SYNTACTIC PRIMING OF RELATIVE CLAUSE ATTACHMENT IN MONOLINGUAL
TURKISH SPEAKERS AND TURKISH LEARNERS OF ENGLISH

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ABSTRACT

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The purpose of this study is to investigate the syntactic priming of relative clause attachment in monolingual Turkish speakers and Turkish learners of English with different levels of proficiency in English. Turkish and English belong to typologically different groups of languages. Within the scope of this study, we investigate syntactic priming of relative clause attachments, which enables us to examine and compare the strategies employed for ambiguity resolution both in Turkish and English. The data was collected through offline (pen-and-paper), online (self-paced reading), and eye-tracking studies. The analysis of the data revealed important findings about the parsing strategies employed by both monolingual Turkish speakers and Turkish learners of English. The role of several confounding factors on RC attachment preferences was identified, such as the role of (i) animacy / inanimacy information embedded in the host NPs, (ii) semantic relations between the host NPs, (iii) the semantic associations of the host NPs with the proximal and the distal predicate, and (iv) active / passive RC condition. Furthermore, the relation between working memory capacity and RC attachment preferences was analysed. Overall, the results show that NP1 (high) attachment preference can be attributed to processing difficulty. Besides, effects of methodological issues, such as the presentation mode (i.e. full sentence or phrase-by-phrase), techniques (i.e. offline, online, or eye-tracking), task requirements (i.e. implicit processing or directed assessment of the syntactic structure in the prime) and modality(comprehension or production) were compared.

Keywords: Syntactic priming, relative clause attachments, ambiguity resolution, active and passive constructions, animacy information

ÖZ

ANA DİLİ TÜRKÇE OLAN TEK DİLLİ VE İNGİLİZCE ÖĞRENEN BİREYLERDE İLGİ TÜMCELERİNİN BAĞLANMASINDA SÖZDİZİMSEL HAZIRLAMA

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Bu çalışmanın amacı farklı seviyelerde İngilizce öğrenen ana dili Türkçe olan bireylerde ilgi tümcelerinin isim tamlamalarında tamlayan ya da tamlanan ile bağlanmasında yapısal hazırlama etkisini yalnızca Türkçe konuşan bireylerle kıyaslayarak incelemektir. Türkçe ve İngilizce tipolojik olarak farklı dil gruplarına aittir. Bu çalışma kapsamında her iki dilde ilgi tümcelerinin isim tamlamalarında tamlayan ya da tamlanana bağlanması ve yapısal hazırlama etkisi incelenmiştir. Gerekli veri oldukça geniş bir katılımcı grubundan, çevrimdışı (kağıt-kalem), çevrimiçi (kendi hızında okuma), ve göz izleme çalışmaları uygulanarak toplanmıştır. Veri analizi hem yalnızca Türkçe konuşan bireylerin hem de ana dili Türkçe olan İngilizce öğrenenlerin kullandıkları çözümleme stratejileri ile ilgili önemli bulgular sağlamıştır. İlgi tümcelerinde tamlayan ya da tamlanan tercihi üzerine etkisi bulunan pek çok etmen ortaya çıkmıştır. Bu çalışma şu etmenlerin rolüne değinmektedir: (i) tamlayan ve tamlanan isimlerde yer alan canlı / cansızlık bilgisi; (ii) tamlayan ve tamlanan isimler arasındaki anlamsal ilişki; (iii) tamlayan ve tamlanan isimlerin yakın ve uzak yüklem ile anlamsal ilişkisi; (iv) ilgi tümcelerinde etken ya da edilgen fiil kullanımı. Ayıca, işleyen bellek kapasitesi ve ilgi tümcelerinin tamlayan ya da tamlanan ile bağlanması arasındaki ilişkiye değinilmiştir. Özetle, ilgi tümcelerinin tamlanan ile bağlanması işlemleme zorluğu ile ilişkilendirilmiştir. Bunların dışında, yöntemsel etmenlerin, örneğin sunum şekli (örn. tüm cümle veya öbek öbek), teknik (örn. çevrimdışı,çevrimiçi, veya göz izleme çalışması), ve çalışma şartları (örn. örtülü işlemleme veya yönlendirilmiş değerlendirme; kavrama veya üretme) gibi, ilgi tümcelerinin tamlayan ya da tamlanan ile ilişkilendirilmesi üzerine etkileri olduğu görülmüştür. Konuyla ilgili daha fazla araştırma fikri tez sonunda belirtilmiştir.

Anahtar Sözcükler: Yapısal hazırlama, ilgi tümcelerinin bağlanması, belirsizlik çözümlemesi, etken ve edilgen yapılar, canlı ve cansız varlık isimleri

To my parents for all their love and support. I wouldn't have been able to get to this stage without them.

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3SG	3.person singular
ACC	Accusative
BA	Brodmann area
CEFR	Common European Framework of Reference
COP	Copula
CP	Complementizer phrase
DO	Direct object
DP	Determiner Phrase
ERP	Event related potential
fMRI	functional Magnetic Resonance Imagining
GEN	Genitive
IFG	Inferior frontal gyrus
IMPF	Imperfective aspect
IPH	Implicit Prosody Hypothesis
L1	First language
L2	Second language
LOC	Locative
NP	Noun phrase
NP1	High Attachment
NP2	Low Attachment
OPart	Object participle
PART	Participle
PASS	Passive
PAST	Past tense marker
pl	Plural
PO	Prepositional object
POSS	Possessive
PP	Prepositional phrase
prog	Progressive
Psych	Psychological (verb)
RC	Relative clause
SOV	Subject-Object-Verb
SPart	Subject participle
SVO	Subject-Verb-Object
VP	Verb phrase
WM	Working memory
WST	Word Span Test
TRST	Turkish Reading Span Test

CHAPTER 1

INTRODUCTION

Syntax represents a fascinating aspect of human faculty of language. Within the very first years of life, across a wide range of environments, children master this complex patterning of linguistic units and become competent users of their language. However, syntactic processing is still not exactly understood, especially how syntax of a second language is acquired, represented and processed in mind. People encounter more difficulties in syntactic processing as compared to semantics and lexicon while learning another language, especially after puberty (Caffara, et al. 2015). The question of how second language (L2) processing differs from first language (L1) is at issue, and the debates have been basically over two prominent views. One of them claims that the same mechanisms are used in both L1 and L2 processing, and differences could be attributed to L1 transfer or L2 processing being slower and cognitively demanding. As for the other, it suggests that parts of L2 processing do not function native-like and that L2 processing is more dependent on lexical memory and less on the procedural system compared to L1 processing (Kırkıcı and Clahsen, 2013).

Language comprehension requires language users to integrate several aspects of language. They need to have knowledge of syntactic category of words, recognize their meanings, analyse their morphological form, and establish syntactic, referential, and discourse-pragmatic relations between them (Hopp, 2014). Whereas L1 speakers implicitly achieve these tasks, the relevant literature suggests that L2 speakers do not rely on abstract hierarchical syntactic information, and that they make use of different strategies while processing their L2 (Clahsen & Felser, 2006). With this view, scientific interest in L2 research has also turned to online language comprehension in the recent years (Rah, 2009).

Many studies have investigated sentence processing in L1, and several models of sentence processing have been already put forth in order to explain the strategies we might be using in syntactic ambiguity resolution. The models differed in their assumptions about the universality of the parser and the underlying mechanisms working in the initial analysis, the sources of information used in sentence processing. Five types of models are mentioned in Chapter 2 in further detail. These include: (i) universal sentence processing models, (ii) parameterised models of parsing, (iii) experience-based models of sentence processing, (iv) prosody-based model of sentence processing, and (v) the Unrestricted Race model. Briefly, universal sentence processing models propose that there is a universal parser, and that the parser goes through a serial processing (i.e. two-stage) and makes an initial analysis by making use of syntactic clues (Frazier & Fodor, 1978; Frazier & Clifton, 1996). Parameterised models of parsing, on the other hand, argue that there is no universal parser, that parsing strategies might vary depending on parameter settings available (Cuetos & Mitchell, 1988; Gibson et al., 1996; Hemfort et al., 1998). Experienced-based models suggest that parsing decisions are based on frequency information, and that the parser does not rely heavily on syntactic information (Mitchell et al., 1995; MacDonald et al., 1994; Thornton et al., 1998, 1999). Unlike the previous models of sentence processing, The Implicit Prosody Hypothesis (Fodor, 1998) proposes that sentence processing is guided by prosodic information. Lastly, the Unrestricted Race model by van Gompel, Pickering &

Traxler (2000) argues against the assumptions of the previous models, and suggests that multiple sources of information are employed at the initial analysis. Even though all these models aim to explain L1 sentence processing, there seems to be no single model that can completely explain the issue. L2 sentence processing, in this sense, could be regarded as more complicated. L1 and L2 processing might differ in several ways. L2 learners' restricted access to syntactic representations, lack of essential processing strategies, or limited processing capacity could account for the difficulties observed in L2 processing (Rah, 2009). Hence, L2 learners are expected to rely more heavily on lexical-semantic information available in ambiguity resolution rather than syntactic clues when compared to L1 speakers who show somewhat default processing strategies (e.g. RC attachment tendency either towards NP1 or NP2 observed in speakers of various native languages) (Clahsen & Felser, 2006). In real-time processing, thus, L2 learners are also expected to show difficulties in processing syntactic dependencies, and recovering from their initial analysis. The strategies L2 learners rely on and develop as their level of proficiency increases are examined in the current dissertation.

