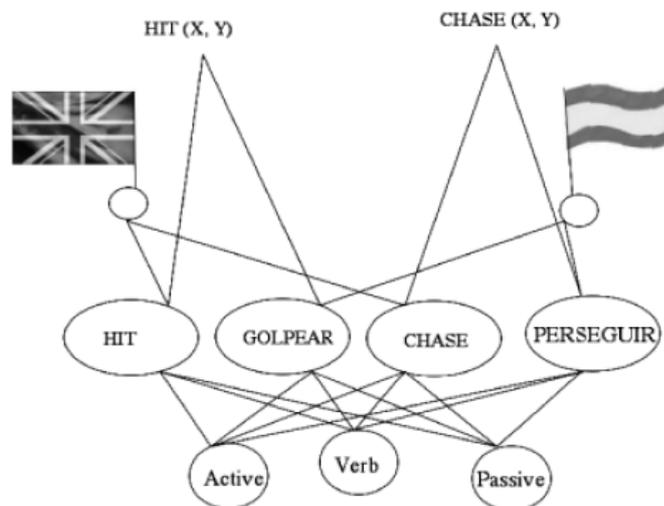


Figure 3. Hartsuiker et al.'s (2004) integrated model of bilingual language representation

As can be observed, the lemma stratum contains both the English verbs *to hit* and *to chase*, and their translation equivalents in Spanish *golpear* and *perseguir*, which link to the same conceptual node. They are connected to the same categorical node (“Verb”), and to the same combinatorial nodes (“Active” and “Passive”). Hence, the conceptual node “HIT (X, Y)” activates both the English verb lemma *hit* and the Spanish verb lemma *golpear*. Moreover, as *hit* and *golpear* are linked to the same category node and combinatorial nodes, there is a greater possibility that the activation of *hit* may result in the selection of the Spanish verb *golpear* instead. Thus, by supporting the close integration of languages in the bilingual mind, their account provides a straightforward explanation of the occurrence of code switching (i.e., the tendency to use in a language a word or an entire phrase that belongs to another language) or the tendency to borrow constructions from the L1, into the L2. The authors provided support for this model using structural priming, with Spanish-English bilinguals. The experiment consisted of a picture description task: participants first heard a prime description in Spanish, their L1, and then were asked to describe a target picture in English, their L2. The results showed evidence for cross-linguistic structural priming between Spanish and English, in that the subjects were more likely to produce a passive sentence in English following a passive prime than following an active prime. Consequently, they concluded that Spanish-English bilinguals use the same syntactic representations for Spanish and English passives, and that syntactic representations are shared between languages whenever possible.

Schoonbaert, Hartsuiker and Pickering (2007) investigated cross-linguistic priming of datives (prepositional or double-object datives) in Dutch-English bilinguals, to assess the extent to which lexical and syntactic information is integrated between the two languages. They conducted two within-language priming experiments, and two cross-linguistic priming experiments, which tested syntactic priming effects across the two languages in both directions (from L1 to L2, and from L2 to L1). Their results were consistent with the shared-syntax account, in that in each of the four experiments a strong priming effect was observed, and its magnitude resulted to be independent of the languages under scrutiny, in fact between-language priming was as robust as between-language priming, regardless of the priming direction. They observed a similar phenomenon to that described by Pickering and Branigan (1998) as the “lexical boost effect”, since the cross-linguistic dative priming effect was significantly stronger when

prime and target contained translation equivalents (e.g., *give* in the English prime and *geven* in the Dutch target), than when different verbs were used. Interestingly, the translation-equivalent boost appeared to be asymmetric, in fact it was only found in Experiment 3, in which participants were primed from L1 to L2, and not in the opposite priming direction (from L2 to L1). In light of these findings, Shoonbaert et al. (2007) proposed an integration of Hartsuiker's (2004) shared-syntax account, as illustrated in Figure 4:

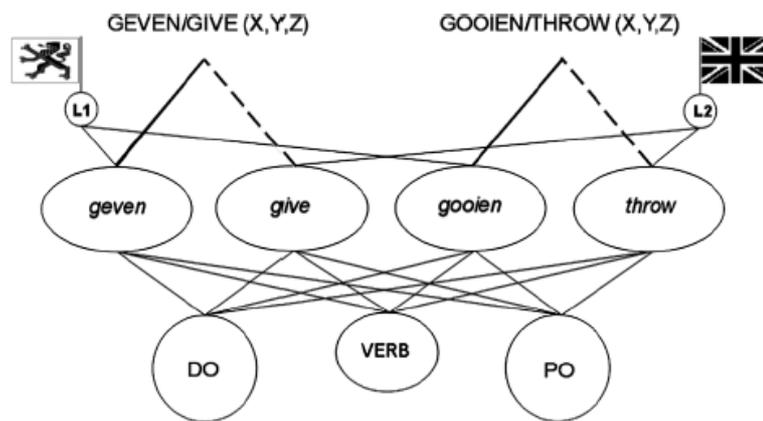


Figure 4. Shoonbaert et al.'s (2007) integration of Hartsuiker et al.'s (2004) shared-syntax model

According to this adaptation of the model, the conceptual nodes GEVEN/GIVE (X, Y, Z), GOOIEN/THROW (X, Y, Z) have stronger connections with L1 lemma nodes *geven* and *gooien* (indicated by full lines), and weaker connections with L2 lemma nodes *give* and *throw* (indicated by dotted lines). As a consequence, in L1 to L2 priming, the L2 target lemma *give* spreads activation to the L1 prime lemma *geven*, whereas in the opposite priming direction, from L2 to L1, the L1 target lemma *geven* spreads less activation to the L2 prime lemma *give*, which is therefore not as strongly re-activated. Hence, the model accounts for the asymmetric translation-equivalent boost to syntactic priming, based on the attested weaker lexical-conceptual links in the L2.

While a number of studies show cross-linguistic syntactic influences in bilinguals, in line with the shared syntax model, suggesting that whenever the L1 and L2 have similar syntactic structures bilinguals may beneficially represent them only once or in a highly integrated way, another account has been proposed, according to which syntactic representations are language specific. The separate syntax account suggests that syntactic

information is not shared between languages of a bilingual, because activating representations of a language while processing another language would be too resource demanding and it could facilitate the production of errors. Indeed, there are so many syntactic differences across languages that, regardless of how similar L1 and L2 structures may be, it is hard to ascertain whether they can be used in the same exact way, and consequently it would be more advantageous for bilinguals to store L2 syntactic structures separately.

De Bot (1992) argued that bilinguals have separate yet interacting syntactic representations for each of their languages. Levelt's (1989) blueprint of the speaker claimed that language production entails a conceptualizer, a formulator, and an articulator. From a bilingual perspective, De Bot suggested that while processing in L1 and L2 overlaps at the conceptual and lexical level, the formulators of the two languages are separate, but they interact with each other. There are different variables modulating the extent of this cross-linguistic syntactic interaction, such as the etymological relatedness of the languages, and the L2 proficiency of speakers. Thus, languages that are etymologically closely related are characterized by a bigger interaction of their formulators, or cross-linguistic influence, which in turn predicts stronger syntactic priming effects. Similarly, L2 proficiency is a factor that can influence the magnitude of the cross-linguistic interaction between L1 and L2: according to this account more proficient L2 bilinguals are more capable of keeping their languages separate, and less proficient L2 bilinguals are more subject to influences from their L1, while processing the L2.

According to Ullman's (2001) declarative/procedural model of the mental lexicon and grammar, L1 and L2 syntactic processing rely on two qualitatively different systems, which have different neural bases. In the L1, procedural memory is responsible for syntactic processing, while lexical and semantic processing is carried out by declarative memory. Nonetheless, bilinguals rely on declarative memory also for grammatical processing in the L2, as they store in the mental lexicon complete syntactic constructions. If the L2 is acquired early enough, syntactic processing in the L2 can be carried out by procedural memory, as in the case of simultaneous bilinguals. Ullman's (2001) further predicts that L2 proficiency could play an important role, namely as proficiency increases

syntactic processing may become more native-like, and late bilinguals may use procedural memory for L2 syntactic processing as well.

Bernolet, Hartsuiker and Pickering (2013) proposed an extended version of the shared-syntax account, whereby fully shared representations across languages are acquired at the end of a developmental trajectory. They tested bilingual subjects who had Dutch as their L1 and English as their L2, using the syntactic priming paradigm. Specifically, they wanted to understand whether the representations of new L2 structures are immediately integrated with the existing representations of equivalent L1 structures, or whether the representations of L1 and L2 structures are kept separate at first, becoming integrated only at a later stage. In terms of Hartsuiker et al.'s (2004) model, the latter hypothesis would imply that L2 learners initially create a new combinatorial node for L2 structures, which is later collapsed with an existing L1 combinatorial node only when they are sure that the L1 and L2 structures are indeed equivalent. Thus, Bernolet, Hartsuiker, & Pickering (2013) conducted two experiments, a between-language and a within-language priming experiment, focusing on English genitives, a syntactic structure which is similar but not identical to its Dutch equivalent one, testing Dutch-English bilinguals that differed in their levels of L2 proficiency. The participants were tested in both different meaning conditions and same meaning condition (i.e., prime and target shared the same head noun or translation equivalents). In the first experiment, results showed a significant effect of between-language priming, since participants produced more English genitives following primes containing Dutch genitives. Moreover, the findings showed that language proficiency affected the strength of the priming effect, in that highly proficient L2 speakers produced more English s-genitives than low proficient ones. There was also a translation equivalence boost, as between-language priming was facilitated when the head nouns of the prime and target had the same meaning. Accordingly, the second experiment also resulted in a significant within-language priming, which was influenced by L2 proficiency. However, a different pattern was observed, in that while in the different meaning condition the strength of the priming effect increased together with participants' L2 proficiency, the same meaning condition had the opposite effect. Therefore, less proficient bilinguals relied more on lexical repetition than high proficient bilinguals. Taking together the results of the two experiments, Bernolet, Hartsuiker, & Pickering (2013) came to the conclusion that less

proficient participants had separate representations for English and Dutch genitives, while more proficient ones use the same language-neutral representation shared between the two languages. In other words, they claimed that L2 syntactic representations are at first concrete, item-based and language specific, then they develop into more abstract representations, in a process which is similar to that delineated for L1 acquisition (Tomasello, 2000). Thus, the findings were in contrast with Hartsuiker et al.'s (2004) proposal, which does not take into account the influence of L2 proficiency on the extent of syntactic integration between L1 and L2, and therefore on the strength of the syntactic priming effect.

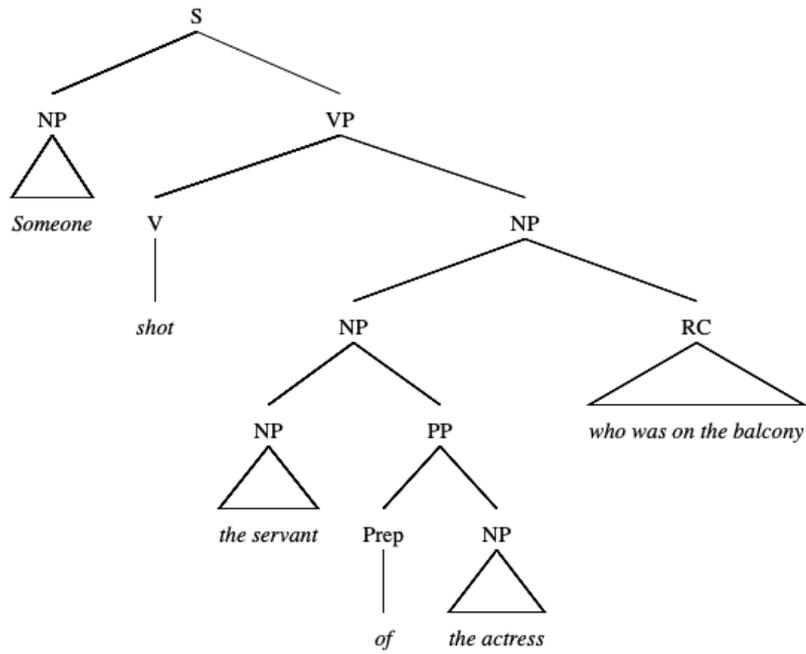
1.3. Relative Clause Attachment Ambiguity

In 1988, Cuetos and Mitchell published an article in which they analyzed the attachments of relative clauses to complex heads of the type NP1-of-NP2, exemplified in (4), providing evidence that the preferred attachment of the relative clause varied cross-linguistically.

(4) Someone shot [NP1 the servant] of [NP2 the actress] [RC who was on the balcony].

The syntactic structure presented above features a complex noun phrase and a modifying relative clause. It is ambiguous because there are two potential attachment sites for the relative clause (i.e., “who was on the balcony”). Therefore, the latter can be subject to both high attachment and low attachment: namely it can be attached to the NP higher up in the syntactic tree, which is represented by “the servant” in the aforementioned example, alternatively, it can be attached to the NP lower in the syntactic tree, represented by “the actress”. The two interpretations are illustrated in (Figure 5).

(a) NP1 attachment



(b) NP2 Attachment

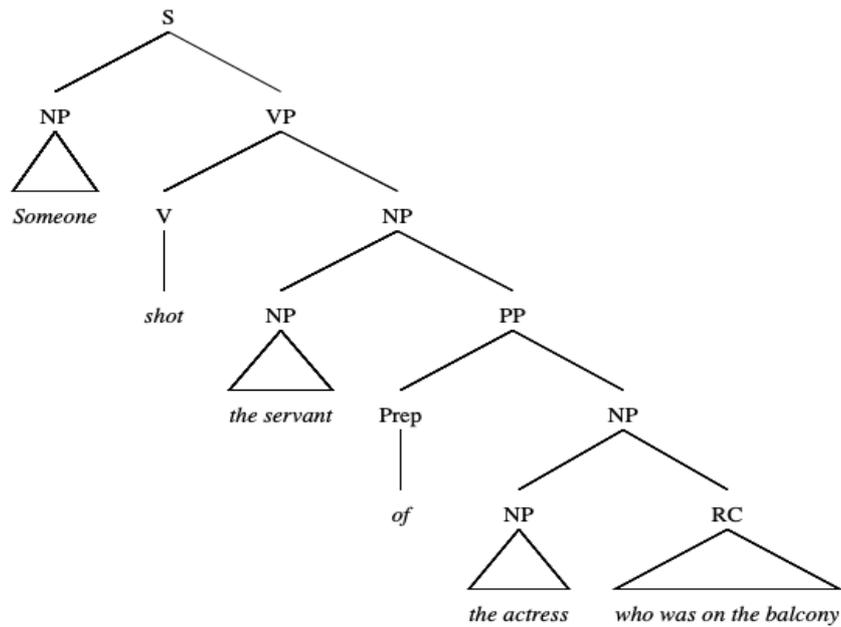


Figure 5. (a) High attachment of the relative clause. (b) Low attachment of the relative clause.

Cuetos and Mitchell (1988) tested both English and Spanish language users, showing that English speakers prefer low attachment of RCs embedded with complex NPs, while Spanish speakers generally opt for a high attachment bias. Their findings were in contrast with the prevailing theories of syntactic parsing at the time, (e.g., the Late Closure principle in Frazier's (1978) garden-path theory) according to which principles of locality, or recency guide the human language parser, and consequently new incoming information is preferably attached to the last constituent that has been parsed. Their research has thus sparked off an important debate on the resolution of RC attachment ambiguities in the psycholinguistic literature: providing evidence that the interpretation of RC attachments differs across different languages, the universality of locality principles in language parsing, until then widely accepted, was brought into question, alongside the very existence of universal principles of language processing.

Over the past three decades, this cross-linguistic asymmetry in RC attachment preferences has been confirmed by a large body of empirical research, targeting several languages. These studies confirmed that not only Spanish, but also other languages such as French (Mitchell et al., 1990), Dutch (Desmet et al., 2002), German (Hemforth et al., 2000) and Russian (Sekerina, 2004) exhibit a preference for NP1 attachment, while similarly to English, Chinese (Shen, 2006), Swedish, Norwegian and Romanian (Ehrlich et al., 1999) usually opt for NP2 attachment instead. Yet, results are often contradictory and at various levels, in that they may differ for the same method used, or even for the same language. For instance, the position of Italian itself is rather complicated, because while it is generally considered as falling into the category of languages that show a bias towards high attachment (Frenck-Mestre & Pynte, 2000), other studies have demonstrated just the opposite (De Vincenzi & Job, 1993, 1995). Variation in attachment preference within the same language has been observed also in German, Bulgarian and Brazilian Portuguese. This within-language contrasting findings could be the result of dialectal variation, of different experimental designs and materials.