The aim of this study is to explore the effect of syntactic priming in monolingual Turkish speakers and Turkish learners of English. Syntax has been studied from a variety of aspects by making use of different mechanisms, one of which is syntactic priming. Relevant research has proven that syntactic choices are sensitive to syntactic priming. Over the last three decades, a manifold of studies have investigated the phenomenon; the origins of the effect, the effects of syntactic priming, and temporal properties. However, there is still a need for further research to provide a sophisticated understanding of underlying mechanisms and the effects of syntactic priming. Furthermore, there is quite low number of research on syntactic priming with monolingual Turkish speakers, and Turkish learners of English, which would tell a lot with respect to both first (i.e. Turkish; a head final language) and second language (i.e. English; a head initial language). Thus, the current study is expected to contribute to the understanding of how L1 and L2 speakers represent and process syntax in their minds.

Turkish and English belong to typologically very different two groups of language. Within the scope of this dissertation, we sought to investigate relative clause (RC) attachments illustrated in (1) below, which makes it likely to examine and compare the strategies employed for ambiguity resolution both in Turkish and English.

(1)   Someone shot the servant of the actress who was on the balcony.

        a.   The servant was on the balcony.
        b.   The actress was on the balcony.

In this example, the RC (*who was on the balcony*) could be attached to the first noun (*the servant*) as in the first interpretation illustrated in (1a) or to the second noun (*the actress*) as in the second interpretation illustrated in (1b). The ambiguity here is particularly intriguing because it shows cross-linguistic variations. To illustrate, monolingual English speakers show an NP2 attachment preference (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999) whereas monolingual Spanish speakers favour an NP1 attachment strategy (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999; Carreiras, Salillas, & Barber, 2004). These cross-linguistic variations are relevant for L2 research considering the fact that they display if L2 learners transfer their L1 processing strategies while reading in their L2, or they follow the

pattern of their L2, or another possibility, if they do not rely on any syntactic information, they simply use different strategies in their L2, and show no clear attachment preferences. Hence, research on L2 processing, with a comparison to L1 speakers' processing strategies, might enable us to obtain a sophisticated understanding of general processing mechanisms.

Thus, syntactic priming of RC attachments is investigated through a series of experiments including both offline (untimed; pen-and-paper) and online (computerized self-paced reading task; measuring real time processing) tasks in the current dissertation. A comparison of English proficiency levels (i.e. upper-intermediate and advanced) is also aimed in order to provide insights into the question of how syntactic processing mechanism in L2 develop with increasing proficiency. An eye-tracking study is employed to gather the relevant psycholinguistic data in order to assess the assumptions made and the hypothesis put forth based on the findings of the previous experiments conducted before. Lastly, the extent to which and how actually working memory capacity of individuals play a role in RC attachment preferences is also evaluated in the current dissertation.

The dissertation is organized into 14 chapters as follows: Chapter 1 is this part where the introduction is presented. Chapter 2 gives a detailed summary of relevant research in L1 and L2 (covering the topics such as sentence processing, relative clause attachment ambiguity, and syntactic priming in general). Chapter 3 presents the multiple studies conducted to obtain unbiased, balanced ambiguous sentences, and thus to validate the first stimulus set. Chapter 4 describes the first two experiments conducted with monolingual Turkish speakers. The effect of animacy information is evaluated with these offline tasks. Experiment 1 is a comprehension to comprehension priming study whereas Experiment 2 is a comprehension to production priming study. Chapter 5 and 6 presents the studies conducted to validate the new stimulus sets including a variety of sentence structures to be used in the following experiments. Chapter 7 touches upon the issue of interaction between working memory capacity of individuals and RC attachment preferences in offline reading. Chapter 8 presents offline tasks conducted with monolingual Turkish speakers. These studies provide a comparison of the syntactic priming effects in two different designs. The first design requires directed assessment of prime attachment sites whereas the second requires implicit processing of prime attachment sites. Chapter 9 also presents offline tasks, but this time the study is conducted with Turkish learners of English. A comparison of two English proficiency levels is also aimed here. Therefore, multiple tasks conducted with upper-intermediate and advanced groups are presented separately. Similarly, Chapter 9 also provides a comparison of the syntactic priming effects in two different designs. Chapter 10 and 11 describe online tasks conducted with monolingual Turkish speakers and Turkish learners of English respectively. Chapter 12 presents eye-tracking studies conducted with monolingual Turkish speakers. Chapter 13 presents the discussion of the findings, and eventually Chapter 14 presents the conclusion.

CHAPTER 2

2. BACKGROUND

Chapter 2 is divided into two main sections. In this first section, various sentence processing models in L1 and their predictions will be analysed in relation to the empirical data from the studies on RC attachment preferences in speakers of various native languages. The second section covers the issue of sentence processing in L2. It briefly mentions the mental representation of a second language, the interaction between L1 and L2, the factors which might play a key role in syntactic processing in L2, and *the Shallow Structure Hypothesis*.

2.1. Sentence Processing Models

In this first section of Chapter 2, a number of sentence processing models and their predictions will be presented in relation to the empirical data obtained from the studies on RC attachment preferences in different languages. As briefly mentioned in Chapter 1 before, the existing sentence processing models differ in their assumptions about the principles of the human parser. More precisely, the existing sentence processing models could be categorized according to different criteria available; namely human sentence processing could be serial or parallel when categorized according to the type of processing, modular or interactive when categorized according to the source of information available at the initial analysis, and lastly it could be universal, parameterised or based on frequency or prosodic information. Considering the fact that the ultimate focus of this dissertation is on the cross-linguistic differences in sentence processing, the following subsections will be exclusively based on the issue of universality of the parser. This chapter is divided into five subsections, in which (i) universal sentence processing models, (ii) parameterised models of parsing, (iii) experience-based models of sentence processing, (iv) prosody-based model of sentence processing, and (v) the Unrestricted Race model are discussed one by one in order. Table 1 below shows the flow of the subsections in Chapter 2, Section 1.

Table 1.
Sentence processing models presented in Chapter 2, Section 1.

Universal Accounts	➢ The Garden Path Model (Frazier and Fodor, 1978) ➢ Construal Theory (Frazier and Clifton, 1996)
Parameterised Accounts	➢ Modifier Straddling (Cuetos and Mitchell, 1988) ➢ Anaphor Resolution (Hemforth et al., 1998) ➢ Recency / Predicate Proximity (Gibson et al., 1996)
Experience-based Accounts	➢ The Tuning Theory (Mitchell et al., 1995) ➢ Constraint Satisfaction Approaches (MacDonald et al., 1994; Thornton et al., 1998)
Other Accounts	➢ The Implicit Prosody Hypothesis (Fodor, 1998) ➢ The Unrestricted Race Model (van Gompel, Pickering & Traxler, 2000)

2.1.1. Universal Sentence Processing Models

Universal sentence processing models postulate that the parsing strategies are the same across different languages and they are guided by the syntactic and working memory constraints (Papadopoulou, 2006). The models advocate that human sentence processing mechanism is a parsimonious system, and the parsing choices are determined by a locality principle, which favours attachments to the phrase currently being processed, or to the latest phrase as a strategy of parsimony. In this subsection, two of the most prominent universal sentence processing models are presented; *The Garden Path Model* and *Construal Theory*.

2.1.1.1. The Garden Path Model (Frazier and Fodor, 1978)

The Garden Path model has been regarded as one of the most influential universal sentence processing models. This model advocates a serial, modular and phrase structure driven parser (Frazier & Fodor, 1978). The parser prefers one analysis when faced with ambiguity, and only if this initial preferred analysis turns out to be incorrect, then the parser reanalyses

the sentence. Accordingly, sentence comprehension consists of two distinct stages; the parsing and the interpretation stage respectively. In the parsing stage, the parser prefers an initial analysis merely based on syntactic information. In this stage, non-syntactic sources of information are not consulted or used. Lexical-semantic information is claimed to play a role only in the final interpretation phase which guides the reanalysis procedure.

The parser makes use of two strategies, Late Closure and Minimal Attachment in the initial analysis stage so as to decide between alternative choices, as in RC attachment ambiguity. Both are regarded as economical strategies in the sense that they save computation and memory cost. Frazier and Fodor (1978) defined these strategies as follows:

> Late Closure: When possible, attach incoming material into the phrase or clause currently being parsed. (p.49).

> Minimal Attachment: Attach incoming material into the phrase-marker being constructed using the fewest nodes consistent with the well-formedness rules of the language under analysis. (p.36).

To illustrate, Late Closure principle predicts the direct object reading illustrated in the sentence (2a). The sentence (2b) is rather difficult to process in this principle since the parser needs to hold the material unstructured in memory until receiving and analyzing the rest of the sentence. The principle prefers to attach "a mile" in the preceding phrase that has been currently parsed rather than at the beginning of the next phrase.

(2)   a.   Since Jay always jogs a mile this seems like a short distance to him.
        b.   Since Jay always jogs a mile seems like a short distance to him.

(Rayner & Pollatsek, 1989, p.247)

The principle of Minimal Attachment can be illustrated in the following example. The principle leads that the sentence (3a) regards "answer" as the direct object of the verb "knew" in the initial analysis since the parser prefers to build syntactically the simplest structure with the minimum number of possible nodes.

(3)   a.   The girl knew the answer by heart.
        b.   The girl knew the answer was wrong.

(Rayner & Pollatsek, 1989, p.246)

In RC attachment ambiguity as in the sentence (4), thus, the Late Closure principle predicts that the parsing strategies are universal and people will attach the RC to NP2, *the actress*.

(4) Someone shot the servant of the actress who was on the balcony.

However, the universality of the Late Closure principle has been challenged by many researchers over years such as Cuetos and Mitchell's seminal study (1988) on RC attachment

preferences in English and Spanish. Even though the prediction has been confirmed for some languages such as English (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999), the model fails to explain NP1 attachment preference observed in Spanish (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999; Carreiras, Salillas, & Barber) and also in a number of other languages (Brysbaert & Mitchell, 1996; Hemfort, Konieczyn, & Scheepers, 1998; Zagar, Pynte, & Rativeau, 1997; Sekerina, 1997, etc.). Therefore, Frazier and Clifton (1996) developed the Garden Path model and proposed another universal parsing account, *Construal Theory*.