While much of the literature on RC attachment preferences has focused on the presumed between-language differences in the interpretation of RCs, hence, suggesting the existence of fundamental differences in language-specific parsing preferences, other approaches on the other hand highlighted the similarities across languages. According to

these, cross-linguistic differences are limited in scope, and they are often due to properties of their grammar.

Some theories have proposed new principles of sentence processing, according to which the human-parser is experience-based. They claim that the parser keeps track of the way structural ambiguities are resolved in favor of one or other analysis in the language. Therefore, the resolution of syntactic ambiguity favors the parsing choices which have proved to be most frequently reliable in the past. One of the major experience-based models of structural ambiguity resolution is the tuning hypothesis (Brysbaert & Mitchell, 1996) which has been later tested by Desmet et al.'s series of studies on Dutch (Desmet, Brysbaert, & De Baecke, 2002; Desmet, De Baecke, Drieghe, Brysbaert, & Vonk, 2006).

Through two corpus analyses and two sentence continuation tasks, Desmet, Brysbaert and De Baecke (2002) showed that the interpretation of ambiguous RCs following two potential attachment hosts is affected by animacy, in particular by the animacy of NP1. In their experiment, high attachment of RC was particularly favored when NP1 was animate, whereas when NP1 was inanimate low attachment predominates. Attachment preference did not seem to be relevantly affected by the animacy of NP2 instead, even though when NP2 was animate a higher incidence of NP2 attachment was detected. Desmet et al. (2006) carried out a corpus analysis and an eye-tracking experiment, which allowed them to confirm the role of this semantic property of noun phrases in determining RC attachment preferences. Furthermore, they discovered a new variable that may have an influence on this bias: concreteness. When NP1 was both animate and concrete, as opposed to animate and abstract, there was a higher frequency of HA. According to them, this finding is consistent with the fact that semantic features of concrete words are more rapidly activated compared to those of abstract words, therefore they more strongly activate the thematic agent role.

Acuña-Fariña et al. (2009) tested Desmet et al.'s new findings about the role of animacy in the processing of RCs, in order to uncover whether it could contrast the well-established HA preference of the Spanish language. When they compared their results to those found in Dutch some similarities and differences arose. The general preference for HA was confirmed, nevertheless, their data suggested that animacy does interact with it, as only when NP1 was inanimate and NP2 animate, the adjunction pattern was reversed.

Anaphoric Binding-Dualism (Hemforth et al., 2000) and Predicate Proximity (Gibson et al., 1996) are two examples of parametrized models of parsing.

Hemforth et al. (2000) observed that in German, structures involving a RC are interpreted differently from structures involving a prepositional phrase, as illustrated in (5).

- (5) a. The daughter₁ of the teacher₂ who₁ came₁ from Germany met John.
b. The daughter₁ of the teacher₂ from₂ Germany met John.

(Desmet et al., 2002, p. 881)

In (5a) there was a preference for NP1 attachment (e.g., the daughter), in (5b) a preference for NP2 attachment (e.g., the teacher) was observed. In light of this observation, Hemforth et al. (2000) proposed the Anaphoric Binding hypothesis, according to which RC attachment is guided by discourse factors, rather than syntactic principles. In particular, they state that RC attachments are determined by a conflict of anaphoric and syntactic processes, in that while syntactic processes try to bound RCs to the most recent host, anaphoric processes favor attachment to the most salient one, which is NP1 in constructions with two NPs. Indeed, since salience is affected by factors such as focus and thematic assignment, NP1 is generally more salient than NP2. From this perspective, cross-language variations in RC attachment preferences emerge as a consequence of differences in the way RCs are introduced in different languages. Languages such as German, in which RCs are necessarily introduced by relative pronouns, are especially sensitive to anaphoric binding, on the other hand, languages such as English, in which relative pronouns are not obligatory in certain contexts, and RCs can also be introduced by complementizers (e.g., that), are less sensitive to anaphoric binding. The data they collected through two off-line studies in German, a sentence completion task and a magnitude estimation experiment, strongly confirmed their hypothesis, with participants exhibiting a strong preference to attach the RC to NP1 in all conditions tested.

The Predicate Proximity hypothesis emerged from data on RC attachment ambiguities that involve three potential hosts, as in (6).

- (6) La lámpara₁ cerca de la pintura₂ de la casa₃ que fué_{3>1>2} dañada en la inundación
The lamp₁ near the painting₂ of the house₃ that was_{3>1>2} damaged by the flood.

(Gibson et al., 1996)

Gibson et al. (1996) observed that in this syntactic environment the asymmetry between Spanish and English disappeared. Indeed, both languages displayed a U-shaped pattern of attachment, in which the local NP₃ was the most preferred, followed by NP₁, while NP₂ was the least preferred. Based on this finding, Gibson et al. (1996) proposed that attachments are influenced by two parsing principles: the recency or locality principle, which predicts attachment of the RC to the closest NP, and the parametrized principle of Predicate Proximity, which favors attachment to the NP that stands in a predicate-argument relation with the matrix verb. Consequently, cross-linguistic differences in the preferred RC attachment are motivated by the fact that while recency is fixed, the strength of predicate proximity varies across languages. In languages with relatively free word order (such as Italian, Spanish, French, German) the predicate occupies a more prominent role in sentence parsing than in languages with relatively strict word order (such as English or Chinese). Hence, the strength of predicate proximity in the former languages would be consistent with their HA preference, whereas its weakness in the latter languages would explain their LA preference.

Fodor (1998) highlighted how sentence processing is affected by prosodic factors, in that in the presence of syntactic ambiguity, parsing choices are sensitive to the prosodic features of sentences. In her Balanced sister hypothesis, Fodor (1998) argued that constituents prefer to attach to a “sister” of the same size, therefore in order to achieve prosodic balance, light constituents prefer to attach low, while heavy constituents prefer to attach high. As a result, variations in RC attachment preferences across and within languages would be explained by the fact that languages differ in their prosodic features.

Fodor (2002) proposed a more general hypothesis, the Implicit Prosody hypothesis, according to which RC attachment decisions are influenced by the position of prosodic boundaries. Accordingly, when a prosodic boundary precedes the RC the parser is expected to favor HA, as in the example (7a), whereas when a prosodic boundary occurs right after NP₁ the parser is assumed to prefer LA, as in (7b)

- (7) a. Someone shot the servant of the actress / who was on the balcony.
b. Someone shot the servant / of the actress who was on the balcony

Moreover, the account predicts that intonational boundaries are more likely to occur before longer RCs than shorter ones. It follows that long RC are subject to a HA bias. A sentence like (8b) is expected to favor HA, while LA is assumed to be the preferred parsing choice in (8a).

- (8) a. The doctor met the son₁ of the colonel₂ who₂ died₂.
b. The doctor met the son₁ of the colonel₂ who₁ tragically died₁ of a stroke.

(Hemforth et al., 2015, p. 45)

From this point of view, cross-linguistic variations are the reflection of differences in the default prosodic phrasing provided by readers of a language during silent reading. This hypothesis was later tested by Hemforth et al. (2015), who did observe effects of position and length on RC attachment in German, English and Spanish, and showed that longer RCs favor higher attachment.

Yet, the abovementioned theories did not offer a satisfactory and comprehensive explanation for this complex pattern of variation, and Grillo and Costa (2014) tried to shed light on the residual asymmetry in attachment preferences, across languages and structures, which had been left unexplained. They proposed a new argument in favor of the universality of parsing principles: the PR-first Hypothesis. According to them, locality is the universal principle governing the human language parser and the apparent cross-linguistic variation in RC attachment preferences can be reduced to the asymmetric availability of pseudo relatives across languages and structures. RCs and PRs look identical, but they differ structurally and semantically, in that RCs are NP-modifiers (and denote properties of entities) and PRs are complements or adjuncts of VPs (and denote events or situations). In the context of complex NPs, RCs can be attached to both NP1 and NP2, whereas PRs obligatory take NP1 as their subject. Therefore, the languages that only allow genuine RCs demonstrate a Low Attachment preference, while languages in which PRs are available, like Spanish, French, Italian and Dutch, demonstrate a

significant High Attachment preference. In these languages, the adjunction pattern is reversed, thus low attachment arises only in the syntactic and semantic contexts in which PRs are not a grammatical option. The example below (9) demonstrates that in Spanish, as in the other PR-languages, a RC is open to an additional structural parse that is not available in English and in the other non PR-languages.

- (9) a. RC, NP1 attachment:
 Vi al [DP [NP1 hijo del medico] [CP que corría]].
- b. RC, NP2 attachment:
 Vi al [DP hijo [del [NP2medico [CP que corría]]]].
I saw the son of the doctor that was running
- c. PR, obligatory NP1 attachment:
 Vi al [SC [DP hijo₁ del medico₂] [CP que_{EC1/*2} corría]]
I saw the son of the doctor running

(Grillo & Costa, 2014, p. 161)

As can be noted, while in English the sentence is two-ways ambiguous, as the RC can take either NP1 and NP2 as its subject, its Spanish translation is three-ways ambiguous, in that the relative pronoun can introduce a RC, which likewise allows both HA and LA, but it can also introduce a PR, which is obligatory attached to NP1.

Although the experimental literature on variation in RC attachment in complex DPs across languages and structures has addressed a number of interesting issues (often with conflicting results), currently there is no uniform explanation that is able to account for the basic and still puzzling question of whether cross-language differences in parsing preferences exist and, if so, what underlies them. Presumably, one of the main reasons lies in the fact that there have been few studies in which languages traditionally regarded as different in their RC attachment preference have been compared using the same materials, which should be an essential prerequisite, considering that there is a great deal of RC attachment variation also within languages. For this same reason, Hemforth et al. (2015) stressed the need to hold the materials constant across languages, when investigating their pattern of RC ambiguity resolution, and to carefully select items which are able to arise cross-linguistic variation, if indeed it exists.

1.4. Syntactic Priming of Relative Clause Attachment

It has been experimentally demonstrated that the attachments of relative clauses in an NP-of-NP-RC sequence are susceptible to structural priming (Scheepers, 2003; Desmet & Declercq, 2006; Hartsuiker, Beerts, Loncke, Desmet & Bernolet, 2011). According to Scheepers (2003), this construction is particularly worthy of attention because it can give us an understanding of the kinds of syntactic information that are affected by priming in language production. RCs are modifiers and, according to standard linguistic theories, the syntactic representation of the two RC attachment alternatives (HA and LA) is not lexical, in that it is not represented in the argument structure of the lexical items they modify. Furthermore, both structures are generated by the same set of syntactic principles, thus they only differ in their hierarchical tree configuration: the rule “NP → NP RC” modifies the NP higher up in the tree, resulting in HA, or it can modify the NP that is lower in the tree configuration, in the LA case. Therefore, the syntactic priming of RC attachments differs from priming of structures such as transitives and datives, as the latter arise from priming of syntactic information that is closely related to specific lexical entries, namely the verb argument structure. As a result, the model proposed by Pickering and Branigan (1998), as well as other lexicalist theories according to which structural priming originates at the lemma stratum, cannot account for priming of this syntactic structure, because this is not driven by residual activation of subcategorization frames, or the pre-activation of individual syntactic rules.

Scheepers (2003) demonstrated that the relative clause attachment ambiguity is subject to priming in German. He carried out three sentence completion experiments in which participants were asked to generate NP-of-NP-RC constructions. In the first two experiments prime sentences forced either NP1 or NP2 attachment of the RC by using relative pronouns that were marked for gender in German, while target sentences had ambiguous pronouns, hence participants could freely decide whether to attach the RC high or low. In particular, prime sentences had three conditions: in the HA condition the relative pronoun agreed in gender with NP1; in the LA condition it agreed with NP2; in the BL (baseline) condition the relative pronoun was replaced by a temporal or causal connective, as illustrated in (10) below:

- (10) a. HA Forced Prime
 Die Assistentin verlas den Punktestand der Kandidatin, der ...
The assistant announced the score [masc, sing] of the candidate [fem, sing] that [masc, sing] ...
- b. LA Forced Prime
 Die Assistentin verlas den Punktestand der Kandidatin, die ...
The assistant announced the score [masc, sing] of the candidate [fem, sing] that [fem, sing] ...
- c. BL Forced Prime
 Die Assistentin verlas den Punktestand der Kandidatin, bevor ...
The assistant announced the score [masc, sing] of the candidate [fem, sing] before...
- d. Target Sentence
 Der Rentner schimpfte u"ber die Autorin der Flugbla"tter, die ...
The pensioner railed about the author [fem, sing] of the fliers [neut, plur] that

(Sheepers, 2003, p.185)

These two experiments provided clear evidence for structural priming of attachment site, in that the proportion of HA target completions was significantly higher after HA primes than after LA primes or BL primes, while the proportion of LA target completions was higher after LA primes than after HA primes and BL primes. In order to evaluate the syntactic nature of RC attachment priming, a third control experiment was designed. In this case, the prime sentences were syntactically incongruent with the targets, in that the relative pronouns in the prime fragments were replaced by temporal and causal connectives, which constrained the generation of anaphoric adverbial clauses instead of relative clauses, while the relative clause attachment targets remained unaltered, as in the example (11).

- (11) a. Die Assistentin verlas den Punktestand der Kandidatin, als dieser ...
The assistant announced the score [masc, sing] of the candidate [fem, sing] when this [masc, sing] ...

- b. LR Die Assistentin verlas den Punktestand der Kandidatin, als diese ...
*The assistant announced the score [masc, sing] of the candidate [fem, sing]
when this [fem, sing] ...*

(Sheepers, 2003, p.195)

The absence of reliable structural priming effects in the last experiment demonstrated that the observed RC attachment priming effect is the result of syntactic persistence in sentence production and cannot be merely driven by non-syntactic, discourse-based mechanisms, such as repetition of anaphoric binding relations or of focus structure. Scheepers (2003) further observed that the magnitude of the priming effect for either of the attachment sites is affected by the baseline bias. In other words, HA priming is stronger when there is a LA preference in the baseline (as in his first experiment), while LA is stronger when a baseline preference for HA is observed (as in his second experiment). Simultaneously, he argues that the baseline trend could be influenced by pragmatic factors, as there can be a bias in the target sentences which favors either NP1 or NP2 attachment. That would also explain the results he obtained in the first experiment, which revealed a trend towards LA completions, in contrast with the general attested preference for HA in German. As mentioned above, the model of grammar representation proposed by Pickering and Branigan (1998) cannot account for RC attachment priming, which originates from the persistence of hierarchical syntactic relations (and not separate syntactic rules) between prime and target sentences. Scheepers (2003) proposed an extension of this model according to which, in addition to combinatorial nodes, there must be a mental record of the sequence in which syntactic rules are applied during sentence building. In particular, the rule sequence $\langle NP \rightarrow NP RC \rangle \langle NP \rightarrow NP PP \rangle \langle PP \rightarrow prep NP \rangle$ would result in the high attachment of the RC, and the sequence $\langle NP \rightarrow NP PP \rangle \langle PP \rightarrow prep NP \rangle \langle NP \rightarrow NP RC \rangle$, would be responsible for the low attachment of the RC. Thence, syntactic priming of RC attachments could be explained by this model, as it foresees that not only combinatorial nodes (encoding individual syntactic principles) but also the order in which they are activated can retain residual activation, which facilitates priming.

Desmet & Declercq (2006) and Hartsuiker, Beerts, Loncke, Desmet and Bernolet (2016) not only demonstrated within-language priming but also between-language priming of RC attachments.

Desmet & Declercq (2006) conducted three experiments with Dutch–English bilinguals and found that the attachment of RCs can be primed from Dutch to English. This study was especially relevant because, for the first time, it provided evidence of the cross-linguistic priming of syntactic information that is not tied to specific lexical items, a finding that particularly supports the shared-syntax account of bilingual processing. In the first experiment the researchers observed within-language priming of this structure, using close translations of Scheepers' (2003) experimental items, as well as his same methodology and design. Similarly, they also used gender agreement on relative pronouns (i.e., the Dutch relative pronouns “die” and “dat”) in order to force HA or LA in the prime sentences. The second experiment aimed at investigating whether bilinguals share syntactic representations related to the hierarchical tree configuration across languages, or whether they are kept separate in the L1 and L2. Thus, the same prime sentences of experiment 1 were used, while the target sentences were translated into English. The results showed a strong priming structural effect of attachment site, proving that this syntactic information is shared between the two languages of bilinguals. Importantly, the data also revealed that the impact of the priming effect was similar to the previous experiment, suggesting that cross-linguistic syntactic priming of RC attachments may be as strong as within-language syntactic priming of this structure. The third experiment served as a control measure designed with the purpose to exclude that the origin of the priming effect in the second experiment was discourse-based. This interpretation was already discarded by Scheepers (2003), yet Desmet and Declercq considered the possibility that bilinguals might rely more on discourse representations during sentence processing compared to monolinguals. Indeed, this possibility would be coherent with Ulijn's (1980) assumption, according to which L2 processing may be more conceptually than syntactically driven. As in Scheepers (2003), they replaced the relative pronouns in the prime fragments with temporal and causal connectives, while the target sentences were kept the same. In the absence of syntactic overlap between prime and target fragments, the results of the control experiment were consistent with Scheepers (2003), as they did not reveal any significant priming effect. Consequently, Desmet and Declercq

proved that the RC attachment priming effect is due to the reactivation of syntactic representations, rather than discourse representations. This finding represents further evidence in favor of the interactive view of bilingual syntactic processing.

Hartsuiker et al. (2016) investigated whether the syntactic representations and procedures involved in RC attachment are shared across the languages of multilinguals, as stated by shared-syntax accounts, or whether they are kept separate, consistently with separate-syntax accounts. While an extensive literature on bilingualism that has focused on the influence of L1 on L2 processing, and vice versa, fewer studies have contemplated the cross-linguistic influences that might affect multilingual language processing (i.e., in the case of speakers of more than two languages). Hartsuiker et al. (2016) conducted four cross-linguistic structural priming experiments, with multilingual participants, that had Dutch as their L1 and French, English and German as their L2. The aim was to examine whether within-language priming differs from between-language priming, as well as whether L1 to L2 priming differs from structural priming between two different L2s. They used a sentence completion paradigm, like Desmet and Declercq (2006) and Scheepers (2003), but while the latter used gender-marking on the relative pronoun in order to disambiguate attachment site of the RC, since English and French lack gender-marking on relative pronouns, Hartsuiker et al. (2016) relied on noun-verb number agreement. Hence, the prime contained two NPs that differed in number, an ambiguous relative pronoun and a number-marked verb, whereas the target fragments did not contain a relative clause verb, therefore allowing both HA and LA (12).

(12) a. HA Forced Primes

Claire bezocht de leerlingen [plur] van de professor die warden [plur] ...

Claire a rendu visite aux élèves [plur] du professeur qui étaient [plur] ...

Claire visited the students [plur] of the professor who were [plur] ...

b. LA Forced Primes

Claire bezocht de leerlingen van de professor [sing] die werd [sing] ...

Claire a rendu visite aux élèves du professeur [sing] qui était [sing]...

Claire visited the students of the professor [sing] who was [sing] ...

c. Target Sentence

De storm vernielde de ramen van de bungalow die ...

The storm destroyed the windows of the bungalow that ...

(Hartsuiker et al., 2016, p.18)

The first three experiments tested for structural priming of RC attachment using Dutch (the subjects' L1), French and English (the subjects' L2) as prime languages, while the target language was held constant, respectively Dutch (Experiment 1), French (Experiment 2) and English (Experiment 3). Their results provided clear evidence of structural priming of attachment sites, with a higher frequency of high attachment responses after high attachment primes, and a higher frequency of low attachment responses after low attachment primes. Importantly, the magnitude of the priming effect did not differ as a function of the language of the prime sentences: within-language priming was equally strong as between-language priming, and priming between an L1 and an L2 was equally strong as priming between two second languages, consistently with the shared-syntax model. Additionally, while the strength of cross-linguistic priming did not seem to be affected by the multilingual's proficiency in the prime languages, it was on the other hand influenced by their proficiency in the target language. Indeed, priming was weakest in French, the language in which the participants were less proficient. The latter result could be due to individual differences of the subjects, or to other constraints that might have affected their syntactic choices in the different languages, such as pragmatic feasibility, effects related to animacy of the NPs, or overall attachment preferences.

CHAPTER 2

Establishing Relative Clause Attachment Preferences in Italian

In this chapter we present two studies we conducted in order to investigate whether native speakers of Italian have a particular RC attachment preference when two potential NP hosts are available.

2.1. Introduction

Cross-linguistic studies investigating parsing preferences concerning the attachment of relative clause modifiers to complex noun phrases have challenged the universality of parsing principles. According to the previous prevailing theories of syntactic parsing, as the Late Closure principle (Frazier, 1978; Frazier & Fodor, 1978), constituents such as RC modifiers are attached to the most recently processed constituent. Yet, the experimental literature has provided evidence that there is variation across languages when it comes to RC attachment preference in complex DPs, with some showing a Late Closure preference, some showing an Early Closure preference, and others showing no preference. On these grounds, some researchers have suggested alternative hypotheses concerning parsing strategies (see Chapter 1).

Previous research on relative clause attachment has found a preference for high attachment in Italian (De Vincenzi and Job 1993,1995). However, De Vincenzi and Job (1993,1995) demonstrated that initial parsing in Italian is affected by the Late Closure principle irrespective of the thematic structure of the complex noun phrase, while final interpretation is influenced by pragmatic preference and thematic structure. Indeed, in contrast with their offline results, their online results showed that reaction times are shorter when the RC is attached to NP2, than when it is attached to the NP1. Therefore, the differences between offline and online results were interpreted as providing evidence for an initial preference to attach the RC low (to NP2), which is contrasted by a later reanalysis for high attachment. Interestingly, De Vincenzi and Job (1993,1995) have shown that the cross-linguistic asymmetry in attachment preferences disappears in specific syntactic contexts. They observed that in Italian the preference to attach the RC

high disappears with prepositions such as “*di*”, and with thematic assigner prepositions such as “*con*”, as in the example (13) below:

- (13) Qualcuno ha sparato alla governante₁ con l’attrice₂ che stava seduta₂ in balcone.
Someone shot the maid₁ with the actress₂ that was sitting₂ on the balcony.

Grillo and Costa (2014) proposed a new argument in favor of the universality of parsing strategies, as according to them, the human language parser is governed by the principle of locality and the apparent cross-linguistic variation in parsing preferences is reducible to grammatical factors. In particular, when it comes to RC attachment, they argue that a crucial grammatical distinction is represented by the asymmetric availability of pseudo relatives across languages and structures. Consequently, while the languages that only allow genuine RCs (nonPR languages) demonstrate a Low Attachment preference, those in which Pseudo Relatives are available (PR languages) demonstrate a significant High Attachment preference. Evidence of this hypothesis is shown by the fact that in the syntactic and semantic contexts in which PRs are not a grammatical option, PR languages display a LA preference as well. Despite looking identical, RCs and PRs differ structurally and semantically: while RCs modify NPs, and thus appear in all the contexts in which NPs can appear, PRs are complements or adjuncts of VPs, or adjuncts of NPs, and therefore they appear in a much more limited set of syntactic and semantic environments. Hence, PRs are a particular type of clausal complement and as such they are selected only by a restricted set of predicates such as perceptual verbs (e.g. see, hear, feel) or quasi-perceptual verbs (e.g. photograph, film, record). They are structurally and semantically similar to English Small Clauses of the eventive (progressive) type (e.g. I saw John running) (Cinque, 1992).

In the context of complex NPs, RCs allow both HA and LA, whereas PRs force HA, in that they obligatory take NP1 as their subject. Therefore, Grillo and Costa (2014) proposed the PR-first Hypothesis, according to which in the absence of strong biases related to factors such as prosodic, contextual and lexical influences:

- i. High attachment preferences should emerge whenever PRs are available.

- ii. When PRs are available, they should be preferred over RCs, as the former are structurally and pragmatically simpler than RCs, and therefore easier to parse.
- iii. In complex NPs, HA disambiguation should be easier to parse for PR-verbs than RC-only verbs.
- iv. In the presence of PR-verbs a preference for HA is observed even in nonPR languages, as they create a context which allows an ambiguity between a RC interpretation and a correlate of PR interpretation, e.g. the Acc-ing construction in English.

In order to test their PR-first Hypothesis, Grillo and Costa (2014) carried out two experiments in Italian, which strongly supported their predictions. In the first study, they used target sentences which contained both PR and nonPR embedded verbs, and their syntactic structure was either PR compatible or PR incompatible. Hence, in a 2x2 design, they crossed position of embedding (right branching vs. center embedding) and extraction site (subject vs. object). The results demonstrated that when the same sequence NP1 of NP2 + RC was embedded in different positions, LA preference was observed whenever a PR reading was excluded through the manipulation of the syntactic structure of the sentence (i.e. object extraction, position of embedding), whereas HA preference emerged when a PR reading was available (subject extraction in Right Branching context). In the second experiment the authors tested the role of PR availability on RC attachment preferences by only manipulating the type of verb in the matrix clause. In the target sentences everything was kept constant with the exception of the matrix verb: the sentences could either be ambiguous as to whether they allowed a RC or PR interpretation, as they contained perceptual or quasi-perceptual verbs, or they could only allow a RC interpretation, in that they contained stative verbs. The results of the second experiment were consistent with the PR- first Hypothesis as well: a LA preference was found in unambiguous RC contexts, on the other hand a strong HA preference was observed in ambiguous contexts, which allowed both a PR and a RC reading.

In the following paragraphs we will report the results of two studies we carried out in order to investigate the resolution of RC attachment ambiguity in Italian. The first study consisted of a sentence completion task, in which we collected attachment decisions on globally ambiguous materials. In a second study we replicated Grillo and Costa's (2014)

experiment 2, consequently we focused on the preferred interpretation of ambiguous RCs following two potential attachment hosts.

2.2. Sentence Completion Task

The first study aimed at investigating RC attachment preferences of Italian L1 speakers, through a sentence completion paradigm. Hence, we wanted to ascertain whether it is indeed true that there is a bias for high attachment in Italian, as determined by previous studies in this area of research. This study served as an item norming phase as well, in that we used the same sentences that served as priming sentences in our cross-linguistic syntactic priming experiment, which will be discussed in the following chapter. In turn, the experimental items of the latter experiment were an adaptation of Scheepers' (2003) items (his Experiment 2). Some of the items were translated from German into Italian and adapted in a way that the critical complex noun phrase contained two NPs that differed in number, since Scheepers used gender-marking to disambiguate RC attachment site. On the other hand, some of the items were changed such that we could manipulate the animacy of the NPs, in order to prevent that their characteristics could affect attachment decisions. This choice was made as a result of the initial pilot data we gathered, which were characterized by a strong bias towards LA. Thence, as a means to reduce this bias we decided to organize the experimental items in a way that in half of the target fragments NP1 and NP2 had the same animacy, in the other half of the target fragments NP1 and NP2 had opposite animacy.

2.2.1. Method

2.2.1.1. Participants

The participants of this study were 21 monolingual Italian speakers recruited through personal contacts. They gave their informed consent before taking part in the experiment and were unaware of the purpose of the study. The mean age of the participants was 40. None of them took part in the experiments that will be subsequently reported.

2.2.1.2. Materials and Design

The 24 target sentence fragments used in this study were the same used in the cross-linguistic syntactic priming experiment as priming sentences, with the only difference that here we did not include the relative clause verb that followed the relative pronoun, which was number-marked and thus was used to disambiguate attachment site of the RC. Indeed, since our current objective was to determine the RC attachment preference of Italian L1 speakers, the target sentence fragments were ambiguous, as they could be completed producing either HA or LA. Each target fragment contained a complex noun phrase containing two number-marked noun phrases, one with singular number (e.g., l'autore) and one with plural number (e.g., i romanzi), followed by the beginning of a RC represented by a relative pronoun “*che*” which is ambiguous for number and gender. (14) depicts an example of the target fragments used.

- (14) Il commentatore sportivo ha elogiato la difesa dei calciatori che...
The sports commentator praised the defense of the footballers that...

There was an equal number of target fragments with a singular NP1 and a plural NP2, and an equal number of target fragments with a plural NP1 and a singular NP2. One quarter of the target sentences had singular NP1 and plural NP2, the second quarter had plural NP1 and singular NP2, and the same division was repeated in the second half of the targets. In order to prevent that attachment decisions could be influenced by characteristics of the NPs, in half of the target fragments NP1 and NP2 had the same animacy (i.e., they were either both animate, or both inanimate), in the other half of the target fragments NP1 and NP2 had opposite animacy (i.e., in one quarter of the targets NP1 was animate and NP2 was inanimate, in another quarter NP1 was inanimate and NP2 was animate). Additionally, 48 filler sentences were included, which were semantically and structurally unrelated to the targets, as they did not permit the construction of RCs. The order of items was pseudo-random, but subject to the constraint that the target fragments were separated by at least one filler. The full set of experimental items that were used can be found in Appendix A.

2.2.1.3. Procedure

The participants were sent an instruction email with a URL link to the consent form, administered through Qualtrics. Once they filled out the consent form, they were automatically redirected to the interpretation study. At first, they were asked to provide their demographic and language background information, then they were given detailed instructions on how to complete the experiment. Examples were also provided, in order to ensure the instructions were clear and participants understood what was being asked of them. They were instructed to read the sentence fragments and complete them with the first continuation that came to mind, whilst still producing grammatically correct and plausible sentences. A typical session took about 20 minutes to complete.

2.2.1.4. Scoring

The participants' responses were coded according to two coding schemes, strict coding and lax coding. The attachment of the target relative clause was disambiguated by means of number agreement between the verb of the RC and the host NP. Thus, within the strict coding scheme, responses were coded as either 'strict high attachment' (i.e., when the verb of the target RC agreed in number with NP1) or 'strict low attachment' (i.e., when the verb of the target RC agreed in number with NP2). In the analysis we took into consideration subject-RCs, in which the relative pronoun acts as the subject of the resulting RC, as in (15), as well as object-RCs, in which the relative pronoun acts as the object of the resulting RC, as in (16). For instance, the object-RC in (16) was coded as 'strict high attachment'.

- (15) Abbiamo apprezzato gli articoli del giornalista che ha messo in luce gli sprechi della sanità pubblica.

We appreciated the articles of the journalist that shed light on the waste in public healthcare.

- (16) I cittadini hanno criticato le normative del governo che credono siano troppo rigide.

The citizens criticized the regulations of the government that they consider too rigid.

The responses were coded as ‘strict other’ in case of: target completions that left the attachment site ambiguous between HA and LA interpretations, as in (17); completions that semantically suggested a different attachment site than verb number did, as in (18) and (19); RCs that were attached to the subject of the sentence instead of one of the NPs, as a consequence of a misinterpretation of the target fragments, as in (20); and unrelated responses as in (21).

- (17) La professoressa di letteratura ci ha consigliato di leggere l’incipit dei romanzi che ci ha distribuito.

The literature professor advised us to read the incipit of the novel that she distributed.

- (18) Hanno annunciato le nuove produzioni della compagnia teatrale che dovrà svolgersi nel 2021.

They announced the new productions of the theatre company that will [sing] take place in 2021.

- (19) Il freddo ha distrutto il raccolto dei frutticoltori che dovevano essere venduti al mercato ortofrutticolo.

The cold destroyed the harvest of the fruit farmers that were supposed to be sold at the farmer’s market.

- (20) I cittadini hanno criticato le normative del governo che non sanno cosa fare, dove andare e a chi chiedere.

The citizens criticized the regulations of the government that do not know [plu] what to do, where to go and who to ask.

- (21) L’editrice ha contattato l’autore dei romanzi che oggi giorno sono stata benissimo.

The editor contacted the author of the novels that today I felt great.

However, some of these target completions were not excluded within the lax coding scheme. Indeed, when number marking on the RC verb could not be used to determine the relevant target attachment, we relied on plausibility criteria. Therefore, (17) was coded as ‘lax high attachment’ because it seemed more likely that “the professor distributed

copies of the novel’s incipit to the classroom”. (18) and (19) were also coded as ‘lax high attachment’ as possibly the participants misinterpreted the number marking on NP1, thus the resulting target completion agrees in number with NP2, yet it is conceptually attached high to NP1. Indeed, the intended meaning they wanted to convey was that “the new productions (of the theatre company) will take place in 2021” and that “the harvest (of the fruit farmers) was meant to be sold at the farmer’s market”. The remaining responses where neither number agreement nor plausibility could disambiguate the attachment of the target RCs, including (20) and (21), were coded as ‘lax other’.