2.1.1.2. Construal Theory (Frazier and Clifton, 1996)

According to *the Construal Theory* (Frazier & Clifton, 1996), the parser distinguishes two classes of processing decisions; namely primary and non-primary relations. Primary relations (e.g. PP attachment and NP vs. S (sentence) conjunction, as in *The visiting sailor kissed Marie and her sister laughed*) are guided by general parsing principles. Non-primary relations (e.g. adjunct predication as in *The poor boy ate the small roll hungry*), on the other hand, are not guided by general structural preferences. RC attachment ambiguities, which are non-primary relations, thus are not governed by universal principles such as *Late Closure*. The closest thematic processing domain is defined by the extended maximal projection of the last theta-assigner. In a sentence like (1) above, since of is not a theta-role assigning preposition, no distinctive attachment preference will be observed in the resolution of RC ambiguity. Still, among two possible hosts, Frazier and Clifton claimed that the parser prefers the referential one, which is the head of the maximal projections following *the Referentiality Principle*. Furthermore, Frazier and Clifton suggested that *the Avoid Ambiguity Strategy*, which is based on the conversational maxim of Quantity (Grice, 1975), is used for disambiguation. English genitive constructions are a case in point here. If a language employs two forms of genitive construction as in English; Saxon (e.g. the actress's servant) and Norman (e.g. the servant of the actress) genitives, where the Saxon genitive does not lead to ambiguity since the only possible interpretation for that is the servant in the actress's servant who was on the balcony, the use of the Norman genitive could be regarded as the structure which is implying an NP2 attachment, i.e. the actress in the servant of the actress. However, in languages such as Spanish, which have only the Norman genitive type, NP1 attachment is preferred following *the Referentiality Principle*.

2.1.2. Parameterised Models of Parsing

The cross-linguistic variations in RC attachment preferences suggest that parsing strategies might not be guided by universal principles but language-specific parameters. In what follows, the parameterised accounts of sentence processing are briefly discussed.

2.1.2.1. Modifier Straddling (Cuetos and Mitchell, 1988)

The Modifier Straddling strategy was proposed by Cuetos and Mitchell (1988). The account was motivated by the divergent attachment preferences in ambiguous RCs observed in English and Spanish readers. Accordingly, the Modifier Straddling strategy operates when a modifier has to be attached to one of the available host NPs in post-modifying languages but not in pre-modifying languages. Even though the proposal could be taken as a plausible explanation in the beginning, the empirical data did not verify the predictions of the strategy. Italian, for instance, being a post-modifying language, exhibited an NP2 attachment

tendency although it is a post-modifying language like Spanish (DeVincenzi & Job, 1993) whereas German, being a pre-modifying language, showed an NP1 attachment tendency (Hemfort, Konieczyn, & Scheepers, 1998). Nevertheless, the proposal succeeded in drawing researchers' attention to the fact that parsing strategies might vary depending on language-specific properties, and further accounts have been put forth.

2.1.2.2. Anaphor Resolution (Hemforth et al., 1998)

Another parameterised account is *Anaphor Resolution* proposed by Hemfort et al. (1998). The model is an extended version of the Head Attachment model, which suggests that the parser can assign an alternative syntactic analysis based on lexical properties of words encountered (Hemfort et al., 1998, & Konieczyn et al., 1997). The model predicts that the most Recent Head Attachment principle operates in the case of RC attachment ambiguity, and RCs are attached to the most recent NP, which is NP2. In order to accommodate the cross-linguistic variations in RC attachment preferences, Hemfort et al. (1998) extended the Head Attachment Model to Anaphor Resolution. The extended account assumes that the processing of RCs requires the relative pronoun to be bound to its antecedent, and thus RC attachment is regarded as a case of anaphor resolution. In this regard, RCs are assumed to be attached to the most salient discourse entity, which is NP1 considering the fact that NP1 is the internal argument of the main predicate. Hence, cross-linguistic variations in RC attachment preferences are explained with language-specific properties, more specifically, with the way RCs are introduced in different languages. Accordingly, languages in which RCs are headed by a relative pronoun (such as German) are sensitive to anaphoric binding, and they require RCs to be attached to the most salient NP, NP1. However, languages (such as English) in which the relativized element is not obligatory in certain contexts or a complementizer (e.g. *that*) can introduce RCs are not sensitive to anaphoric binding. In these languages, the requirements of anaphor resolution are not strong, and RCs are merely processed on the basis of structural considerations, which leads RCs to be attached to the most recent NP, NP2. Anaphor Resolution could account for the empirical data obtained in studies in languages such as German, Dutch, Russian for NP1 attachment preference (which could be due to the obligatory introduction of RCs by a relative pronoun in these languages) as well as in languages such as English, Swedish, and Norwegian for NP2 attachment preference (which could be because RCs are not necessarily introduced by a relative pronoun in these languages). However, the predictions of the model have not been verified in some other languages such as Italian (DeVincenzi & Job, 1993), Portuguese (Maia et al., 2007), Romanian (Ehrlich et al., 1999), Croatian (Lovrić, 2003), and Spanish (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999; Carreiras, Salillas, & Barber, 2004). In Croatian, Spanish, Italian, and Portuguese, all four of these languages have a relative complementizer, *sto* (that) for Croatian, *que* (that) for Spanish and Portuguese, *che* (that) for Italian. However, Spanish and Croatian show an NP1 attachment tendency whereas Croatian and Italian show an NP2 attachment tendency. Furthermore, Romanian shows an NP2 attachment preference, but not an NP1 attachment preference which would be assumed according to the anaphoric binding process, although RCs are obligatorily introduced by a relative pronoun in Romanian.

2.1.2.3. Recency / Predicate Proximity (Gibson et al., 1996)

Gibson et al. (1996) proposed that two parsing principles govern attachment preferences across languages. The first is *the Recency Principle* which favours attaching the structure to the closest noun. The second is *the Predicate Proximity* which favours attaching the RC to a

noun as closely as possible to the head of a predicate phrase. Gibson and colleagues claimed that *the Recency* is fixed while languages differ in their strengths of *the Predicate Proximity*, thereby resulting in variations in attachment preferences across languages.

The Recency / Predicate Proximity account was motivated by the data on RC attachment ambiguities that involve three potential host NPs as illustrated below:

(5)   a.   NP3 attachment:

las lámparas cerca de las pinturas de la casa que fue dañada en la inundación.

'*the lamps near the paintings of the house that was damaged in the flood*'

     b.   NP2 attachment

las lámparas cerca de la pintura de las casas que fue dañada en la inundación.

'*the lamps near the painting of the houses that was damaged in the flood*'

     c.   NP1 attachment

la lámpara cerca de las pinturas de la casa que fue dañada en la inundación.

'*the lamp near the paintings of the house that was damaged in the flood*'

The results showed that NP3 was the most preferred and NP2 was the least preferred site in both languages. Thus, Gibson et al. (1996) suggested that NP3 and NP1 preference in both languages could be explained by these two factors pointed above; Recency and Predicate Proximity, the former favouring NP3 attachment and the latter favouring NP1. Recency is similar to locality principles postulated by the previous models of sentence processing, determined by working memory considerations, and accordingly RCs are attached to the phrase most recently being parsed. Predicate Proximity, on the other hand, assumes that phrases associated with the main predicate are important in sentence comprehension, and that modifying constituents to be attached to its argument. Therefore, Predicate Proximity favours an NP1 attachment since the first NP is the direct object of the verb. Gibson and colleagues claimed that the relative strength of the Predicate Proximity strategy varies across languages, and that's why Predicate Proximity has stronger effect in some languages than others. The strength of Predicate Proximity is determined by "the average distance from the head of a predicate (verb) to its arguments" (Gibson et al., 1996, p.49). Accordingly, languages such as Spanish which allow relatively freer word order, and great distance between the predicate and its arguments, Predicate Proximity is strongly activated and RCs are attached to NP1. However, languages such as English which have fixed word order, and low distance between the verb and its arguments, then Predicate Proximity is not strongly activated, and RCs are attached to NP2. This explanation seems to account for NP1 attachment preference observed in Spanish, German, French, and Russian, in which adjuncts are allowed between the head of a predicate phrase and its complements as well as NP2 attachment preference observed in English, Norwegian, Swedish and Portuguese, which have a rigid word order. However, Italian, which is similar to the group of languages like Spanish in terms of allowing relatively great distance between the predicate and its arguments,

exhibits an NP2 attachment preference. Additionally, the model has been criticized for not being entirely clear and presenting the details of the relation between the verb/argument distance and the strength of Predicate Proximity (Mitchell & Brysbaert, 1998; Papadopoulou, 2006).

2.1.3. Experience-based Models of Sentence Processing

Experience-based models of sentence processing assume that parsing decisions are determined based on frequency information. Hence, these models propose a statistically-driven parser. Accordingly, the parser keeps records of the way structural ambiguities are resolved in the language, and favors the analysis that has been most frequently preferred in the past when faced with a particular ambiguity. Experience-based models of sentence processing can be further categorised into two groups according to which frequency information is encoded , namely coarse-grained models and fine-grained models (Papadopoulou, 2006). In coarse-grained models, the frequencies are registered at a syntactic level (Brysbaert & Mitchell, 1996) whereas in fine-grained models, the frequencies are registered at the word level by making use of context specific and lexically specific records (MacDonald et al., 1994; Thornton et al.,1998). In this section, two experience-based models are described and evaluated in relation to the findings of the studies conducted on RC attachment preferences in different languages. The first one is a coarse-grained model, the Tuning theory, and the second one involves fine-grained, Constraint-based approaches.