2.2.2. Results

The proportions of high attachment and low attachment responses per the strict coding scheme are listed in Table 1. Descriptively, there were more LA completions (55,3%) than HA completions (44,6%). Hence, we observed a significant tendency to attach the RC to NP2 rather than NP1, as the amount of LA responses was 10,7% higher than HA responses.

Table 1
Numbers of high attachment and low attachment target completions by coding category (strict)

Strict High Attachment	Strict Low Attachment
217 (44,6%)	269 (55,3%)

Table 2 shows the distribution of high attachment and low attachment responses per the lax coding scheme. The results were not significantly different from those obtained with the strict coding scheme. In this case, the amount of LA responses (44,7%) was 10,5% higher than HA responses (55,2%).

Table 2

Numbers of high attachment and low attachment target completions by coding category (lax)

Lax High Attachment	Lax Low Attachment
220 (44,7%)	272 (55,2%)

Table 3 illustrates the observed proportions of high attachment and low attachment responses per item, according to the strict coding scheme. As it can be noted, even though target fragments were assumed to be globally ambiguous, some of them had a bias towards HA completions (e.g., Items 01, 02, 10, 22), and others had a clear bias towards LA completions (e.g., Items 02, 07, 08, 11, 14, 19, 20, 24). Additionally, in some cases the RC attachment preference was unanimous, with all 21 participants attaching the relevant RCs high (Items 04, 21, 23), or low (Items 06 and 17).

In light of the results of these analyses we can reach the conclusion that the significant bias towards LA observed in this study, which is at odds with the HA preference traditionally associated with Italian (e.g., De Vincenzi and Job 1993,1995), may be due to pragmatic biases in the target sentences. Indeed, it has been shown that the semantic relations established between the two NPs contained in the complex noun phrase can completely shift the way the RC attachment ambiguity is resolved by the speakers of a language (Desmet et al., 2002; Desmet et al., 2006). Therefore, constraints such as animacy, concreteness, number associated to the NPs, and in general pragmatic feasibility may have contributed to make NP2 more accessible than NP1.

Table 3

Numbers of high attachment and low attachment target completions per item

Item	HA target	LA target
1. La polizia ha interrogato il sospettato degli omicidi che	16 (76,1%)	5 (23,8%)
2. L'assistente ha annunciato il punteggio dei candidati che	5 (23.8%)	16 (76.1%)
3. L'editore ha contattato l'autore dei romanzi che	11 (55%)	9 (45%)
4. Martina ha accarezzato il cane dei vicini che	21 (100%)	0 (0%)
5. L'esperto ha elogiato l'azienda dei giovani imprenditori che	7 (33.3%)	14 (66.6%)

6. Il freddo ha distrutto il raccolto dei frutticoltori che	0 (0%)	20 (100%)
7. Il docente ha assistito gli studenti del collega che	4 (19%)	17 (80.9%)
8. Hanno annunciato le nuove produzioni della compagnia teatrale che	3 (16.6%)	15 (83.3%)
9. I cittadini hanno criticato le normative del governo che	14 (70%)	6 (30%)
10. La testimone ha riconosciuto i colpevoli del crimine che	14 (70%)	6 (30%)
11. La giornalista ha intervistato i sostenitori del candidato alla presidenza che	3 (14.2%)	18 (85.7%)
12. Mi hanno regalato i biglietti dello spettacolo che	11 (55%)	9 (45%)
13. La custode ha salutato la governante degli inquilini che	7 (33.3%)	14 (66.6%)
14. Il commentatore sportivo ha elogiato la difesa dei calciatori che	3 (14.2%)	18 (85.7%)
15. La professoressa di letteratura ci ha consigliato di leggere l'incipit dei romanzi che	6 (33.3%)	12 (66.6%)
16. La ricercatrice ha studiato la lingua degli aborigeni che	8 (42.1%)	11 (57.8%)
17. La classifica della rivista Forbes è stata stilata in base al fatturato delle aziende che	0 (0%)	20 (100%)
18. La direttrice ha incontrato il capo degli impiegati che	12 (63.1%)	7 (36.8%)
19. Abbiamo apprezzato gli articoli del giornalista che	3 (14.2%)	18 (85.7%)
20. Abbiamo studiato i seguaci del grande filosofo idealista che	3 (15.7%)	16 (84.2%)
21. La paziente ha consultato gli specialisti dell'ospedale che	21 (100%)	0 (0%)
22. La guida turistica ha menzionato le campane della chiesa che	18 (85.7%)	3 (14.2%)
23. Il manager ha aspettato i musicisti della band che	21 (100%)	0 (0%)
24. Il pompiere ha salvato gli inquilini dell'attico che	6 (28.57%)	15 (71.4%)
<i>Total</i>	<i>217 (44,6%)</i>	<i>269 (55,3%)</i>

Thus, for the reasons mentioned above, a second study was conducted in which we replicated Grillo & Costa's (2014) Experiment 2. The objective was to determine whether the availability of PRs could play a role in shaping RC attachment preferences, and whether using materials that had been already tested by other authors may yield different results.

As regards the cross-linguistic syntactic priming experiment, we decided to use as priming sentences the same items that were used in the current study as target fragments, despite the pragmatic biases detected. There are two main reasons behind this choice: i. participants will be provided with full versions of these sentences and therefore will not make attachment decisions on them; ii. the experiment will not investigate the RC attachment preference in Italian, but rather whether RC attachment can be primed in Italian-English late bilinguals.

2.3. RC Interpretation Task

In the second study, we replicated Grillo & Costa's (2014) experiment 2. As discussed in section 2.1, according to Grillo & Costa's (2014) PR-first hypothesis, the asymmetric availability of pseudo relatives may be responsible for the cross-linguistic differences in RC attachment preferences observed in this area of research. Therefore, in this experiment we manipulated the type of verb in the matrix clause in order to test the effects of PR availability on RC attachment decisions. Following Grillo & Costa (2014) we predicted a LA preference in all the contexts in which only a RC interpretation is available, and a HA preference in ambiguous contexts, which allow both PR and RC interpretations.

2.3.1. Method

2.3.1.1. Participants

The participants of this RC interpretation study were 22 monolingual Italian speakers recruited through personal contacts. They gave their informed consent before taking part in the experiment and were unaware of the purpose of the study. The mean age of the participants was 36. None of them took part in the previous study. A typical session took about 15 minutes to complete.

2.3.1.2. Materials and Design

The experimental items consisted of 24 minimal pairs of target sentences, which were adapted from the items that were used in Experiment 2 of Grillo & Costa (2014). The 24 target pairs had two conditions, which had identical structure but differed in the matrix verb: *Condition A* contained a PR-verb (i.e., a perceptual or quasi-perceptual predicate), thus allowed both PR and RC readings; *Condition B* contained a nonPR-verb (i.e., a stative predicate), therefore a RC was the only available parse. The target pairs were allotted to two lists in a way that each item appeared exactly once per list, in one of the two conditions, and each list contained 12 items per condition. Hence, only one version of each target sentence was presented to each subject, followed by a comprehension question, in which participants were asked to provide their RC interpretation preference, namely whether the ambiguous RC modified NP1 or NP2. The questions and answers to target sentences were counterbalanced, such that NP1 was presented first in 50% of the answers, and NP2 was presented first in the remaining 50% of the answers. The study was administered online through Qualtrics. An example of the sentence stimuli and questions is provided in (22).

(22) a. PR/RC Condition:

Gianni ha visto il figlio dell'amico che correva la maratona.

Gianni saw the son of his friend running the marathon.

b. RC only Condition:

Gianni vive con il figlio dell'amico che correva la maratona.

Gianni lives with the son of his friend that run the marathon.

Unlike Grillo & Costa's (2014) Experiment 2, we did not include filler sentences as we were investigating participants' relative clause interpretation preferences, and they were aware of the aim of the study. Furthermore, some of the original experimental items were adapted in order to make the relations expressed within the complex NP more horizontal, so as to prevent them from affecting participants' attachment decisions. For instance, (22a) was originally "Gianni ha visto il figlio del dottore che correva la maratona / *Gianni saw the son of the doctor running the marathon*" in Experiment 2 of Grillo &

Costa (2014), and the decision to substitute NP2 in the present study was made to ensure that there was no imbalance between the two potential NP hosts, which could facilitate the high attachment of the RC. The full set of experimental items that were used can be found in Appendix B.

2.3.2. Results

Table 3 shows the proportions of high attachment and low attachment responses per condition. As predicted, there were significantly more HA preferences when the target sentences contained PR-verbs (Condition A) rather than nonPR-verbs (Condition B). Therefore, a LA preference was observed with stative predicates, thus in the contexts in which the only available parse was a RC. Conversely, a HA preference arose with perceptual and quasi-perceptual predicates, that is when both a RC and a PR interpretation was available. Interestingly, the proportion of high attachments was 43,9% higher when participants had to interpret matrix sentences containing PR taking verbs, than when they had to interpret matrix sentences containing nonPR-taking verbs. In general, in the second study we observed more high attachments than low attachments, however there was a difference of only 3,1%, which was not considered significant. In the final analysis, we can argue that these results strongly support the PR-first Hypothesis proposed by Grillo & Costa (2014), suggesting that pseudo relatives may be indeed responsible for the asymmetry in RC attachment preferences observed across languages.

Table 3
Numbers of high attachment and low attachment target completions per condition

	High Attachment	Low Attachment
PR/RC	194 (73,4%)	70 (26,5%)
RC	78 (29,5%)	186 (70,4%)
<i>Total</i>	<i>272 (51,5%)</i>	<i>256 (48,4%)</i>

2.4. Discussion

In this chapter we presented two studies through which we aimed to establish RC attachment preferences in Italian. The first study consisted of a sentence completion task, whereby we collected the attachment decisions of 21 monolingual Italian speakers on globally ambiguous sentences, in which RCs could be attached to either one of the potential host NPs. The study served as an item norming phase as well, as the priming sentences of our cross-linguistic syntactic priming experiment (see Chapter 3) were used as target sentences within the scope of this study. The same sentences were adapted from the items that were used in Experiment 2 of Scheepers (2003): some of them were simply translated from German into Italian, some of them were changed such that we could manipulate the animacy of the NPs, in order to prevent that their characteristics could affect attachment decisions.

The results of the sentence completion task showed that the participants had a tendency to attach RCs to NP2, which is in contrast with previous studies that have found a high attachment preference in Italian, hence a preference to attach RCs to NP1 (De Vincenzi and Job 1993,1995). Indeed, we observed a significant bias towards low attachment, as the amount of LA completions was 10,7% higher than HA completions. A closer inspection of the experimental items, through the observation of the proportions of HA and LA responses per item, showed that some sentences were semantically biased towards NP1 or NP2 attachment, although they were meant to be globally ambiguous. In light of these results, our hypothesis is that the observed preference for LA, which is at odds with the general attested preference for HA in Italian, may be due to pragmatic biases in the target sentences. In particular, constraints such as animacy, concreteness, number associated to the NPs, and in general pragmatic feasibility may have contributed to make NP2 more accessible than NP1, and thus played a key role in the participants' attachment preferences. Indeed, Desmet et al. (2002, 2006) showed that the semantic relations established between the two NPs contained in the complex noun phrase can completely shift the way the RC attachment ambiguity is resolved by the speakers of a language. Despite the pragmatic biases detected, we still decided to use these sentences as primes in our cross-linguistic syntactic priming experiment, which will be discussed in the following chapter, on the grounds that participants will be provided with full versions of these sentences, therefore they will not make attachment decisions based on

them, and also the experiment will not aim at investigating the RC attachment preference in Italian, but rather whether RC attachment ambiguity can be primed in Italian-English late bilinguals.

A second study was conducted, in which we replicated Grillo & Costa's (2014) Experiment 2, in order to ascertain whether the strong LA preference observed in the previous study was the result of pragmatic biases in the target sentences, and whether the asymmetric availability of PRs could play a role in shaping RC attachment preferences across languages, consistently with Grillo & Costa's (2014) PR-first Hypothesis. Moreover, this second interpretation study was motivated by the necessity to compare the findings of our sentence completion task to those of a further study, in which we used materials that had been already tested by other authors, in order to yield significant and productive generalizations. Therefore, in the RC interpretation study we investigated RC interpretation preferences of Italian L1 speakers. The type of verb in the matrix clauses was manipulated in order to test the effects of PR availability on RC attachment decisions: the target sentences contained either a PR-verb (i.e., a perceptual or quasi-perceptual predicate), which allowed both PR and RC readings, or a nonPR-verb (i.e., a stative predicate), which only allowed a RC parse. Each target sentence was followed by a comprehension question, in which participants were asked to provide their interpretation of the sentence, namely whether the attachment host of the ambiguous RC was NP1 or NP2.

The results of the second study were consistent with Grillo & Costa's (2014) PR-first Hypothesis, as there were significantly more HA responses when the target sentences contained PR-verbs rather than nonPR-verbs. Indeed, the proportion of high attachments was 43,9% higher in the former case, namely when participants had to interpret matrix sentences containing perceptual or quasi-perceptual predicates, in which both a RC and a PR interpretation was available. On the other hand, a LA preference was observed with nonPR-verbs, thus in the contexts in which the only available parse was a RC. Furthermore, in this study we observed more HA than LA interpretations, however there was a difference of only 3,1%, which was not considered significant.

In conclusion, the results of the two studies illustrated in this chapter suggest that two key factors have to be taken into account in the analysis of cross-linguistic RC attachment preferences. The first concerns the importance of holding materials constant

across languages, already emphasized by Hemforth et al. (2015), as in the aforementioned studies we have observed that there is a great deal of RC attachment variation also within the same language. The second factor involves the necessity to carefully construct the linguistic materials used in these experiments, preventing PR readings, as a means to avoid confounds. Before Grillo & Costa (2014), most previous experiments on RC-attachment used experimental items which contained a variety of PR-verbs and nonPR-verbs. In these conditions, a low attachment preference could arise both across syntactic structures and languages, even in those in which PRs are a grammatical option, re-establishing the universality of locality principles in language parsing.

CHAPTER 3

Cross-Linguistic Syntactic Priming of RC Attachment in Italian-English Bilinguals

In this chapter we present an experiment we conducted in order to investigate whether the representations of purely syntactic information related to the hierarchical tree configuration are shared or kept separate between the languages of Italian-English late bilinguals. Specifically, we used the syntactic priming methodology to ascertain whether the attachments of relative clauses in an NP-of-NP-RC sequence are susceptible to cross-linguistic structural priming from Italian (the participants' L1) to English (their L2).

3.1. Introduction

Over the past decades, the psycholinguistic literature has provided a large body of empirical evidence intended to explore the nature of the syntactic representations and mechanisms of bilinguals through the priming methodology. Indeed, a number of cross-linguistic syntactic priming studies have been conducted in order to test whether bilinguals share representations and mechanisms across the languages they speak, or whether they are kept strictly separated instead.

In the present chapter we investigate whether the attachments of relative clauses in an NP-of-NP-RC sequence are susceptible to cross-linguistic structural priming. Thus, the syntactic structure at the heart of our analysis features a complex noun phrase and a modifying relative clause, as in “Someone shot the servant of the actress who was on the balcony”. In this type of construction, the RC is ambiguous since it has two potential attachment sites: namely it can be attached to the first noun phrase, higher up in the syntactic tree representation (i.e., “the servant”), alternatively, it can be attached to the noun phrase lower in the syntactic tree representation (i.e., “the actress”).