2.1.3.1. The Tuning Theory (Brysbaert and Mitchell, 1996; Mitchell et al., 1995)

The Tuning Theory claims that structural ambiguities are resolved on the basis of frequencies of the resolution of comparable ambiguities in the past. Therefore, if, for instance, an ambiguous RC is typically resolved towards NP1 in a language, then the possibility of attaching an ambiguous RC to NP1 will be stronger, leading the speakers of that language to show a tendency to prefer NP1 attachment in general. Thus, according to the Tuning theory, cross-linguistic variations in RC attachment preferences are attributed to the frequency of the disambiguation towards NP1 and NP2 encountered in different languages. The parser keeps records of previous analysis at a purely structural level. Thus, Brysbaert and Mitchell (1996) claimed that the Tuning theory could be regarded as a variant of the Garden Path Model. The only difference between the Tuning and the Garden-Path model is that initial parsing choices are determined by linguistic principles such as Late Closure according to the Garden-Path instead of exposure facts as proposed by the Tuning theory.

In order to test the predictions of the experience models of sentence processing, data on the pattern of ambiguity resolution in corpora and data obtained from experimental studies have been compared. The Tuning hypothesis has received support from studies conducted in English (Cuetos et al., 1996), Spanish (Cuetos et al., 1996), and French (Mitchell et al., 1995). Corpus data for these languages are consistent with the attachment preferences observed in the experiments. More precisely, RCs have been observed more frequently to be attached to NP2 in English whereas they have been more frequently found to be attached to NP1 in Spanish and French, which is in line with the experiments conducted in these three languages (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999; Carreiras, Salillas, & Barber, 2004; Zagar, Pynte, & Rativeau, 1997), thereby suggesting that the attachment preferences could be due to exposure facts.

However, a discrepancy between the attachment preferences and the corpus data was observed in Dutch. In eye-movement data conducted in Dutch, NP1 attachment preferences were obtained whereas the corpus analysis showed NP2 attachment preference (Brysbaert & Mitchell, 1996). On the other hand, Desmet et al. (2002) found a factor which could explain this contradiction observed in Dutch. They conducted both a corpus analysis and an eye-tracking experiment. The results showed that both animacy and concreteness information had impact on RC attachment preferences. More precisely, Desmet and colleagues asserted that the attachment preferences in Dutch strongly relied on the animacy of NP1, and the exceptions could be explained by the concreteness of both NPs. The explanation provided by Desmet et al. (2002) is as follows:

> When NP1 is animate, there is a bias towards high attachment; when NP1 is inanimate there is a bias towards low attachment. (There are only two exceptions to his pattern: First, when both NPs are animate there are more NP2 attachments when NP2 is concrete and NP1 is abstract. Second, when NP1 is inanimate it still attracts more RCs when it is concrete and modified by an abstract animate NP2.)

(Desmet et al., 2002, p. 32)

Based on these results, Desmet et al. (2002) suggested that experience-based models of sentence processing should take not only structural but also lexical frequencies into account. Furthermore, although Desmet and colleagues provided some evidence for the experience-based models of sentence processing, they criticized that these models also need to explain why the corpus data look the way they do in different languages and why there are distinct attachment preferences in the first place. The Tuning theory does not offer a comprehensive explanation for the underlying mechanisms which determine the parsing strategies. In response to this criticism, Cuetos et al. (1996) did not deny the importance of any underlying linguistic phenomena for a better theory, yet advocated that the Tuning theory has an adequate theoretical framework by emphasizing that "the function of the statistically-driven parser is to explain the rapid mechanisms employed in real-time parsing and not to go beyond that an account for the prevalence of different structures in the language" (p.181).

Nonetheless, another evidence against the Tuning hypothesis also came from a series of studies conducted by Gibson et al. (1996) and Gibson and Schütze (1999). They investigated the attachment preferences in English sentences with three potential host NPs. The results of both online (Gibson & Schütze, 1999) and offline (Gibson et al., 1996) tasks revealed that the third NP is the most preferred and the least preferred is the middle NP (the second NP, but not the first NP as the corpus data (Gibson et al., 1996) would suggest (i.e. the experimental data NP3 > NP1 > NP2; the corpus data NP3 > NP2 > NP1). In brief, the assumption of a statistically-driven parser made by the Tuning has not been verified yet.

2.1.3.2. Constraint Satisfaction Approaches (MacDonald et al., 1994; Thornton et al., 1998)

Constraint satisfaction approaches predict that parsing is affected both by the frequencies of structural patterns and by the frequency of individual lexical items. Accordingly, sentence processing is achieved through the satisfaction of multiple constraints based on syntactic, lexical and discourse level information. Pieces of information from various domains are activated in parallel and cooperate in reaching the preferred analysis. The strength and

consistency of the constraints determine the final interpretation. Constraint-satisfaction approaches differ from the Tuning theory in that they allow for non-syntactic information to guide the human sentence processor to propose an interpretation at the initial analysis.

Constraint-satisfaction approaches account for context, frequency, and lexical effects that some studies have reported (MacDonald et al., 1994; Thornton et al., 1998). However, they fail to address the structural biases people have when there are no clues from context or lexical frequencies about the alternatives in the case of structurally ambiguous sentences (Philips, 1996).With respect to RC attachment preferences, MacDonald et al. (1994) attributed the cross-linguistic variation to the frequency data of the attachment sites to be modified. Accordingly, if NP1 has a stronger lexical bias of appearing with a modifier, the modifier is expected to be attached to the NP1 rather than NP2 and vice versa. Based on this proposal, the expectation is that RC attachment preferences would change by reversing the position of NPs in the genitive construction because the attachment preferences are assumed to depend on the different lexical biases of NPs. The proposal, however, was not verified in an English completion task (Corley & Corley, 1995 as cited in Mitchell et al., 1995). The position of NPs were counterbalanced over the experiment as illustrated in the sentences (6a) and (6b) below, and the participants were asked to complete each sentence with a clause starting with either who or which, yet an overall NP2 attachment preference was obtained irrespective of which NP occupied NP2 site of the genitive construction.

(6)   a.   The satirist ridiculed the lawyer of the firm wh ... (human noun first; nonhuman noun second)

        b.   The satirist ridiculed the firm of the lawyer wh ... (nonhuman noun first; human noun second)

(Mitchell et al., 1995, p. 479)

Furthermore, Gibson et al. (1999) obtained NP3 attachment preference (followed by NP1 and NP2 attachment preference respectively) in three-NP-site ambiguities but NP1 attachment preference in two-NP-site ambiguities in Spanish although the same NPs occupied the closest site to RCs in both conditions. Thus, the attachment preferences might depend on the structural position of NPs, not solely on the lexical biases of NPs.

Thornton et al. (1998) suggested another explanation for the cross-linguistic variation in RC attachment preferences. Accordingly, the attachment preferences are claimed to be affected by the particular discourse properties of NPs involved. More precisely, attachment preferences depend on the degree of NPs' availability for modification. If an NP has not already been modified as extensively as an alternative NP, it is more likely to receive additional modification. Therefore, Thornton and colleagues suggested that the modifiability constraint could account for NP2 attachment preference observed in some languages because NP1 has already been modified by NP2 in the genitive construction, and NP2 has no modification. Evidence in support of modifiability was found in completion and self-paced reading tasks in English and Spanish carried out by Thornton et al. (1998, 1999). Prepositional Phrase (PP) attachment preferences were tested in two conditions. In the first condition, the second NP did not receive further modification (labelled as 'easy to modify'), and therefore it was assumed to be a better candidate for the attachment. In the second condition, on the other hand NP2 was already modified (labelled as 'difficult to modify'), and

thus the prediction was that NP2 attachment would be less likely. The examples of the experimental materials used in Spanish (7) and English (8) are as follows:

(7)   a.   *NP2 rated as easy to modify:*

Las sábanas de una cama con
'The sheets of a bed with'

       b.   *NP2 rated as difficult to modify:*

Las sábanas de mi cama con
'The sheets of my bed with'

(8)   a.   *NP2 rated as easy to modify:*

The computer down the only hall with

       b.   *NP2 rated as difficult to modify:*

The computer down my front hall with

(Thornton et al., 1999, p. 1351)

In the Spanish completion task, Thornton et al. (1999) found an overall NP1 attachment preference. However, NP2- easy to modify condition resulted in significantly less NP1 than NP2- difficult to modify condition. In the self-paced reading task, NP1 attachment preference was found only in NP2- difficult to modify condition, and no clear attachment preference was found in NP2- easy to modify condition. In the English completion task, they obtained similar results, an overall NP1 attachment preference. NP2- difficult to modify condition yielded significantly greater NP1 attachment than NP2- easy to modify condition. In the self-paced reading task, the results were different from those of the Spanish task. In NP2- easy to modify condition, English showed an overall NP2 attachment preference. However, there was no clear attachment preference in NP2- difficult to modify condition.

Table 2.
The result of the completion and self-paced reading tasks by Thornton et al. (1998, 1999)

	Spanish		English	
	Completion Task	Self-paced Reading Task	Completion Task	Self-paced Reading Task
NP2- easy to modify	More NP2 (significantly less NP1)	No clear attachment preference	More NP2	NP2 attachment preference
NP2- difficult to modify	More NP1	NP1 attachment preference	More NP1 (significantly greater NP1)	No clear attachment preference

Therefore, Thornton and colleagues suggested that there was an effect of NP modifiability on interpretation of an ambiguous PP. However, the modifiability constraint does not explain why there are still distinct attachment preferences and NP1 attachment preference observed in other languages as opposed to the predictions of the modifiability. In this regard, Thornton et al. (1999) asserted that both the nature of the task and the language under investigation should be taken into account while interpreting the overall attachment preferences. The availability of alternative structures in languages such as English could be a factor which accounts for the distinct patterns in different languages. Based on the Gricean maxim of Quantity as proposed in the Construal Theory, Thornton et al. (1999) suggested that NP2 attachment preference in English could be due to the availability of alternative genitive forms (Norman and Saxon genitives), and a consequence of the Avoid Ambiguity strategy.

2.1.4. Prosody-based Models of Sentence Processing

In this subsection, the Implicit Prosody Hypothesis proposed by Fodor (1998) is presented.

2.1.4.1. The Implicit Prosody Hypothesis (Fodor, 1998)

The Implicit Prosody Hypothesis was proposed by Fodor (1998). The account assumes that sentence processing is guided by prosodic factors, even in silent reading. She asserted:

> The Implicit Prosody Hypothesis (IPH): In silent reading, a default prosodic contour is projected onto the stimulus, and it may influence syntactic ambiguity resolution. Other things being equal, the parser favors the syntactic analysis associated with the most natural (default) prosodic contour for the construction.

(Fodor, 2002, p.112)

Accordingly, attachment decisions in the resolution syntactic ambiguity are sensitive to the prosodic characteristics of a sentence, more specifically to the position of a prosodic boundary. Fodor (1998) claimed that a prosodic break before an RC could be interpreted as a marker of a larger syntactic boundary. As a consequence of this, the parser is assumed to favor NP1 attachment if a prosodic break occurs right before an RC as illustrated in (9a), and the parser prefers NP2 attachment if a prosodic break occurs right after NP1 as in (9b).

(9)   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.

Additionally, the account predicts that a prosodic break is less likely to occur before a short RC, and that a long RC is more likely to be attached to NP1. Therefore, a sentence like (10a) is assumed to favor NP2 attachment rather than NP1 attachment unlike a sentence like (10b).

(10) a.   The professor read the review of the poem that just came out.
      b.   The professor read the review of the poem that was published at the end of the magazine.

(Hwang et al., 2011, p.268)

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Therefore, not only the position of the prosodic boundary but also the length of the constituents are claimed to have an impact on the resolution of ambiguity in RC attachment. Furthermore, cross-linguistic variations in RC attachment preferences can be attributed to distinct prosodic patterns observed across languages, though not entirely clarified.

The Implicit Prosody Hypothesis seems to be verified by some studies which have manipulated the constituent length (Quinn, Abdelghany, & Fodor, 2000, as cited in Fernández, 2003) or induced a prosodic break by using segmentation (Gilboy & Sopena, 1996). However, further research seems essential to validate the results in other languages. Besides, a more recent study already shows that the prosody generated in reading aloud would not be necessarily the same as the prosody generated in silent reading (Jun, 2010). Thus, more research is needed for the hypothesis to account for the cross-linguistic variations in RC attachments.

2.1.5. *The Unrestricted Race Model (van Gompel, Pickering & Traxler, 2000)*

The Unrestricted Race model was proposed by van Gompel, Pickering, and Traxler (2000). The researchers reviewed a series of eye-tracking studies, and concluded that neither two-stage theories (e.g. Frazier & Fodor, 1978; Frazier & Clifton, 1996) nor constraint-based approaches (e.g. MacDonald et al., 1994; Thornton et al., 1998, 1999) accounted for the resolution of the structurally ambiguous sentences. The model claimed that processing difficulty did not result from the competition between two or more syntactic analysis which are activated in parallel as proposed by the constraint-based approaches, and that non-syntactic information is also employed at the initial analysis phase, not during the reanalysis as assumed by the two-stage approaches. Therefore, van Gompel et al. (2000) suggested another account of syntactic ambiguity resolution. Accordingly, the initial analysis is determined by multiple sources of information. Furthermore, the model predicts a two-stage analysis. Only one analysis is constructed at a time, and the processor conducts a reanalysis only when the initially preferred analysis proves to be incorrect. Therefore, the model suggests that processing difficulty is attributable to the reanalysis process. With respect to the processing difficulty of RC attachments, constraint-based approaches predict that ambiguous sentences are harder to process because more than one syntactic structure are activated in parallel, yet when a sentence is disambiguated either towards NP1 or NP2, then only one analysis is activated and there is no competition. According to the two-stage theories, ambiguous sentences are not assumed to be rather difficult than disambiguated sentences because reanalysis do not occur for ambiguous sentences. The Unrestricted Race model, however, predicts that disambiguated sentences result in more difficult processing compared to balanced ambiguous sentences because reanalysis for the alternative host NP is expected to occur in disambiguated sentences. In the case of ambiguous sentences, however, since both analyses are plausible, the parser simply opts for the initially preferred analysis, and processing difficulty is expected to be less. Additionally, if a language already has a really strong bias towards, for instance, NP2 attachment, then processing difficulty is expected to be higher for the sentences disambiguated towards NP1 because then reanalysis may occur somewhat more often in such sentences and vice versa.

The predictions of the Unrestricted Race model were verified by Traxler et al. (1998). In eye-tracking experiments, Traxler and colleagues tested RC attachment ambiguity using ambiguous and disambiguated sentences as illustrated in (11) below.

(11) a.   The son of the driver that had the moustache was pretty cool. (ambiguous)
      b.   The car of the driver that had the moustache was pretty cool. (NP2 forced)
      c.   The driver of the car that had the moustache was pretty cool. (NP1 forced)

(Traxler et al., 1998, p. 563)

The offline pre-test showed that there was an NP2 attachment bias (68%), yet the results of the eye-tracking experiments confirmed the predictions of the model. Total times on the critical word were shorter in the ambiguous sentences, and disambiguated conditions did not differ from each other. The results are against competition-based frameworks, such as constraint-based approaches because they would expect that ambiguous sentences would show longer times than the disambiguated conditions. Traxler and colleagues even provided a further analysis with more balanced sentences (with 35% NP1 and 60% NP2 attachment preference). However, the results were the same as the entire set of sentences. The results also provided evidence against the two-stage theories such as the Garden Path model because they would expect that NP1 attachment forced condition would be more difficult to process than both the biased attachment, NP2 attachment forced condition and ambiguous sentences. The results indicated that readers reanalysed the alternative host NP in both disambiguated conditions whereas reanalysis did not occur in the ambiguous condition. However, the data was obtained from the total times, which could be regarded as a relatively late measure for evaluating the initial analysis. Therefore, van Gompel et al. (2000) themselves also conducted two experiments using the sentences illustrated in (12) and (13) below, and evaluated the first- pass regressions.

(12)   Experiment 1

        a.   The brother of the colonel who shot himself on the balcony had been very depressed. (ambiguous)

        b.   The daughter of the colonel who shot himself on the balcony had been very depressed. (NP2 attachment)

        c.   The daughter of the colonel who shot herself on the balcony had been very depressed. (NP1 attachment)

(13)   Experiment 2

        a.   The advisor of the mayor that had been driven to the meeting had a lot of problems. (ambiguous)

        b.   The village of the mayor that had been driven to the meeting had a lot of problems. (NP2 attachment)

        c.   The mayor of the village that had been driven to the meeting had been a lot of problems. (NP1 attachment)

(van Gompel et al., 2000, p.18)

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The offline pre-test showed there was an NP2 attachment bias (70%). The results of the first experiment showed that the number of regressions in NP1 attachment forced condition was greater than ambiguous sentences. The number of regressions in NP2 attachment forced condition was also greater than ambiguous sentences, however it was only significant by items. The pattern was also similar in total times. The results were found consistent with the Unrestricted Race model. Furthermore, van Gompel et al. (2000) explained that the absence of a significant difference between NP2 attachment forced condition and ambiguous condition could be a consequence of 70% NP2 attachment bias observed indicating that ambiguity was not balanced in the experimental sentences. In the second experiment, ambiguity was more balanced, with 49 % NP2 attachment preference, and a clearer difference between NP2 attachment forced condition and ambiguous condition was observed. The percentage of regressions in the ambiguous condition was less than both disambiguated conditions, and the disambiguated conditions did not differ from each other, replicating Traxler et al. (1998).

However, Swets et al. (2008) recently challenged the Unrestricted Race model by indicating that readers underspecify the representation of ambiguous sentences as a strategy so as to save time unless the task demands them to disambiguate these sentences. In order to test the Unrestricted Race model, Swets and colleagues asked participants to read similar sentences used by van Gompel et al. (2000). The example sentences were illustrated below in (14).

(14)   a.   The maid of the princess who scratched herself in public was terribly humiliated. (ambiguous)

          b.   The son of the princess who scratched herself in public was terribly humiliated. (NP2 attachment)

          c.   The son of the princess who scratched himself in public was terribly humiliated. (NP1 attachment)

(Swets et al., 2008, p. 204)

However, they also asked different questions about them by manipulating the difficulty and frequency of these questions in a between-participants design. The first group of participants was asked questions about RC attachments (e.g. *Did the maid / princess / son scratch in public?*) whereas the second group of participants was asked superficial questions (e.g. *Was anyone humiliated / proud?*) at every experimental trial. The last group of participants was asked superficial questions again but only occasionally. The results showed that ambiguous sentences were read faster when superficial questions were asked. However, this advantage was not observed when the questions were related to RC attachments. More precisely, the ambiguous sentences were read as fast as NP2 attachment forced sentences, and even more slowly than NP1 attachment forced sentences. Thus, Swets and colleagues claimed that the Unrestricted Race model could not explain these results. Furthermore, they asserted that the ambiguity advantage depended on the task demands, and if the ambiguity has to be resolved, then processing will slow down, which is not predicated by the Unrestricted Race model. Besides, the model does not provide a clear explanation for the cross-linguistic variations observed in RC attachment preferences across different languages, but focuses heavily on the processing difficulty and the degree of reanalysis in structurally ambiguous sentences.

Apart from these hypotheses, more recently Grillo and Costa (2014) also suggested a confounding factor on RC attachment preferences, namely Pseudo-Relative Small Clauses (PRs) which are not cross-linguistically available. The idea is that languages which show an NP2 attachment preference have genuine RCs such as English, whereas those which show an NP1 attachment preference contain an identical but structurally different representation, PRs as in Spanish. For instance, que in Spanish can introduce a RC which can be attached either to NP1 or NP2. Accordingly, the English sentence in (15a) is a two-way ambiguous sentence in that the RC could be attached either to NP1 or NP2 whereas its Spanish counterpart with que in (15b) is a three-way ambiguous sentence as the RC could be attached either to NP1 or NP2, and *que* also allows a PR reading as in (15c), which forces NP1.