Previous studies in this area of research not only demonstrated within-language priming of RC attachments (Scheepers, 2003), but also between-language priming of this syntactic information (Desmet & Declercq, 2006; Hartsuiker et al., 2016) which is not

represented lexically or tied to specific lexical items, but it is rather truly structural, in that priming originates from the persistence of hierarchical syntactic relations. These previous studies all used a sentence completion paradigm, in which prime sentences forced either high or low attachment of the RC, while target sentences were ambiguous, therefore they were unconstrained with respect to RC attachment and participants were free to produce NP1 or NP2 attachments. In order to disambiguate attachment site of the RC in the prime trials, Scheepers (2003) and Desmet & Declercq (2006) used gender-marking on the relative pronoun, while target sentences contained ambiguous relative pronouns. For instance, in Scheepers' (2003) prime sentences such as “Die Assistentin verlas den Punktestand_{masc} der Kandidatin_{fem}, der_{masc}/die_{fem}...[The assistant announced the score of the candidate that. . .]” the relative pronoun “der” can only refer to a masculine singular NP, represented by “Punktestand” in the example, whereas the relative pronoun “die” can only refer to a singular feminine NP, hence RC attachment would be forced towards LA, in favor of “Kandidatin”. On the other hand, Hartsuiker et al. (2016) constrained RC attachments in the prime trials using noun-verb number agreement, since English and French lack gender-marking on relative pronouns. Consequently, the prime contained two NPs that differed in number, followed by an ambiguous relative pronoun and a number-marked verb, whereas the target fragments did not contain a relative clause verb, therefore allowing both HA and LA.

In the following paragraphs we present the results of a cross-linguistic syntactic priming experiment we conducted with Italian-English late bilinguals in order to test whether the attachment of RCs can be primed from Italian (the participants' L1) to English (the participants' L2). Just like Hartsuiker et al. (2016) we used noun-verb number agreement to disambiguate RC attachment site, however unlike this or the abovementioned studies we used a different structural priming paradigm, as we investigated comprehension-to-production priming, rather than production-to-production priming. Our main aim was to ascertain whether the syntactic representations and procedures involved in RC attachment are shared across the languages of Italian-English bilinguals.

Our main research questions were as follows:

- i. Can relative clause attachments be primed from Italian to English in native Italian speakers? Hence, can non-lexical syntactic information (i.e.,

- information related to the hierarchical tree configuration) be susceptible to cross-linguistic structural priming?
- ii. How does L2 proficiency interact with the strength of syntactic priming between the L1 and the L2 of bilinguals?

According to our prediction, relative clause attachments should be subject to cross-linguistic syntactic priming from comprehension to production. In other words, the recency of use of this structure (i.e., reading a HA or LA attachment forced RC) should affect the production of sentences involving globally ambiguous RCs in English by Italian speakers. We also predicted that the strength of cross-linguistic priming would be modulated by second language proficiency. Thus, we expected the priming effect to be stronger at higher levels of proficiency in L2 English. Consequently, if the results meet our expectations, they would also be consistent with the hypothesis that the syntactic representations and procedures involved in RC attachment are shared across the languages of bilinguals, yet the level of integration of L1 and L2 representations increases together with the participants' proficiency in their second language.

3.2. Method

3.2.1. Participants

The participants of this study were 85 native speakers of Italian with intermediate, upper-intermediate or advanced levels of English. 49 participants were students of the Ca' Foscari University of Venice, while the remaining 36 participants were recruited through personal contacts. The mean age of the participants was 24. The majority of participants had some level of higher education: 55 of them had completed or were in the process of completing a master's degree; 24 participants had completed or were completing a bachelor's degree; 7 participants had graduated high school.

Participant demographic and language background information was collected through a Language Profile Questionnaire, implemented through Qualtrics (the full Language Profile Questionnaire can be found in Appendix E). As they completed the questionnaire, participants were asked to self-rate their English proficiency level using the Common European Framework of Reference (CEFR) scale. 37 participants (44%)

rated their level of proficiency in English as C1 on the CEFR scale, 29 participants (34%) rated their level as B2, 19 participants (22%) said they were a B1 level.

Additionally, participants were also asked to rate how well they speak, read, write and understand English on a scale of 1 (not well at all) to 7 (extremely well). The mean of these four scores was calculated to reveal the participants' mean English ability score.

In order to obtain a more reliable indication of the participants' proficiency level in English, before the experiment was administered, they were also asked to complete the Macmillan Straightforward Quick Placement & Diagnostic test.

8 participants were excluded from the analysis since 1 of them failed to complete all parts of the study and 7 of them were not native speakers of Italian, as the Language Profile Questionnaire revealed.

All the participants gave their informed consent before taking part in the study and were unaware of the purpose of the experiment. None of them took part in the previous studies reported in Chapter 2. Table 4 below shows participant demographic data.

Table 4

Data from 85 Italian speakers of L2 English

	Mean	Range	SD
Age	23.7	18-35	3.9
Macmillan Score	44.9	26-50	6
Self-rated English ability (1-7)	5.1	2.5-7	1
Participants			
Self-rated CEFR level			
B1	19 (22%)		
B2	29 (34%)		
C1	37 (44%)		
<i>Total</i>	85		

3.2.2. Materials and Design

The materials included 24 experimental items. Each item consisted of a target fragment which was immediately preceded by a prime sentence occurring in one of the three conditions: high-attachment (HA), low-attachment (LA) or baseline (BL).

The primes were full sentences characterized by a complex noun phrase of the type NP1-of-NP2, containing two number-marked noun phrases, followed by the critical RC. The verb of the RC agreed in number with the host NP, and thus determined the attachment site of the RC: in HA primes, the verb of the relative clause agreed in number with the first host NP, thus the RC was attached high, whereas in LA primes, the verb agreed in number with the second host NP, hence the RC was attached low. BL prime sentences differed from HA and LA primes in that they did not contain a RC, rather the relative pronoun was replaced by a temporal or causal connective, consequently they were unlikely to influence RC attachment decisions in the target trials, but rather they informed us of the participants' baseline RC attachment preference.

The target sentence fragments, on the other hand, were unconstrained with respect to RC attachment: they were globally ambiguous, as they allowed both HA and LA. Each target fragment consisted of a subject, followed by a finite verb, a complex noun phrase containing two number-marked noun phrases such that a singular NP was always contrasted with a plural NP, and the beginning of a RC represented by a relative pronoun “*che*” which is ambiguous for number and gender. (23) depicts an example of the target fragments used. The target sentences were semantically and conceptually unrelated to the primes they were preceded by.

(23) a. HA Forced Prime

Il commentatore sportivo ha elogiato la difesa dei calciatori che ha decretato la vittoria decisiva del team.

The sports commentator praised the defense [sing] of the footballers [plur] that ensured [sing] a decisive victory to the team.

b. LA Forced Prime

Il commentatore sportivo ha elogiato la difesa dei calciatori che hanno abilmente contrastato gli avversari.

The sports commentator praised the defence [sing] of the footballers [plur] that ably contrasted [plur] their opponents.

c. BL Forced Prime

Il commentatore sportivo ha elogiato la difesa dei calciatori alla fine della partita contro la Juventus.

The sports commentator praised the defence [sing] of the footballers [plur] at the end of the match against Juventus.

d. Target Sentence

The owner repaired the door of the residents that...

The experimental items were an adaptation of Scheepers' (2003) items (his Experiment 2). Some of the items were translated from German into Italian and adapted in a way that the critical host NPs within the complex noun phrase differed in number from each other, since Scheepers used gender-marking to disambiguate RC attachment site, while we used noun-verb number agreement. On the other hand, some of the items were changed such that we could manipulate the animacy of the NPs, in order to prevent that their characteristics could affect attachment decisions. This choice was made as a result of the initial pilot data we gathered for the sentence completion task we conducted in order to investigate RC attachment preferences in Italian (presented in Chapter 2), which was characterized by a strong bias towards LA. Thence, as a means to reduce this bias we decided to organize the experimental items in a way that in half of the target fragments NP1 and NP2 had the same animacy (i.e., they were either both animate, or both inanimate), in the other half NP1 and NP2 had opposite animacy (i.e., in one quarter of the items NP1 was animate and NP2 was inanimate, in another quarter NP1 was inanimate and NP2 was animate). The full set of experimental items that were used can be found in Appendix C.

3.2.3. Procedure

The 24 prime-target pairs were allotted to three lists so that each item appeared exactly once in every list in one of the three conditions, and therefore each list contained eight items per condition. There was an equal number of experimental items with a singular NP1 and a plural NP2, and experimental items with a plural NP1 and a singular

NP2. Consequently, one quarter of the prime and target sentences had singular NP1 and plural NP2, the second quarter had plural NP1 and singular NP2, and the same division was repeated in the second half of the items. Additionally, 51 filler sentences were included, which were semantically and structurally unrelated to the experimental items, as they did not include RCs. The order of items was pseudo-random, but subject to the constraint that there were five fillers at the beginning of each list, and that each experimental prime-target pair was preceded by two fillers.

The participants were sent an instruction email with a URL link to the Macmillan Straightforward Quick Placement & Diagnostic test and were then redirected to the Bilingual Speaker Language Profile Questionnaire. After at least 24 hours after completing the test and the questionnaire, participants were sent another email with a link to the experiment's consent form, administered through Qualtrics (the full consent form can be found in Appendix D). Once they filled out the consent form, they were automatically redirected to the experiment, which was constructed using Psychopy3 and run remotely through the Pavlovia platform. As the trial started, participants were given detailed instructions on how to complete the experiment. Examples were also provided, in order to ensure the instructions were clear and participants understood what was being asked of them. They were instructed to read aloud the full sentences they were presented with, and to complete the sentence fragments with the first continuation that came to mind, whilst still producing grammatically correct and plausible sentences. Each prime sentence and target fragment was displayed one at a time, on a single line, and participants could go through them once they were done reading or completing the sentences pressing the button <ENTER> on their keyboards. The experiment took approximately 20-30 minutes to complete.

3.2.4. Scoring

The participants' responses were coded according to two coding schemes, strict coding and lax coding. The attachment of the target relative clause was disambiguated by means of number agreement between the verb of the RC and the host NP. Thus, within the strict coding scheme, responses were coded as either 'strict high attachment' (i.e., the verb of the target RC agreed in number with NP1) or 'strict low attachment' (i.e., the verb of the target RC agreed in number with NP2). In the analysis we took into consideration

subject-RCs, in which the relative pronoun acts as the subject of the resulting RC, as in (24), as well as object-RCs, in which the relative pronoun acts as the object of the resulting RC, as in (25) and (26). For instance, the object-RC in (25) was coded as ‘strict low attachment’, while the object-RC in (26) was coded as ‘strict high attachment’.

- (24) The scholar investigated the language of the communities that...have lived in this area for the past decade.
- (25) We visited the dogs of the rescue centre that...Maria told me about.
- (26) The president met the representative of the state guests that...he invited for the ceremony.

The responses were coded as ‘strict other’ in case of: target completions that left the attachment site ambiguous between HA and LA interpretations, as in (27) and (28); completions that semantically suggested a different attachment site than verb number did, as in (29) and (30); RCs that were attached to the subject of the sentence instead of one of the NPs, as a consequence of a misinterpretation of the target fragments, as in (31) and (32); and unrelated responses as in (33).

- (27) The coach talked to the players of the team that...lost the last five games of the season.
- (28) Klara visited the students of the piano teacher that...she met once.
- (29) Amnesty International denounced the condition of the immigrants that...were critical and problematic.
- (30) The police arrested the suspect of the murders that...were trying to escape the country.
- (31) The committee reported the source of the donations that...the vaccine is ready.
- (32) The lecturer spoke to the participants of the seminar that...is important to attend all the scheduled dates.
- (33) We were amused about the articles of the newspaper that...enjoying life.

However, some of these target completions were included within the lax coding scheme. Indeed, when number marking on the RC verb could not be used to determine the relevant target attachment, we relied on plausibility criteria. Therefore, (29) and (30) were coded as ‘lax high attachment’ as it seems likely that participants misinterpreted the number marking on NP1, consequently the resulting target completion agrees in number with NP2, yet it is conceptually attached high to NP1. Indeed, the intended meaning the subjects of the experiment wanted to convey was that “the condition of the immigrants was critical and problematic” in (29), and that “the suspect of the murders was trying to escape the country” in (30). The remaining responses where neither number agreement nor plausibility could disambiguate the attachment of the target RCs, including (27), (28), (31), (32) and (33), were coded as ‘lax other’.

3.3. Results

The proportions of high attachment and low attachment responses as a function of prime type per the strict coding scheme are listed in Table 5. Descriptively, the data show a significant syntactic priming effect as the number of HA responses was 14% higher after a HA prime (51%) compared to the number of HA responses after a LA prime (37%). With respect to the baseline condition, the difference with the HA condition (HA-BL) and the LA condition (LA-BL) were both significant. Indeed, the number of HA responses was 5% higher after a HA prime (51%) than following a BL prime (46%), while the number of LA responses was 9% higher after a LA prime (63%) than following a BL prime (54%). Overall, participants produced more LA target completions (55%) than HA target completions (45%).

Table 5

*Numbers of Strict High Attachment and Low Attachment target completions (columns)
by levels of prime type (rows)*

	HA target	LA target
HA prime	327 (51%)	313 (49%)
LA prime	240 (37%)	403 (63%)
BL prime	303 (46%)	350 (54%)
<i>Total</i>	<i>870 (45%)</i>	<i>1066 (55%)</i>

Table 6 shows the proportions of high attachment and low attachment responses as a function of prime type and participants' CEFR self-rated level. The data show a significant syntactic priming effect at all levels of proficiency in L2 English. Participants that self-rated their proficiency as B1 produced a number of HA responses that was 7% higher after a HA prime (52%) compared to the number of HA responses after a LA prime (45%). At the B2 level, the number of HA target completions was 13% higher after a HA prime (51%) than following a LA prime (39%). At the highest level of proficiency, C1, participants produced 17% more HA responses when they were primed with HA sentence (50%) compared to when they were primed with a LA sentence (33%).

As regards the baseline condition, at the B1 and B2 self-rated CEFR level, the difference between the HA condition and the BL condition was not significant (respectively 2% for the former group and 1% for the latter group), whereas the difference between the LA condition and the BL condition gave a significant result (5% and 11%). On the other hand, at the C1 level the difference between the HA condition and the BL condition (8%), and the difference between the LA condition and the BL condition (9%) were both significant.

Table 6
Numbers of *High Attachment and Low Attachment target completions by levels of prime type and CEFR self-rated level*

CEFR	HA target	LA target
B1		
HA prime	69 (52%)	63 (48%)
LA prime	59 (45%)	73 (55%)
BL prime	67 (50%)	67 (50%)
<i>B1 Total</i>	<i>195 (49%)</i>	<i>203 (51%)</i>
B2		
HA prime	114 (51%)	108 (49%)
LA prime	86 (39%)	136 (61%)
BL prime	112 (50%)	112 (50%)
<i>B2 Total</i>	<i>312 (47%)</i>	<i>356 (53%)</i>
C1		
HA prime	144 (50%)	142 (49%)
LA prime	95 (33%)	194 (67%)
BL prime	124 (42%)	171 (58%)
<i>C1 Total</i>	<i>363 (42%)</i>	<i>507 (58%)</i>

The data were then analysed using logistic mixed-effects models in the lme4 package in R (Bates, 2010). The results of this analysis are shown in Table 7. We examined the effects of prime type (LA/HA/BL) and included English language proficiency as a continuous covariate. The analysis used the maximal random effects structure appropriate for our experimental design (Barr et al., 2013), which included random intercepts for participants and items, and random slopes for prime structure for participants and items. As predicted, the experiment showed significant main effects of prime structure with regards to LA responses produced after LA primes vs. HA primes (59%, SD = 0.19, SE = 0.02, CI = 0.04 vs. 46%, SD = 0.21, SE = 0.02, CI = 0.04), however this was not true for the production of LA responses when primed with LA compared to BL (59%, SD = 0.19, SE = 0.02, CI = 0.04 vs. 50%, SD = 0.21, SE = 0.02, CI = 0.04). The significant main effect of prime type indicated that on average participants produced more LA sentences when primed with a LA prime, than when primed with a HA prime. On the other hand, participants did not produce significantly more LA sentences when primed with a LA prime, than when primed with a BL prime. There was a main effect of English language proficiency, however there was no interaction between Proficiency and the different prime types, indicating that the strength of the priming effect did not increase as a function of participants' English language proficiency, yet the latter did modulate their production of LA responses. Indeed, at higher levels of proficiency participants produced significantly more LA target completions, than at lower levels of proficiency. Moreover, the *p* value of the intercept was not significant, revealing that overall there was no clear bias towards one of the response alternatives, HA or LA.

Table 7
Summary of the fixed effects in the logistic mixed-effects model

Predictor	Coefficient	SE	Wald Z	<i>p</i>
Intercept	0.13	0.24	0.55	n.s.
Prime type 1 (HA vs. LA)	-0,29	0.09	-3,14	<.001
Prime type 2 (BL vs. LA)	-0,02	0.09	-0,24	n.s.
Proficiency	0.28	0.09	2.99	<.001
Prime type 1 x Proficiency	-0,01	0.08	-0,21	n.s.
Prime type 2 x Proficiency	0.06	0.08	0.77	n.s.

Figure 6 and 7 show the probability of producing respectively a HA target completion and a LA target completion as a function of prime type. We can observe a main effect of prime type, as participants produced significantly more HA responses after a HA prime and more LA responses after a LA prime, compared to the proportion of HA and LA responses produced following the other two priming conditions.

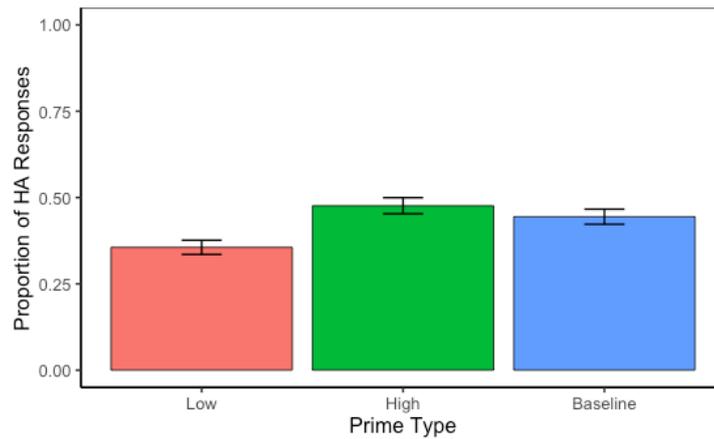


Figure 6. Main effect of prime type on the proportion of HA responses

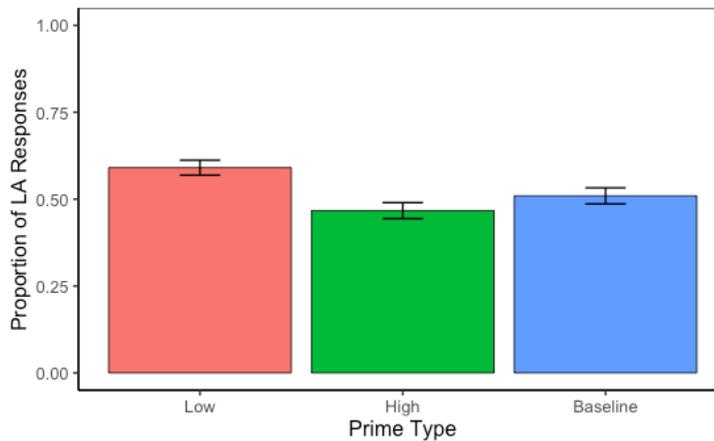


Figure 7. Main effect of prime type on the proportion of LA responses

Additionally, we analysed the data using another variable: second language proficiency. In order to rate the participants' second language proficiency, they were

asked to: i. self-rate their English proficiency level according to the Common European Framework of Reference; ii. rate their English ability, namely how well they speak, read, write and understand English on a scale of 1 (not well at all) to 7 (extremely well); iii. complete the Macmillan Straightforward Quick Placement & Diagnostic test. Therefore, we calculated the correlation coefficient between the participants' score to the Macmillan test and their mean English ability score so as to determine the degree of association between the two variables. The resulting correlation coefficient was high (0.72). Therefore, a new composite variable of proficiency was created, calculating the mean of the z-score related to the participants' mean English ability score, and the z-score of their Macmillan score.

As a result, we present the data in two ways: according to participants' self-rated CEFR level, as well as according to their composite score of proficiency. Hence, in the former case we use a subjective measure, according to which participants are divided in three groups (i.e., B1, B2, C1), in the latter case participants' English proficiency is represented on a continuum, using a composite score of a subjective measure (i.e., their mean English ability score) and an objective measure of proficiency (i.e., their Macmillan score).

Figure 8 and 9 both predict the proportion of HA responses as a function of prime type and second language proficiency. In Figure 8 the data is presented according to participants' self-rated CEFR level, in Figure 9 their English proficiency is represented on a continuum, using their composite score of proficiency. As can be observed, while there is a main effect of prime type, in that the proportion of HA responses is significantly higher after HA primes than after LA and BL primes, on the other hand there is no main effect of proficiency, as HA primes seem to be equally effective in priming HA responses at all levels of proficiency. In other words, there is no significant interaction between the cross-linguistic syntactic priming of HA responses and second language proficiency.

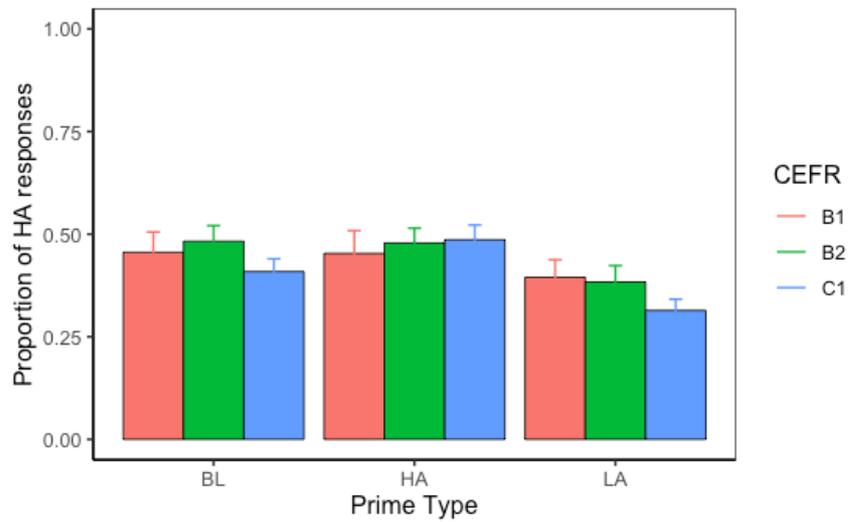


Figure 8. *Proportion of HA responses as a function of prime type and CEFR self-rated level*

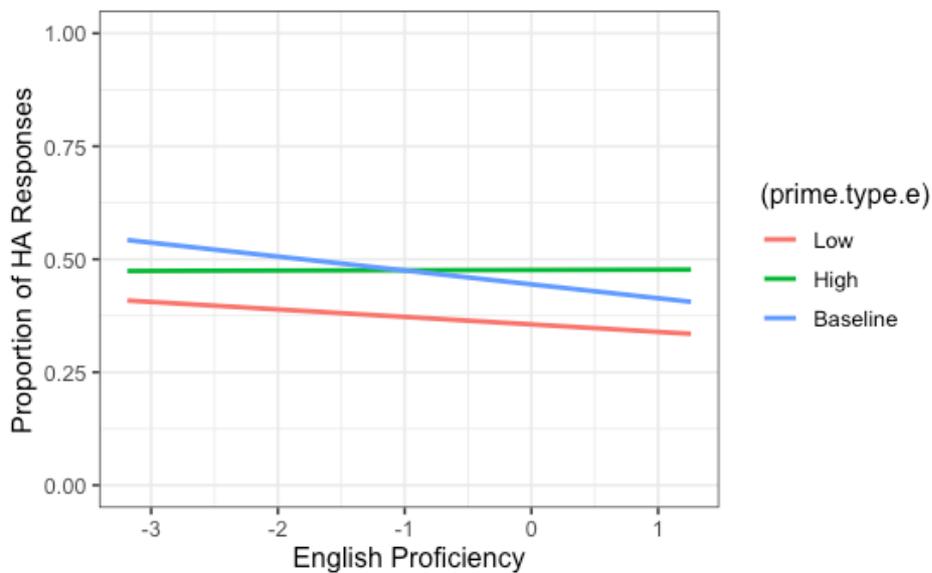


Figure 9. *Proportion of HA responses as a function of prime type and English proficiency*

Similarly, Figure 10 and 11 both predict the proportion of LA responses as a function of prime type and second language proficiency. In Figure 10 the data is presented once again according to participants' self-rated CEFR level, while in Figure 11 their English proficiency is represented on a continuum, using their composite score of proficiency. Contrary to HA responses, when we look at LA responses not only do we observe a main effect of prime type, but we also see a main effect of proficiency. However, second language proficiency does not interact with the different prime types,

as it appears to modulate the production of LA responses overall. Consequently, as participants' proficiency increases, the proportion of LA responses is significantly higher not only after LA primes but after HA and BL primes as well.

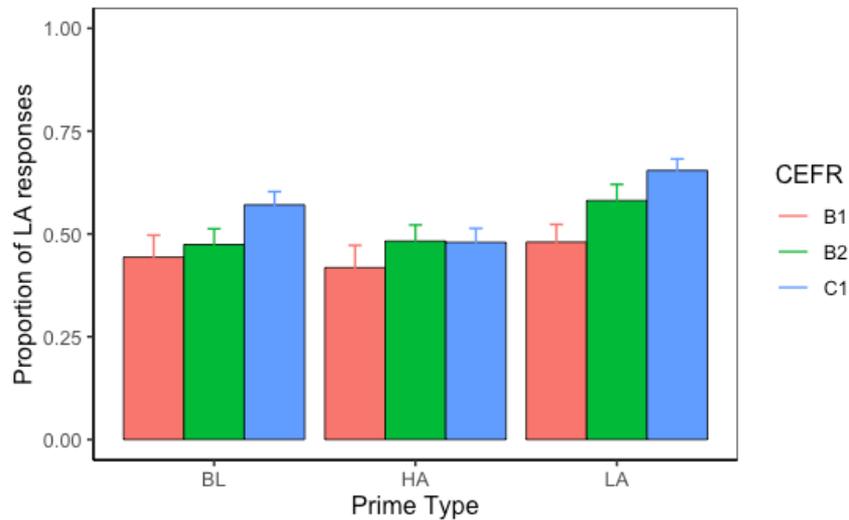


Figure 10. *Proportion of LA responses as a function of prime type and CEFR self-rated level*

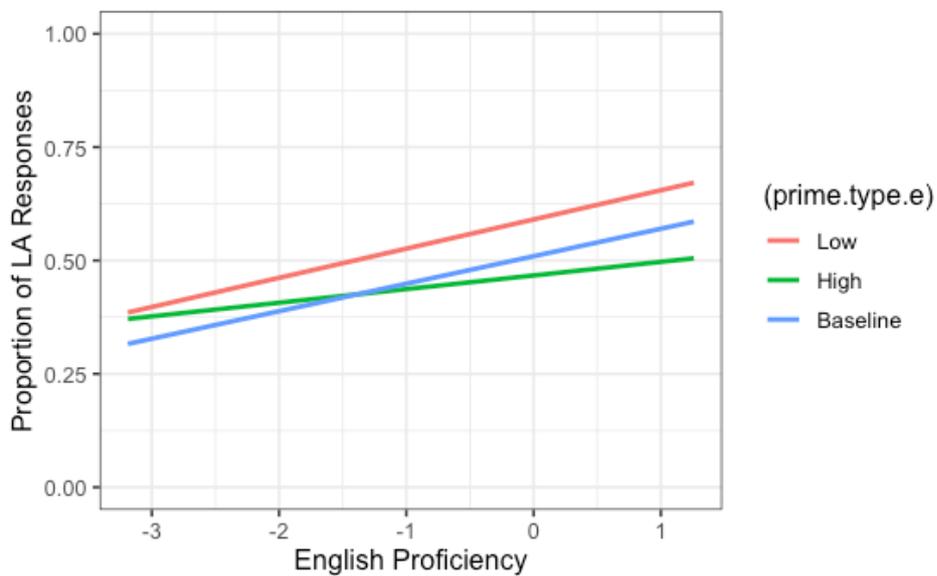


Figure 11. *Proportion of HA responses as a function of prime type and English proficiency*

Another interesting pattern is revealed by the analysis of the participants' responses following BL primes. If we look at Figure 9 above, we notice that at lower levels of proficiency participants produce more HA responses after BL primes, and the production

of HA target completions progressively decreases as participants become more proficient in English. However, in Figure 11 the proportion of LA responses after BL primes shows the opposite trend and an even more striking difference related to participants' second language proficiency, with higher levels of proficiency producing significantly more LA responses than lower levels of proficiency. In this case the production of LA target completions strongly increases together with second language proficiency.

This result is consistent with Frenck-Mestre (1997, 2002) in that it suggests that low proficient Italian-English bilinguals are influenced by syntactic processing strategies derived from their L1, while high proficient Italian-English bilinguals are influenced by native-like processing strategies. Indeed, at lower levels of second language proficiency Italian-English bilinguals prefer to attach the RC to NP1 because they are influenced by their native language, Italian, which is a HA language, on the other hand at higher levels of proficiency Italian-English bilinguals prefer to attach the RC to NP2, showing the same pattern of ambiguity resolution as native speakers of English, a language with a clear preference for LA.

3.4. Discussion

In this chapter we aimed at investigating whether the syntactic representations and mechanisms involved in RC attachment are shared across the languages of Italian-English bilinguals, or whether they are kept strictly separated instead. To this end, we used the syntactic priming methodology to ascertain whether the attachments of relative clauses in an NP-of-NP-RC sequence are susceptible to cross-linguistic structural priming from Italian (the participants' L1) to English (their L2). Previous studies demonstrated both within-language priming of RC attachments (Scheepers, 2003), as well as between-language priming of this syntactic information (Desmet & Declercq, 2006; Hartsuiker et al., 2016).

Following the line of the abovementioned studies, we conducted a cross-linguistic syntactic priming experiment with Italian-English late bilinguals using a sentence completion paradigm, in which prime sentences forced either high or low attachment of the RC, whereas target sentences were unconstrained with respect to RC attachment. However, we followed a different structural priming paradigm, as we investigated

comprehension-to-production priming, rather than production-to-production priming. Thus, the primes were full sentences that participants were instructed to read aloud, while they were asked to provide written continuations for target fragments. We used noun-verb number agreement to disambiguate RC attachment site, similarly to Hartsuiker et al. (2016). According to our predictions, relative clause attachments would be subject to cross-linguistic priming from Italian to English in native Italian speakers, and additionally we hypothesized that the strength of priming would increase as a function of second language proficiency.

The data were analyzed both descriptively and statistically, using logistic mixed-effects models in R. We observed a main effect of prime type as the proportion of HA responses was significantly higher after a HA prime, than after a LA or BL prime, and similarly the proportion of LA responses was significantly higher after a LA prime, than after a HA or BL prime.

On the other hand, we observed a main effect of proficiency only when we analyzed LA responses, as the production of LA responses strongly increased as a function of participants' English proficiency. Yet, second language proficiency did not modulate the cross-linguistic priming of LA responses, as at higher levels of English proficiency, the proportion of LA responses was significantly higher not only after LA primes, but across each of the three priming conditions. Conversely, the proportion of HA responses did not reveal a main effect of proficiency, in that participants were primed similarly by HA primes across proficiency levels.

The analysis of the participants' responses after BL primes revealed another interesting pattern, as we observed that the proportion of HA target completions progressively decreased as participants became more proficient in English, conversely the production of LA target completions strongly increased together with second language proficiency. Taken together these results are consistent with the hypotheses proposed by Frenck-Mestre (1997, 2002): according to the Transfer hypothesis, low proficient bilinguals are influenced by syntactic processing strategies derived from their L1, while according to the Learning hypothesis, high proficient bilinguals show a pattern of ambiguity resolution in their L2 which is highly similar to that of monolingual speakers of that language. Our results are in line with this evolution of processing strategies with experience proposed by Frenck-Mestre, as at lower levels of second language proficiency

Italian-English bilinguals preferred to attach the RC to NP1, in that they transferred their processing strategies from their L1, which is a HA language, whereas at higher levels of proficiency Italian-English bilinguals preferred to attach the RC to NP2, because they acquired native-like processing strategies, namely they processed this ambiguity akin to native speakers of English, a LA language.

CONCLUSIONS

The study presented in this thesis had the purpose of contributing to the understanding of how late bilinguals represent and process syntax in their minds, attempting to grasp whether they share syntactic representations across languages or whether they have separate syntactic representations for each language in bilingual memory. Specifically, we investigated the cross-linguistic syntactic priming of RC attachments in Italian-English late bilinguals, with different levels of second language proficiency.