(15)   a. I saw the son of the doctor that was running.
        b. Vi al hijo del medico que corría.
        c. 'I saw the son of the doctor running.'   PR reading

Retrieved from Grillo and Costa (2014, p.161)

The availability of PRs might be an explanation for cross-linguistic variations and some contradictory results observed in previous work. However, the availability of PRs is subject to great variations given that there are several factors affecting the PR interpretation (e.g. semantic, temporal and aspectual properties of the matrix and embedded verb, contextual or visual cue). Therefore, especially in written modality, one cannot predict whether readers favour RC or PR reading in a given sentence. Even though it is quite convincing to think that the availability of PR reading in languages would have an effect on RC attachment preference, and explain parsing strategies across languages, there seems to be a need for further, detailed investigation in different languages, alternatively in the auditory modality.

2.1.6. Summary

In this Chapter 2, Section 1, a summary of sentence processing models was presented and evaluated with respect to the findings obtained from the empirical data on RC attachment preferences in different languages. The experimental evidence discussed here does not seem adequate to accept any particular model. There is not one single model, the predictions of which could account for all the contradictory findings obtained in a manifold of studies conducted by making use of different materials and tasks in different languages. Nevertheless, the results are motivating for further research. Cross-linguistic variations have been observed in RC attachment preferences. The findings, thus, question the universality of parsing strategies such as the Late Closure. Furthermore, the research has showed that the pieces of information used to disambiguate the sentences (such as animacy information, number and gender) and the task demands affect the attachment preferences. These findings clearly indicate that there is further need for more theoretical and empirical research in different languages to provide a better understanding of parsing strategies employed in structurally ambiguous sentences. Therefore, the motivation of this dissertation is to provide evidence from Turkish, a head-final language in which parsing routines have not been clarified yet, to compare the findings with those obtained in other languages, to provide an explanation for the patterns not only in the first (e.g. Turkish), but also in the second language (e.g. English), and to evaluate the predictions of sentence processing accounts. The next section, Section 2, addresses the issue of second language (L2) processing. Research in

L2 is also invaluable because understanding L2 processing can enable us to figure out whether syntax is shared or separate in L2 learners, and to examine the parsing strategies they employ while processing structurally ambiguous sentences in L2. More specifically, the current dissertation aims to understand if L2 learners transfer their L1 processing strategies while reading in L2, or they adopt the parsing routines in L2, or if they do not rely on any syntactic clues, and simply use different strategies. Therefore, research on L2 processing, with a comparison to L1 speakers' parsing strategies, might enable us to obtain a sophisticated understanding of general sentence processing mechanisms.

2.2. Sentence Processing in L2

No matter how important second language learning is in today's globalised society, reaching a native-like level in a second language remains a challenge, and seems to be a rare achievement. More precisely, as Caffara et al. (2015) stated, many people experience more difficulty in syntactic processing rather than in semantic and lexicon while learning another language, particularly after puberty. Therefore, scholars have attempted to understand the difficulty of second language learning and processing especially at later years in life, which stands in sharp contrast to children's remarkable accomplishment.

The question of how L2 processing differs from L1, for instance, has not been thoroughly answered yet. With respect to L2 processing, debates have been commonly over two leading views. Accordingly, one of these proposals advocates that the same mechanisms are used both in L1 and L2 processing, and that differences could be attributed to L1 transfer or L2 processing being slower and cognitively more demanding. On the other hand, the second proposal claims that parts of L2 processing do not function native-like and that L2 processing is more dependent on lexical memory and less on the procedural system. Research in L2 processing has arisen from the interest in understanding how more than one language are actually represented in the human mind.

In order to investigate similarities and differences between L1 and L2 processing, Kırkıcı and Clahsen (2013) compared the processing of inflected (i.e. (V)r Aorist inflections) and derived (i.e. -lIk derivations) word forms in L1 and L2 Turkish by using the masked priming paradigm. The participants of the study included native speakers of Turkish and advanced L2 learners of Turkish with a variety of L1backgrounds. The results revealed similar priming effects for inflection and derivation in L1 speakers of Turkish and different ones in L2 learners. More specifically, the study showed that inflected words had priming effect in L1, but not in L2 whereas derived words yielded significant priming effect both in L1 and L2. Thus, L1 and L2 processing of morphologically complex words seem to have subtle differences. In this regard, Kırkıcı and Clahsen rejected the view that L1 and L2 processing are alike, and that L2 processing is influenced by L1 transfer and requires extra time because of being cognitively more demanding. Instead, based on their findings, the researchers proposed that advanced L2 learners' lexical representations of morphologically complex words are identical to those of L1 speakers, yet L2 processing does not employ morphological decomposition as L1 speakers do. Therefore, Kırkıcı and Clahsen asserted that more complex explanations are required to account for difficulties and differences observed in L2 processing.

Further discoveries have been made on the neural basis of L2 processing and its relation to L1 processing. For instance, Perani and Abutalebi (2005) indicated that L1 and L2 are

processed by the same neural devices on the contrary to the long-held assumption that they are represented in separate regions in the human mind. The neural differences between L1 and L2, as Perani and Abutalebi noted, vary only depending on the factors such as the age of acquisition, the level of proficiency, and the extent of exposure to each language. Similarly, Unsworth (2007) pointed that L2 learners pass through the same stages as L1 learners, yet they also have an initial stage of L1 transfer, and advocated that L2 is acquired through the same neural devices responsible for L1 acquisition.

2.2.1. L2 Factors and Syntactic Processing

Second language processing is influenced by several factors. These include L1 and L2 differences, the age of acquisition, L2 language proficiency, the role of learning context (immersion vs. instruction), the amount of exposure, and individual differences (DeKeyser, 2005; Caffara et al., 2015). These factors are presented below.

2.2.1.1. L1 and L2 Differences

The linguistic features of L1 and L2 may interact during second language processing. L1 knowledge have been considered as an important source of influence considering the fact that differences or similarities between languages lie at the root of positive or negative cross-linguistic transfer effects (Caffara et al., 2015). The idea is that L2 learners can benefit from a cross-linguistic transfer if L1 and L2 share syntactic rules (i.e. positive transfer); otherwise, cross-linguistic effects may not be observed, or may lead to ungrammatical solutions (i.e. negative transfer) (MacWhinney, 2005). The idea has been verified with the evidence obtained through event-related potential (ERP) studies. To illustrate, Tokowicz and MacWhinney (2005) observed that L2 learners were sensitive to violations in L2 for constructions similarly formed in their L1, and P600 response (i.e. the syntactic positive shift- a late positive response elicited by syntactic violations) was obtained. However, they were not sensitive to violations for constructions which differ in L1 and L2, and thus no P600 response was obtained, thereby suggesting that L2 learners can process some aspects of L2 syntax even in early stages of learning process if grammatical features are similarly expressed in L1 and L2. Furthermore, Jeong et al. (2007) confirmed that linguistic similarity between L1 and L2 affects the cortical processing of a second language. In their study of native Korean trilinguals, Jeong and colleagues examined cortical activation during the processing of Japanese (very similar to Korean) and English (different from Korean). Korean native speakers were reported to have equivalent proficiency in Japanese and English. The researchers differentiated frontal activation in Korean learners of Japanese and English as a function of cross-linguistic similarity and dissimilarity. The results showed that the bilateral superior temporal cortex was activated during the comprehension of three languages. For L2 processing, the pars triangularis of the left inferior frontal gyrus (IFG) was additionally activated. However, the right cerebellum, the pars opercularis of the left IFG, and the posteriomedial part of the superior frontal gyrus were activated during only the syntactically dissimilar English L2 tasks. The activation in these regions did not differ significantly between Korean L1 and Japanese L2. Jeong and colleagues argued that this differential activation of the pars opercularis of the left IFG and the right cerebellum might reflect syntactic distance, and that differential activation in the right temporal cortex might reflect prosodic distance of English both from Korean and from Japanese.

2.2.1.2. Age of Acquisition

The starting age of L2 learning might be a determining factor in the ultimate attainment of L2. In this regard, the leading hypothesis could be the so-called 'critical period hypothesis' put forth by Penfield and Roberts in 1959 and made popular with Lenneberg's biological foundations in 1967 (Tochon, 2009). According to this hypothesis, early exposure to a language is crucial for successful language learning (i.e. native-like attainment). There have been some evidence supporting the critical period hypothesis for the acquisition of syntax in L1 (Friedmann & Rusou, 2015), yet it seems to be a matter of debate whether the hypothesis could be generalized to the acquisition of syntax in L2 or not. Many studies have questioned until when we acquire a second language to native-like level. The question has received various answers, yet most of them revolve around the age of puberty (Meulman et al., 2014). However, Friedmann and Rusou (2015) stated that even around the age of four years, there are some aspects of language which are not acquired native-like anymore and the acquisition resembles that of an adult learning a second language. Furthermore, the relevant research revealed that later exposure to a second language is associated with lower attainment. To illustrate, Wartenburger et al. (2003) found that grammatical processing is deficit when L2 is learned later in life whereas lexical-semantic processing depends heavily on the level of L2 proficiency, irrespective of age of acquisition. In this regard, the authors reported that Italian learners of German showed native-like profiles for syntactic processing only when they learned German from birth (i.e. no activation differences between L1 and L2 in the brain). On the other hand, late learners showed enhanced activation of the bilateral IFG (BA 44/6/46) irrespective of proficiency level. The late, but highly proficient L2 learners showed bilateral activation of the insula and basal ganglia, both of which are linked to semantic, phonological and syntactic aspects of language processing (Oh et al., 2014; Kotz et al., 2003). In brief, the literature has demonstrated that L2 can be learned at any time later in life, yet native-like attainment, particularly in syntax, seems to occur only with very early exposure to L2.