A vast body of literature has shown that the preferred attachment of the RC varies cross-linguistically, implying that language parsing may not be guided by universal principles but language-specific strategies. While much of the literature on RC attachment preferences has focused on presumed between-language differences in the interpretation of RCs, suggesting the existence of fundamental differences in their parsing preferences, other approaches have highlighted the similarities across languages, showing that cross-linguistic differences are limited in scope, and they are often due to properties of the languages' grammar. Several models of sentence processing have been proposed in order to account for the parsing strategies responsible for the resolution of syntactic ambiguity in RC attachments, yet they failed to offer a satisfactory and comprehensive explanation for this complex pattern of variation. Interestingly, Grillo and Costa (2014) proposed a new argument in favor of locality as the universal parsing principle governing the human language parser, according to which the apparent cross-linguistic variation in RC attachment preferences is to be ascribed to the asymmetric availability of pseudo relatives across languages and structures.

RC attachment preferences in Italian were established in two studies, discussed in Chapter 2. The first of these studies was a sentence completion task, in which we collected the attachment decisions of native speakers of Italian, on globally ambiguous materials in which RCs could be attached to either one of the potential host NPs. The results showed that participants had a tendency to attach RCs to NP2, which was at odds with previous studies that have found a high attachment preference in Italian (De Vincenzi and Job 1993,1995). However, we came to the conclusion that some experimental items may have

been semantically biased towards NP2 attachment, therefore we conducted a second study in which we replicated Grillo and Costa's (2014) experiment 2. Hence, in the RC interpretation task we investigated the effects of PR availability on RC attachment decisions, obtaining results that were consistent with the PR-first Hypothesis: participants produced significantly more HA responses when the target sentences contained PR-verbs (which allowed both PR and RC readings), and more LA responses when the target sentences contained nonPR-verbs (thus in the contexts in which the only available parse was a RC). These studies highlighted the necessity to carefully construct the linguistic materials used in the experiments designed to investigate the resolution of this type of syntactic ambiguity, both holding materials constant across languages and preventing PR readings. In these conditions, a low attachment preference could arise cross-linguistically, even in those languages in which PRs are a grammatical option, re-establishing the universality of locality principles in language parsing.

In our main experiment, through a cross-linguistic priming paradigm we investigated whether the syntactic representations and processing mechanisms involved in RC attachment are shared across the languages of Italian-English bilinguals, or whether they are kept strictly separated. The data were collected through a sentence completion task in which participants had to read aloud full prime sentences and had to complete target fragments, generating NP-of-NP-RC constructions. In the prime sentences the relative clause attachment site was disambiguated by means of noun-verb agreement: thus, in high attachment primes the verb of the relative clause agreed in number with the first host NP, while in low attachment primes the verb agreed in number with the second host NP. The target fragments were unconstrained with respect to RC attachment, as they allowed both high attachment and low attachment. According to our predictions, relative clause attachments would be subject to cross-linguistic priming from Italian to English in native Italian speakers, additionally we hypothesized that the strength of priming would increase as a function of second language proficiency. Consistently with our first hypothesis, we observed significant main effects of prime structure, suggesting that Italian-English late bilinguals do access an integrated representation of this type of syntactic information. On the other hand, contrary to our second prediction, the priming effect was not modulated by second language proficiency. However, despite the absence of interaction between Proficiency and the different prime types, we did observe a main effect of English

language proficiency when we analyzed LA responses, as the production of LA responses overall strongly increased as a function of participants' English proficiency. This finding revealed a clear evolution in speakers' processing strategies with experience: at lower levels of second language proficiency Italian-English bilinguals preferred high attachment, showing effects of transfer of processing strategies from their native language, while at higher levels of proficiency Italian-English bilinguals preferred low attachment, exhibiting a pattern of syntactic ambiguity resolution in their L2, which is highly similar to that of native speakers of English.

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APPENDICES

Appendix A

List of the experimental items used in our sentence completion task in which we investigated RC attachment preferences in Italian.

1. Il docente ha assistito gli studenti del collega che...
2. Il custode ha salutato la governante degli inquilini che...
3. Il direttore ha incontrato il capo degli impiegati che...
4. Martina ha accarezzato il cane dei vicini che...
5. Abbiamo studiato i seguaci del grande filosofo idealista che...
6. La giornalista ha intervistato i sostenitori del candidato alla presidenza che...
7. La polizia ha interrogato il sospettato degli omicidi che...
8. L'editore ha contattato l'autore dei romanzi che...
9. Il testimone ha riconosciuto i colpevoli del crimine che...
10. Il paziente ha consultato gli specialisti dell'ospedale che...
11. Il manager ha aspettato i musicisti della band che...
12. Il pompiere ha salvato gli inquilini dell'attico che...
13. L'assistente ha annunciato il punteggio dei candidati che...
14. L'esperto ha elogiato l'azienda dei giovani imprenditori che...
15. Il freddo ha distrutto il raccolto dei frutticoltori che...
16. Il commentatore sportivo ha elogiato la difesa dei calciatori che...
17. Il ricercatore ha studiato la lingua degli aborigeni che...
18. Abbiamo apprezzato gli articoli del giornalista che...
19. Hanno annunciato le nuove produzioni della compagnia teatrale che saranno...
20. I cittadini hanno criticato le normative del governo che impongono...
21. Mi hanno regalato i biglietti dello spettacolo che erano...
22. La guida turistica ha menzionato le campane della chiesa che risalgono...
23. La classifica della rivista Forbes è stata stilata in base al fatturato delle aziende che...
24. La professoressa di letteratura ci ha consigliato di leggere l'incipit dei romanzi che...

Appendix B

List of the experimental items used in our RC Interpretation Study.

- 1a. Gianni ha visto il figlio dell'amico che correva la maratona.
- 1b. Gianni vive con il figlio dell'amico che correva la maratona.
- 2a. Maria ha sentito la nonna della ragazza che gridava.
- 2b. Maria lavora con la nonna della ragazza che gridava.
- 3a. Pietro ha sentito il padre del ragazzo che cantava.

- 3b. Pietro si allena con il padre del ragazzo che cantava.
- 4a. Lo scrittore guardava la zia della ragazza che saltava.
- 4b. Lo scrittore ha sposato la zia della ragazza che saltava.
- 5a. Silvia ascoltava la figlia della segretaria che parlava.
- 5b. Silvia lavora per la figlia della segretaria che parlava.
- 6a. Paola osservava l'amico del vicino che cucinava.
- 6b. Paola è fidanzata con l'amico del vicino che cucinava.
- 7a. Mario ha sorpreso l'assistente dell'attrice che rubava.
- 7b. Mario è affezionato all'assistente dell'attrice che rubava.
- 8a. L'avvocato ha beccato l'autista del vicino che fumava.
- 8b. L'avvocato si esercita con l'autista del vicino che fumava.
- 9a. Lucia osserva il vicino del segretario che si allenava.
- 9b. Lucia è innamorata del vicino del segretario che si allenava.
- 10a. Giorgio guardava il nipote dell'infermiera che mangiava.
- 10b. Giorgio è imparentato col nipote dell'infermiera che mangiava.
- 11a. Carlo ha fotografato il collega dell'impiegato che rubava.
- 11b. Carlo odia il collega dell'impiegato che rubava.
- 12a. Sara ha visto il collega del fratello che guidava.
- 12b. Sara convive con il collega del fratello che guidava.
- 13a. Francesco immaginava l'amica dell'estetista che lavorava.
- 13b. Francesco cena con l'amica dell'estetista che lavorava.
- 14a. Rachele ha sognato l'amico del cugino che beveva.
- 14b. Rachele è sposata con l'amico del cugino che beveva.
- 15a. Ennio ha ritratto il fratello della donna che fumava.
- 15b. Ennio lavora per il fratello della donna che fumava.
- 16a. Filippo ha filmato l'agente del giocatore che russava.
- 16b. Filippo frequenta l'agente del giocatore che russava.
- 17a. Maria ha registrato il cugino dell'avvocato che parlava.
- 17b. Maria lavora per il cugino dell'avvocato che parlava.
- 18a. Roberta ha guardato l'amico del pizzaiolo che ballava.
- 18b. Roberta ama l'amico del pizzaiolo che ballava.
- 19a. Simona ha fotografato il vicino dell'infermiera che studiava.
- 19b. Simona collabora col vicino dell'infermiera che studiava.
- 20a. Michele guardava il fratello dell'amico che scalava.
- 20b. Michele studia col fratello dell'amico che scalava.
- 21a. Antonio ha filmato la sorella dell'amica che scriveva.
- 21b. Antonio ha sposato la sorella dell'amica che scriveva.
- 22a. Mario immaginava l'amica della collega che ballava.
- 22b. Mario lavora con l'amica della collega che ballava.
- 23a. Massimo ha visto la sorella dell'amica che guidava.
- 23b. Massimo esce con la sorella dell'amica che guidava.
- 24a. Anna ascoltava il figlio del vicino che cantava.
- 24b. Anna studia col figlio del vicino che cantava.

Appendix C

Appendix C contains the experimental items used in our cross-linguistic syntactic priming experiment.

List of the prime sentences for each of the three conditions (i.e., HA (a), LA (b), BL (c)):

- 1a. La polizia ha interrogato il sospettato degli omicidi che ha negato ogni responsabilità.
- 1b. La polizia ha interrogato il sospettato degli omicidi che hanno sconvolto l'opinione pubblica.
- 1c. La polizia ha interrogato il sospettato degli omicidi durante un interrogatorio durato più di 4 ore.
- 2a. L'assistente ha annunciato il punteggio dei candidati che risulta superiore alla soglia minima di 39,5.
- 2b. L'assistente ha annunciato il punteggio dei candidati che risultano vincitori del concorso.
- 2c. L'assistente ha annunciato il punteggio dei candidati per poter procedere alla seconda fase del concorso.
- 3a. L'editore ha contattato l'autore dei romanzi che è stato nominato al premio Nobel per la letteratura 2019.
- 3b. L'editore ha contattato l'autore dei romanzi che sono diventati dei successi internazionali.
- 3c. L'editore ha contattato l'autore dei romanzi prima della pubblicazione del nuovo libro.
- 4a. Martina ha accarezzato il cane dei vicini che vive nell'appartamento accanto al suo.
- 4b. Martina ha accarezzato il cane dei vicini che vivono nell'appartamento accanto al suo.
- 4c. Martina ha accarezzato il cane dei vicini quando è uscita sul pianerottolo.
- 5a. L'esperto ha elogiato l'azienda dei giovani imprenditori che ha ricevuto un premio per il suo impegno a favore della sostenibilità.
- 5b. L'esperto ha elogiato l'azienda dei giovani imprenditori che hanno creduto in questo progetto rischioso.
- 5c. L'esperto ha elogiato l'azienda dei giovani imprenditori nell'articolo pubblicato sul Corriere della Sera.
- 6a. Il freddo ha distrutto il raccolto dei frutticoltori che avrebbe costituito una buona parte delle loro entrate.
- 6b. Il freddo ha distrutto il raccolto dei frutticoltori che avevano lavorato ininterrottamente per mesi.
- 6c. Il freddo ha distrutto il raccolto dei frutticoltori durante l'inverno dell'anno scorso.
- 7a. Il docente ha assistito gli studenti del collega che avevano bisogno di un sostituto che li aiutasse.
- 7b. Il docente ha assistito gli studenti del collega che aveva preso un permesso per malattia.
- 7c. Il docente ha assistito gli studenti del collega per un periodo di oltre due mesi.

- 8a. Hanno annunciato le nuove produzioni della compagnia teatrale che hanno riscosso un gran successo l'anno scorso.
- 8b. Hanno annunciato le nuove produzioni della compagnia teatrale che ha riscosso un gran successo l'anno scorso.
- 8c. Hanno annunciato le nuove produzioni della compagnia teatrale prima dell'inizio dell'estate.
- 9a. I cittadini hanno criticato le normative del governo che impongono delle limitazioni agli spostamenti tra regioni.
- 9b. I cittadini hanno criticato le normative del governo che impone un aumento delle tasse.
- 9c. I cittadini hanno criticato le normative del governo durante le manifestazioni di piazza.
- 10a. La testimone ha riconosciuto i colpevoli del crimine che erano ricercati da diverse settimane.
- 10b. La testimone ha riconosciuto i colpevoli del crimine che era rimasto irrisolto fino a quel momento.
- 10c. La testimone ha riconosciuto i colpevoli del crimine nel corso dell'incontro con gli investigatori.
- 11a. La giornalista ha intervistato i sostenitori del candidato alla presidenza che hanno festeggiato la sua vittoria in piazza.
- 11b. La giornalista ha intervistato i sostenitori del candidato alla presidenza che ha ottenuto una vittoria schiacciante.
- 11c. La giornalista ha intervistato i sostenitori del candidato alla presidenza in seguito all'annuncio dell'esito delle elezioni.
- 12a. Mi hanno regalato i biglietti dello spettacolo che erano andati sold out nel giro di pochi giorni.
- 12b. Mi hanno regalato i biglietti dello spettacolo che era andato in scena al San Carlo lo scorso anno.
- 12c. Mi hanno regalato i biglietti dello spettacolo in occasione del mio compleanno.
- 13a. La custode ha salutato la governante degli inquilini che abita con loro al primo piano.
- 13b. La custode ha salutato la governante degli inquilini che abitano al terzo piano.
- 13c. La custode ha salutato la governante degli inquilini prima di uscire dal palazzo.
- 14a. Il commentatore sportivo ha elogiato la difesa dei calciatori che ha decretato la vittoria decisiva del team.
- 14c. Il commentatore sportivo ha elogiato la difesa dei calciatori che hanno abilmente contrastato gli avversari.
- 14d. Il commentatore sportivo ha elogiato la difesa dei calciatori alla fine della partita contro la Juventus.
- 15a. La professoressa di letteratura ci ha consigliato di leggere l'incipit dei romanzi che è considerato l'elemento narrativo più importante.
- 15b. La professoressa di letteratura ci ha consigliato di leggere l'incipit dei romanzi che sono inclusi nei testi di riferimento per l'esame.
- 15c. La professoressa di letteratura ci ha consigliato di leggere l'incipit dei romanzi per introdurre l'argomento della prossima lezione.
- 16a. La ricercatrice ha studiato la lingua degli aborigeni che è parte della famiglia delle lingue pama-nyunga.

- 16b. La ricercatrice ha studiato la lingua degli aborigeni che sono isolati in un'area remota dell'Australia rurale.
- 16c. La ricercatrice ha studiato la lingua degli aborigeni prima del suo soggiorno presso la tribù dei Martu dell'Australia occidentale.
- 17a. La classifica della rivista Forbes è stata stilata in base al fatturato delle aziende che ha avuto il maggior incremento rispetto allo scorso anno.
- 17b. La classifica della rivista Forbes è stata stilata in base al fatturato delle aziende che hanno più valore sul mercato.
- 17c. La classifica della rivista Forbes è stata stilata in base al fatturato delle aziende durante il biennio 2017-2018.
- 18a. La direttrice ha incontrato il capo degli impiegati che ha richiesto un aumento di stipendio.
- 18b. La direttrice ha incontrato il capo degli impiegati che hanno scioperato per il mancato pagamento degli stipendi.
- 18c. La direttrice ha incontrato il capo degli impiegati durante il meeting settimanale.
- 19a. Abbiamo apprezzato gli articoli del giornalista che denunciano la disparità di genere nel mondo del lavoro.
- 19b. Abbiamo apprezzato gli articoli del giornalista che denuncia la precaria situazione sanitaria in Italia.
- 19c. Abbiamo apprezzato gli articoli del giornalista per lo stile chiaro ed efficace.
- 20a. Abbiamo studiato i seguaci del grande filoso idealista che hanno portato avanti la sua dottrina.
- 20b. Abbiamo studiato i seguaci del grande filoso idealista che ha dato un grandissimo contributo alla disciplina.
- 20c. Abbiamo studiato i seguaci del grande filoso idealista prima della fine del quadrimestre.
- 21a. La paziente ha consultato gli specialisti dell'ospedale che sono considerati tra i migliori in ambito cardiologico.
- 21b. La paziente ha consultato gli specialisti dell'ospedale che è considerato un'eccellenza in Italia.
- 21c. La paziente ha consultato gli specialisti dell'ospedale quando le è stata diagnosticata la malattia.
- 22a. La guida turistica ha menzionato le campane della chiesa che risalgono al XVI secolo.
- 22b. La guida turistica ha menzionato le campane della chiesa che risale al XVI secolo.
- 22c. La guida turistica ha menzionato le campane della chiesa durante il tour guidato.
- 23a. Il manager ha aspettato i musicisti della band che si stavano cambiando in camerino.
- 23b. Il manager ha aspettato i musicisti della band che si stava esibendo in un locale.
- 23c. Il manager ha aspettato i musicisti della band prima di dirigersi verso il teatro.
- 24a. Il pompiere ha salvato gli inquilini dell'attico che erano rimasti bloccati in ascensore.
- 24b. Il pompiere ha salvato gli inquilini dell'attico che era andato in fiamme.
- 24c. Il pompiere ha salvato gli inquilini dell'attico nonostante sembrasse impossibile poter intervenire a causa delle fiamme.