2.2.1.3. Proficiency

L2 proficiency might have a driving effect on shaping the patterns of the brain activities according to the results of ERP and fMRI studies (Kotz, 2009). For instance, Rossi et al. (2006) proposed that L2 syntactic processing may not only depend on age of acquisition, but also on the level of L2 proficiency in syntax. Having compared late learners of German and Italian who had high- and low- level of proficiency, Rossi and colleagues observed the same ERP components as native speakers for all syntactic violations in high-proficiency L2 learners in both languages. High-proficiency L2 learners displayed a comparable pattern of syntactic processing (an early anterior negativity (ELAN), and a late P600 evidencing processes of reanalysis) and for the processing of the morpho-syntactic agreement violations (an anterior negativity (LAN), and a P600). The timing of the processing steps was equivalent to that of native speakers, as well though some amplitude differences were identified. On the other hand, low-proficiency L2 learners displayed qualitative differences in the agreement violation characterized by the absence of the LAN and quantitative differences reflected in a delayed P600 in every violation condition. Therefore, Rossi and colleagues argued that late L2 learners with high proficiency could display native-like responses with the timing approximating that of native speakers. Besides, Perani and Abutalebi (2005) indicated that L2 learners with low proficiency are observed to activate less neural substrate for sentence and discourse level processing in the left temporal lobe. In brief, similar activation patterns have been reported in neuro-imaging studies when the level

of L2 proficiency is comparable with the level of L1. However, the pattern seems different for L2 learners with low proficiency from those with high proficiency and native speakers.

2.2.1.4. Learning Context

The quantity and the type of L2 input (in naturalistic or instructed settings) might influence second language acquisition. With instruction, L2 exposure is restricted to an educational setting where L2 learners are exposed to L2 in a structured and discontinuous way and they are not provided with massive amount of input. On the other hand, L2 exposure consists of massive input, provided in a variety of sources and social settings in naturalistic settings such as in the case of immersion (Muňoz, 2010). The assumption is that naturalistic exposure enables L2 learners to reach native-like level of syntax. Caffara et al. (2015) advocated this assumption reviewing the relevant ERP studies. Caffara and colleagues concluded that the duration of immersion had an influence on early syntactic processing. The authors identified the duration of immersion as the most influential L2 factor on the number of reported LAN effects, particularly relying the ERP studies where participants had more than 5 years of immersion. Within such a long period of naturalistic exposure, L2 learners are likely to participate in a wide range of interactions, which is not restricted to a specific source or social setting. Caffara and colleagues stated "an extended naturalistic exposure would give more chances to reach high automaticity in L2 parsing processes and to report neural correlates reflecting an early detection of a syntactic mismatch in grammatical features" (p.42). Accordingly, the authors were of the opinion that the quantity of L2 naturalistic input is linked to high degree of automaticity at early stages of structure-building processes.

2.2.1.5. Amount of Exposure

The literature has displayed that the amount of exposure also plays a significant role in shaping neural organization of L2. For instance, Perani et al. (2003) showed that the exposure to L2 affected the activation pattern in L2 learners' brain even if L2 is acquired early and has a comparable level of proficiency. Furthermore, De Carli et al. (2015) found significant effects of language use and cognitive skills in adult Italian-Spanish bilinguals who achieved high level of proficiency in their L2 as a result of emigration or bilingual environment in their family. Based on the frequency and intensity of their use of both languages, participants were classified as intensive users or occasional users. Intensive users were described as those who use their L2 every day for their job or personal needs, mainly ‚n their daily activities while occasional users have variable, but still sufficient opportunities every month to keep their L2 alive. The results showed that continued language practice has important impact on high proficiency in L2, thereby suggesting that proficiency might be weaker when L2 experience becomes occasional or ceases. Therefore, De Carli and colleagues suggested that continuous and intensive use of L2 played a core role both in achieving and maintaining high proficiency in L2.

2.2.1.6. Individual Differences

Individual differences might be modulating L2 processing of syntactic ambiguities. In this regard, Hopp (2015) exemplified the role of individual differences in German speakers of English. Hopp tested how L2 proficiency, working memory, reading speed, automaticity in lexical access, and grammatical integration ability affected the resolution of temporary object-subject ambiguities in garden path sentences such as *When Anne bathed the baby fell*

out of the bathtub. He utilized sets of sentences including different types of information such as intransitives, case-marking / pronoun, implausible, plausible, and control sentences (no garden path). Each one of the individual factors was explained separately. Hopp found that L2 proficiency affected the processing of L2 morpho-syntax, yet he did not identify any measurable influence on the resolution of temporary object-subject ambiguities. Thus, he indicated that the further analysis might be required because the study might not have been challenging enough to elicit proficiency-related differences in high-intermediate and near-native level learners. Furthermore, the sentences might not have required much of a memory load; therefore working memory capacity did not have any prevalent effect, either. Automaticity of lexical access was identified in some early measures; however, the effect did not persist to later reading measures which could be associated to reanalysis and sentence integration. Reading speed was weakly correlated with the other individual difference variables in the study. One of the underlying causes of individual differences in L2 sentence processing was associated with the efficiency with which particular type of grammatical information was integrated in context. In other words, the findings shed light on the fact that syntactic integration ability constituted an individual difference variable which modulated recovery processes in L2 comprehension of object-subject ambiguities.

The literature has also revealed that there are individual differences regarding affective factors. To illustrate, Antón-Méndez et al. (2015) examined the association between proficiency in instructed second language acquisition and previous bilingualism, starting age, language anxiety and attitude. In the analyses 564 adolescent Australian twins were recruited. Furthermore, the researchers specifically aimed to identify the environmental effects related to attitude and anxiety on achievement by examining discrepancies within approximately 100 pairs of monozygotic twins. The results displayed a clear relationship between attitude towards language learning and L2 proficiency. Hence, Antón-Méndez and colleagues asserted that a positive towards language learning is associated with learners' success in instructed second language acquisition, irrespective of natural language abilities and L1-L2 relations. Additionally, the analyses on the monozygotic twins revealed that the higher anxiety level was linked to the higher proficiency. The anxiety effect in the monozygotic twins could be related to the classroom environment. Lastly, age of acquisition did not appear to be linked to L2 proficiency, which is in line with the relevant literature.

2.2.2. The Shallow Structure Hypothesis (Clahsen and Felser, 2006)

The Shallow Structure Hypothesis posited by Clahsen and Felser (2006) predicts that second language (L2) processing in adults is shallower and less detailed than first language (L1) processing and children's L2 processing. According to *the Shallow Structure Hypothesis*, L2 processing "does not rely on structure-based parsing strategies when resolving ambiguities in the L2" (p.17). Nonnative adults are believed to underuse syntactic information during parsing while being guided by lexical-semantic and pragmatic information to the same extent as adult native speakers. Thus, the investigation of the RC attachment ambiguity also seems interesting from an L2 processing perspective. The Shallow Structure Hypothesis has been supported by some evidence. To illustrate, Hahne (2001) and Hahne and Friederici (2001) conducted ERP studies with Russian and Japanese learners of German. The results displayed similar negative peaks at around 400 ms after the stimulus onset (N400), a response associated with lexical-semantic processing both in L2 learners and L1 speakers. However,

L2 learners did not display significant modulations of the syntax-related ERP components observed in L1 speakers (i.e. early anterior negativity (ELAN) and the P600). Neuro-imaging studies have reported similar results. For instance, Wartenburger et al. (2003) utilized fMRI (functional magnetic resonance imaging) to examine neural responses to syntactic and semantic violations in Italian learners of German. More precisely, Wartenburger and colleagues focused on the influence of age of acquisition and proficiency levels on their responses. The results showed that the level of proficiency played a significant role in determining the pattern of brain activity for semantic judgment whereas syntactic processes were mainly affected by age of acquisition. Rüschemeyer et al. (2006) also investigated the processing of syntactic and semantic information by L1 speakers and L2 learners in an fMRI experiment. The participants were Russian learners of German with high proficiency in L2, and they were tested while reading German sentences containing a syntactic, semantic or no violation. The results revealed overall greater activation in several language- and motor-related regions in L2 learners than L1 speakers, which reflected greater difficulties in reading and a greater reliance on semantic processing for L2 learners. However, the processing of syntactic violations did not elicit greater activation in L2 speakers whereas syntactic processing in L1, as compared to semantic processing, was associated with increased activation in left mid to posterior superior temporal gyrus. Furthermore, both L1 speakers and L2 learners showed increased involvement of left inferior frontal gyrus in response to the processing of semantic violations. There has been also some behavioral evidence in support of the Shallow Structure Hypothesis. To illustrate, Roberts and Felser (2011) investigated the influence of plausibility information on the processing of garden-path sentences in L2. In a self-paced reading task, Greek learners of English read sentences containing temporary subject-object ambiguities such as *While the band played the song pleased all the customers* (the NP *the song* is temporarily ambiguous because it could be analyzed as the direct object of the preceding verb or the subject of the following main clause). The results indicated that L2 learners were more strongly affected by plausibility information in the real-time processing, and that they had more difficulty in recovering from an initially preferred analysis. In brief, the data obtained through electrophysiological and neuro-imaging studies as well as behavioral studies suggest that L1 speakers and L2 learners might be relying on different mechanisms in sentence processing. Nonetheless, the hypothesis has been criticised due to some conceptual problems. For instance, Dekydtspotter et al. (2006) were of the opinion that the Shallow Structure Hypothesis has serious flaws in explanation for both L2 processing and L2 acquisition. In this regard, the authors asserted that if L2 learners rely less on syntactic information and more on lexical-semantic, contextual and pragmatic information, "for natives vs. L2ers, the entire relationship between language and other domains of cognition is fundamentally different" (p.35). Furthermore, Dekydtspotter and colleagues pointed to the consequences of the hypothesis for L2 learning. More precisely, the authors argued that syntactic processing is crucial for L2 learning and the so-called shallow processing employed by L2 learners cannot account for the developmental paths observed in the acquisition of L2 syntax. Besides, as Rah (2009) stated, "shallow processing might be restricted to specific structures, to on-line processing, to inexperienced learners, or to learners who started to acquire their L2 after a certain age" (p.29). The

hypothesis does not clarify where L2 learners apply shallow processing. Therefore, further research with a group of learners from different linguistic backgrounds seems essential.