List of the target sentences used in the cross-linguistic syntactic priming experiment:

1. The committee reported the source of the donations that
2. Amnesty International denounced the condition of the immigrants that
3. The social worker greeted the nurse of the patients that
4. The scholar investigated the language of the communities that
5. The pensioner complained about the content of the fliers that
6. The president met the representative of the state guests that
7. We were amused about the articles of the newspaper that
8. The coach talked to the players of the team that
9. The farmer fed the puppies of the dog that
10. Klara visited the students of the piano teacher that
11. They fired the workers of the factory that
12. The expert called the help desk of the companies that
13. The theatre sold all the tickets of the play that
14. The owner repaired the door of the residents that
15. The cardinal criticized the policy of the politicians that
16. The police arrested the suspect of the murders that
17. Francesca corrected the manuscripts of the publisher that
18. Daniel smiled at the children of the secretary that
19. The boss praised the work of the employees that
20. The flight attendant greeted the passengers of the flight that
21. We visited the dogs of the rescue center that
22. I attended the classes of the professor that
23. The teacher met the parents of the child that
24. The lecturer spoke to the participants of the seminar that

Appendix D

Consent Form

Modulo per l'espressione del consenso informato:

Cross-linguistic structural priming of relative clause attachment in Italian-English late bilinguals

Gentile partecipante,

Il presente studio è condotto dalla studentessa Daniela Errichiello sotto la supervisione della Professoressa Giulia Bencini, del Dipartimento di Studi Linguistici e Culturali Comparati dell'Università Ca' Foscari di Venezia sulla piattaforma online Pavlovia.org. Accettando questo modulo, esprime il suo consenso alla partecipazione allo studio e alle attività in esso incluse.

La partecipazione a questo studio è volontaria e potrà decidere di abbandonarlo in qualsiasi momento senza alcun tipo di conseguenza negativa.

Lo studio e i moduli che ti viene chiesto di compilare hanno ricevuto l'approvazione della Commissione Etica di Ateneo in data 05.02.2020, verbale n. 1/2020 (per ulteriori informazioni: commissione.etica@unive.it).

Il presente studio è rivolto soggetti di età superiore a 18 anni, madrelingua italiani e apprendenti inglese L2 con diversi livelli di competenza. L'interesse principale è quello di indagare la rappresentazione linguistica di strutture sintattiche appartenenti alle lingue di competenza del parlante. Nello specifico, lo studio si propone di contribuire alla ricerca psicolinguistica nell'ambito del bilinguismo. Le attività proposte consistono nella presentazione di frasi in italiano e in inglese, da leggere ad alta voce, e la presentazione di frammenti di frasi da completare in lingua inglese. Infine, potremmo chiederle di compilare il Macmillan Quick English Placement Test, insieme a un breve questionario inerente al suo profilo linguistico, background familiare e percorso educativo, al fine di attestare il suo livello di competenza nella lingua inglese.

Informativa sul trattamento dei dati nell'ambito del progetto:

Shall I take the high node? Cross-linguistic structural priming of relative clause attachment in Italian-English late bilinguals

ai sensi dell'art.13 del Regolamento UE 2016/679 (“Regolamento”)

Con il presente documento, l'Università Ca' Foscari Venezia (“Università”) le fornisce informazioni in merito al trattamento dei dati personali raccolti all'interno del progetto di tesi/ denominato: “Shall I take the high node? Cross-linguistic structural priming of relative clause attachment in Italian-English late bilinguals”, che si prefigge di indagare la rappresentazione di informazione sintattica da parte di parlanti bilingui di italiano L1 e di inglese L2, ed è condotto dalla studentessa Daniela Errichiello e supervisionato dalla Professoressa Giulia Bencini. Ove necessitasse di ulteriori informazioni relative al progetto, la preghiamo di contattare il Principal Investigator scrivendo all'indirizzo di posta elettronica 877223@stud.unive.it.

Il progetto è stato redatto conformemente agli standard metodologici del settore disciplinare interessato ed è depositato presso il Dipartimento/Laboratorio BemboLab – Dipartimento di Studi Linguistici e Culturali Comparati dell'Università Ca' Foscari Venezia ove verrà conservato per cinque anni dalla conclusione programmata della ricerca stessa.

1. Titolare del Trattamento

Il Titolare del Trattamento è l'Università Ca' Foscari Venezia con sede legale in Dorsoduro 3246, 30123 Venezia, rappresentata dal Magnifico Rettore *pro tempore*.

2. Responsabile della Protezione dei Dati

L'Università Ca' Foscari ha nominato il "Responsabile della Protezione dei Dati", che può essere contattato scrivendo all'indirizzo di posta elettronica dpo@unive.it o al seguente indirizzo: Università Ca' Foscari Venezia, Responsabile della Protezione dei Dati, Dorsoduro 3246, 30123 Venezia (VE).

3. Categorie di Dati Personali, Finalità e Base Giuridica

Il trattamento ha ad oggetto i seguenti dati personali: dati anagrafici, dati di contatto, background linguistico e livello educativo del partecipante.

Il trattamento dei dati personali verrà effettuato con strumenti cartacei ed informatici, adottando misure tecniche e organizzative adeguate a proteggerli da accessi non autorizzati o illeciti, dalla distruzione, dalla perdita di integrità e riservatezza, anche accidentali.

Per la tutela della riservatezza dei partecipanti, i dati verranno successivamente privati dei riferimenti direttamente identificativi (ad es. nome e cognome, codice fiscale, etc.), in modo che non siano più immediatamente riconducibili al soggetto a cui si riferiscono, e analizzati ai soli fini della realizzazione del suddetto progetto.

Le attività di ricerca sono svolte nell'ambito dell'esecuzione delle finalità istituzionali di ricerca scientifica dell'Ateneo, pertanto la base giuridica è rappresentata dall'art. 6.1.e) del Regolamento ("esecuzione di un compito di interesse pubblico") e, con riferimento ai dati particolari, dall'art. 9.2.a) del Regolamento ("consenso esplicito dell'interessato"). Le verrà, pertanto, richiesto di esprimere il suo consenso alla raccolta e all'utilizzo dei predetti dati in calce al presente documento. Lei potrà revocare il suo consenso in qualsiasi momento senza subire alcun pregiudizio.

È possibile opporsi al predetto trattamento in qualsiasi momento, scrivendo al Responsabile della Protezione dei Dati personali ai recapiti sopra indicati. L'Ateneo si asterrà dal trattare ulteriormente i predetti dati personali salvo sussistano motivi cogenti che legittimino la prosecuzione dello stesso.

4. Tempi di Conservazione

I dati saranno conservati per la durata del progetto e successivamente per 5 anni. Potrebbero essere utilizzati per ulteriori progetti di ricerca.

5. Destinatari e Categorie di Destinatari dei Dati Personali

I dati raccolti saranno trattati dai ricercatori dell'Università e dai ricercatori impegnati nel progetto, che agiscono sulla base di specifiche istruzioni fornite in ordine alle finalità e modalità del trattamento medesimo, nonché da soggetti che forniscono servizi ausiliari all'Università nominati 'responsabili del trattamento'. La lista aggiornata dei responsabili del trattamento è disponibile alla pagina: <https://www.unive.it/pag/34666/>.

I dati, in forma aggregata ed anonima (in modo da non renderla identificabile), potranno inoltre essere comunicati ad altre Università o enti per lo svolgimento delle attività di ricerca e diffusi per attività di disseminazione dei risultati (ad es. in pubblicazioni, rapporti di ricerca, banche dati nonché citazioni durante lezioni, seminari e convegni). Potranno altresì esaminare tutta la documentazione (comprensiva dei dati identificativi dei partecipanti) raccolta nell'ambito del progetto sia organismi nazionali e internazionali sia comitati delle riviste scientifiche italiane e straniere al fine di controllare che la ricerca

sia condotta correttamente e in conformità alle disposizioni vigenti, nonché eventuali auditor.

6. Diritti dell'Interessato e Modalità di Esercizio

Lei potrà esercitare nei confronti dell'Università Ca' Foscari tutti i diritti previsti dagli artt. 15 e ss. Del Regolamento; in particolare, potrà ottenere: l'accesso ai dati personali, la loro rettifica o integrazione, la cancellazione (c.d. "diritto all'oblio"), la limitazione e l'opposizione del trattamento. La richiesta potrà essere presentata, senza alcuna formalità, contattando direttamente il Principal Investigator giulia.bencini@unive.it e/o il Responsabile della Protezione dei Dati all'indirizzo dpo@unive.it ovvero inviando una comunicazione al seguente recapito: Università Ca' Foscari Venezia – Responsabile della Protezione dei dati, Dorsoduro 3246, 30123 Venezia. In alternativa, è possibile contattare l'Università, scrivendo a PEC protocollo@pec.unive.it.

Inoltre, se ritiene che i dati personali siano stati trattati in violazione a quanto disposto dal Regolamento, potrà fare reclamo al Garante per la Protezione dei Dati Personali o adire le opportune sedi giudiziarie.

Contatti

Per qualsiasi domanda relativa alle procedure dello studio e per modificare/revocare il consenso alla partecipazione allo studio, ora o in futuro, può contattare:

- Supervisore della ricerca: Professoressa Giulia Bencini, tel. studio +39 041 234 7839, indirizzo email: giulia.bencini@unive.it
- Ricercatore/responsabile della raccolta dati: Studentessa Daniela Errichiello, indirizzo email: 877223@stud.unive.it
- Eventuali altri recapiti: Staff BemboLab. Email: bemboLab@unive.it, Telefono: 041/2345738 - 041/2345748

Consenso

Il/La sottoscritto/a _____ (inserire il numero ID)

dichiara

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Appendix E

Language profile questionnaire.

We would like to ask you to help us by answering the following questions concerning your language history, use, attitudes, and proficiency. This survey was created to better understand the profiles of L2 learners of English. The survey consists of 30 questions and will take less than 10 minutes to complete. The Language Profile Questionnaire was created referencing the Bilingual Language Profile: English-French created by Birdsong and colleagues at the University of Texas at Austin and the Language History Questionnaire created by the Language Acquisition Research Center at Hunter College CUNY.

This is not a test, so there are no right or wrong answers. Please answer every question to the best of your ability. You will have an opportunity to clarify and explain any of your responses regarding questions that were unclear or difficult to answer. Thank you very much for your help.

I. Biographical Information

Name _____ Date _____

Age _____ Male / Female / Other _____

Current place of residence: city/state _____ country _____

Country of origin: _____

If your country of origin is different than your country of residence, when did you move to the country where you currently live? _____

Highest level of formal education (your current or most recent education level, even if you have not finished the degree).

- Middle School
- High School
- College (BA/BS/Laurea Triennale)
- Graduate school (MA/MS/Laurea Magistrale)
- Graduate school (PhD/MD/JD)
- Other

II. Language history

In this section, please answer these questions about your language history.

1. Please list all the languages you know in order of dominance. If you are equally dominant in two languages, please pick an order for them.

2. At what age did you **start learning** English?
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
3. At what age did you **say your first English sentence**?
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
4. At what age did you **start feeling comfortable** using English?
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
5. How many years of **English language classes** have you had (preschool through university)?
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
6. How many years of **classes (science, history, math, etc.)** have you had in English (preschool through university)?
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
7. Please indicate the age at which you **started using English** in each of the following environments.

At home _____
 With friends _____
 At school _____
 At work _____
 Language learning software _____
 Online games _____
 Social media _____

8. If you have lived or traveled in countries where you used English for **three or more** months, please indicate the name of the country, the length of your stay, and how often you used English for each country, using the following scale.

Never	Rarely	Sometimes	Regularly	Often	Usually	Always
1	2	3	4	5	6	7

*You may have been to the country on multiple occasions, each for a different length of time. Add all the trips together.
 *Please indicate months or years

9. How much time have you spent in a **family or home environment** where English was spoken?
 Indicate months or years _____

10. How much time have you spent in a **work or school environment** where English is spoken?
 Indicate months or years _____

III. Language use

In this section, we would like you to answer some questions about your language use.

11. Please estimate how many hours you are **exposed to English** in an average week.

Indicate hours _____

12. Please estimate how many hours you **use English** in an average week.

Indicate hours _____

13. How often do you use English to speak to the following groups of people? Please enter the number in the table according to the scale below.

*Include significant others in this category if you did not include them as family members (e.g., married partners).

**Include anyone in the work environment in this category (e.g., if you are a teacher, include students as coworkers).

Never	Rarely	Sometimes	Regularly	Often	Usually	Always
1	2	3	4	5	6	7

Family members _____

Friends* _____

Classmates and/or Coworkers** _____

People on the internet _____

14. How often do you use English for the following activities? Please enter the number in the table according to the scale below.

Never	Rarely	Sometimes	Regularly	Often	Usually	Always
1	2	3	4	5	6	7

**This includes counting, calculating tips, etc.

***This includes telephone numbers, ID numbers, etc

Thinking _____

Talking to yourself _____

Dreaming _____

Arithmetic** _____

Remembering numbers*** _____

15. How often do you use English for the following activities? Please enter the number in the table according to the scale below.

Never	Rarely	Sometimes	Regularly	Often	Usually	Always
1	2	3	4	5	6	7

Expressing pain _____

Expressing frustration/cursing _____

Showing affection to others _____

Talking to pet/animals _____

16. How often are you engaged in the following activities in English?

Never	Rarely	Sometimes	Regularly	Often	Usually	Always
1	2	3	4	5	6	7

Entertainment (music, T.V., podcasts, etc.) _____

Writing for school/work _____

Reading for school/work _____

Reading for pleasure _____

Writing emails _____

IV. Language proficiency

In this section, we would like you to rate your language proficiency.

1 = not well at all 7 = extremely well

17. How well do you **speak** English? 1 2 3 4 5 6 7

18. How well do you **understand** English? 1 2 3 4 5 6 7

19. How well do you **read** in English? 1 2 3 4 5 6 7

20. How well do you **write** in English? 1 2 3 4 5 6 7

21. Using the CEFR, what would you **self-rate your level of English**, whether or not you have a certification? A1 A2 B1 B2 C1 C2

22. If you have taken any standardized language proficiency tests (e.g., TOEFL, IELTS, PET, FCE, CAE), please write the **name of each test**, the **date it was taken** and the **score** you received. If you do not remember the exact score, then indicate an "Approximate score" instead.

If you have not taken any proficiency tests, write 'none'.

V. Language attitudes

In this section, we would like you to respond to statements about language attitudes.

1 = Disagree 7 = Agree

23. I feel like myself when I speak English. 1 2 3 4 5 6 7

24. I identify with an English-speaking culture. 1 2 3 4 5 6 7

25. It is important to me to use (or eventually use) English like a native speaker. 1 2 3 4
5 6 7

26. I want others to think I am a native speaker of English. 1 2 3 4 5 6 7

27. Please choose the language you feel the **most comfortable** in when **listening, speaking, reading,** and **writing** in each of the contexts listed below

	Listening	Speaking	Reading	Writing
At home				
With friends				
At school				
At work				
On the Internet				
On social media				

28. Please rate your **language learning skill**. In other words, how good do you feel you are at learning new languages, relative to your friends or other people you know?

- Extremely bad
- Moderately bad
- Slightly bad
- Neither good nor bad
- Slightly good
- Moderately good
- Extremely good

29. Please comment below to indicate any additional answers to any of the questions above that you feel better describe your language background or usage.

30. Please comment below to provide any other information about your language use.