2.2.3. Summary

The ability to acquire language(s) has been of great interest to many scholars. Several theories and hypothesis have been posited, a considerable number of studies have been conducted in order to enable a sophisticated understanding of both L1 and L2 processing. On the one hand, we, as human beings, have an astonishing capability of early mastery of language with all its complexity at very early ages in life. On the other hand, L2 acquisition with native-like attainment stands as a challenge particularly after a certain age. Some claim that the neural basis of L2 processing is the same as that of L1, and differences or difficulties faced vary depending on a number of L2 factors whereas some others do not share the same opinion advocating that some aspects of L2 processing do not function native-like. In particular, syntactic processing represents an intriguing aspect of both L1 and L2 processing, and the understanding of the underlying mechanisms is actually still incomplete. The current study, as mentioned before, aims to investigate ambiguity resolution in RC attachments by focusing on both L1 and L2 processing strategies. Therefore, the findings of the study are expected to contribute to the understanding of general sentence processing mechanisms.

2.3. Relative Clause Attachment Ambiguity

The processing of syntactic ambiguities such as relative clause (RC) attachment ambiguity as in (16) has been of interest to many scholars, particularly due to the cross-linguistic variation in the way it is processed by speakers of various languages.

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

The sentence in (16) is ambiguous because the noun phrase (NP) (i.e. *the servant* or *the actress*) which the RC modifies is not clear. Figure 1 below displays NP1 attachment interpretation of RC (a), and NP2 attachment interpretation of RC (b) respectively.

Resolution of this ambiguity shows cross-linguistic variation and has gathered attention in L1 processing research. To illustrate, monolingual English speakers show an NP2 attachment preference (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999) whereas monolingual Spanish speakers favour an NP1 attachment strategy (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999; Carreiras, Salillas, & Barber, 2004). The literature which has examined RC attachment shows that different languages have different attachment preferences. Table 3 below shows RC attachment preferences in a variety of native languages.

This cross-linguistic variation was first reported in Cuetos and Mitchell's seminal study (1988). The authors carried out two questionnaire and three online experiments, and found that Spanish speakers, unlike English speakers apparently do not use the Late Closure strategy in parsing ambiguous sentences. Henceforth, Cuetos and Mitchell argued that the Late Closure, which has been regarded as an efficient strategy, might not be favoured across all languages, and different languages might make use of different parsing strategies. The eye-tracking experiment by Carreiras and Clifton (1999) also confirmed the attachment preferences in English and Spanish found by Cuetos and Mitchell.

a. NP1 attachment

```
                        DP
              /                    \
           D                         NP1
           |                    /           \
          the               NP1        [CP who was on the balcony]
                        /        \
                      N              PP
                      |          /        \
                   servant    P               DP
                              |          /        \
                             of        D             NP2
                                       |              |
                                      the           actress
```

b. NP2 attachment

```
                        DP
              /                    \
           D                         NP1
           |                    /           \
          the                N1              pp
                             |          /          \
                          servant    P                 DP
                                     |          /            \
                                    of        D                 NP2
                                              |          /            \
                                             the      N2           [CP who
                                                      |            was   on
                                                    actress        the
                                                                   balcony]
```
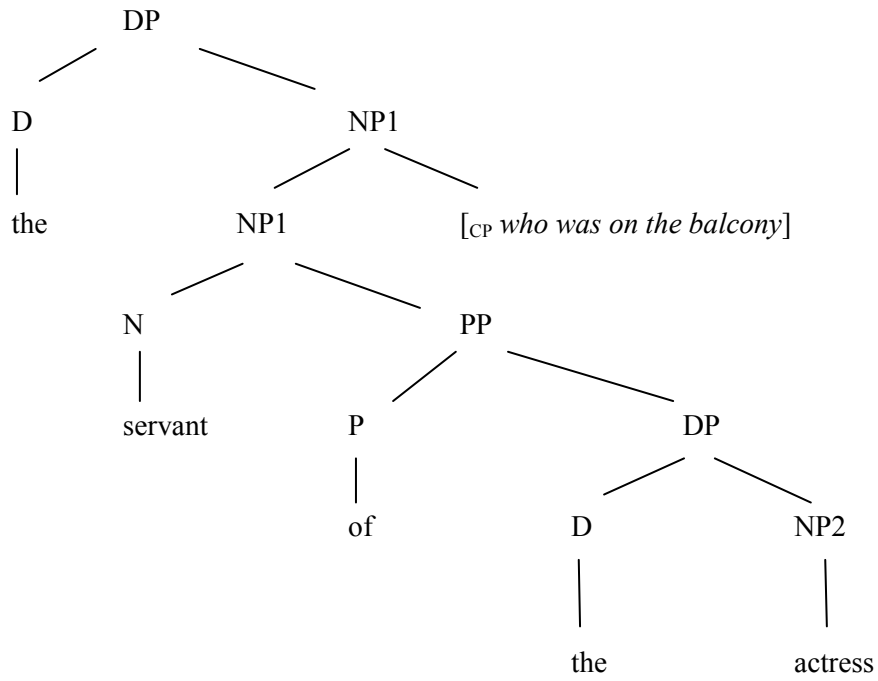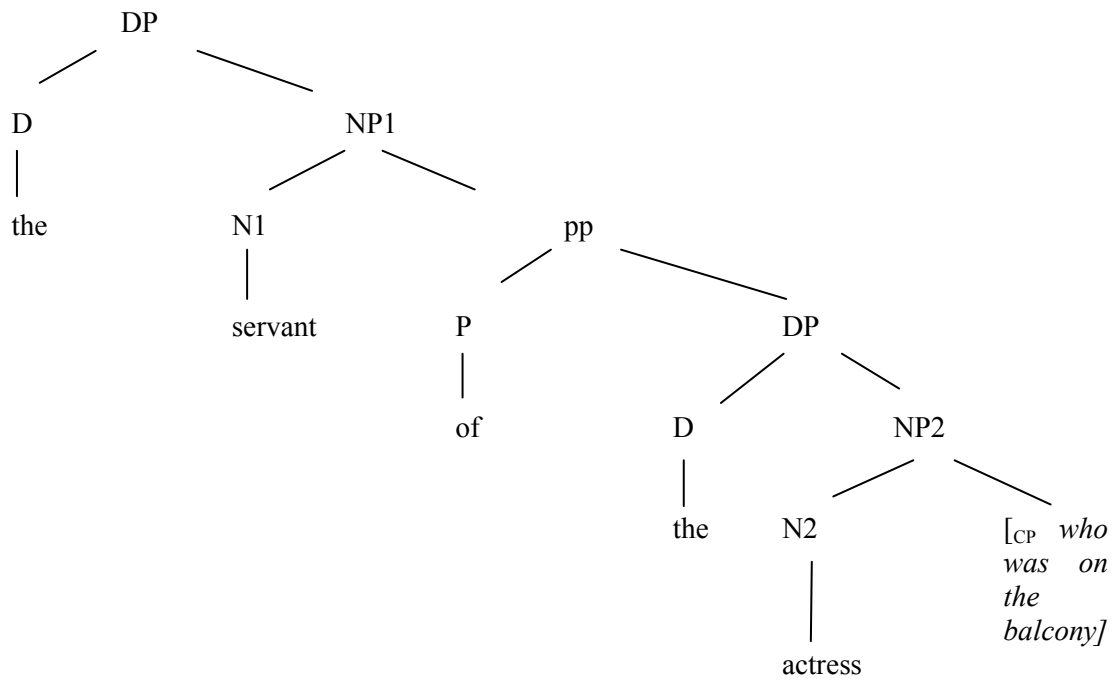
Figure 1. (a) NP1 attachment interpretation; (b) NP2 attachment interpretation

Since then, a manifold of studies have been conducted in order to test the attachment preferences in other languages. The findings revealed that languages fall into either NP1 (e.g. Spanish) or NP2 (e.g. English) attachment category. More specifically, the languages that fall into NP2 attachment category include English (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999), Norwegian, Swedish, and Romanian (Ehrlich et al., 1999), Italian (DeVincenzi & Job, 1993), Portuguese (Maia et al., 2007), and Arabic (Abdelghany & Fodor, 1999 as cited in Abdelghany, 2010). Ehrlich et al. (1999) tested three languages, Norwegian, Swedish, and Romanian using offline tasks. Ehrlich and colleagues first composed sentences in English, and then translated them into these three languages as closely as possible and making sure that they sounded natural in the target languages. Furthermore, these sentences were tested in English and Spanish, and the results conformed to the previously reported attachment preferences in these languages. Even though NP2 attachment in Norwegian and Swedish seems to be in line with the Gricean account because both languages have alternative genitive forms, Ehrlich and colleagues claimed that a syntactic or prosodic account could explain NP2 attachment in Romanian. Using two questionnaires and an online task, DeVincenzi and Job (1993) investigated the attachment preference in Italian, and claimed that the parser obeyed universal parsing strategies. Maia et al. (2007) compared Brazilian and European Portuguese in a self-paced reading task, and claimed that the data confirmed the Late Closure strategy at initial stages of processing. Maia and colleagues suggested that NP1 attachment preference observed in offline (i.e. untimed) tasks could be explained by the Implicit Prosody Hypothesis posited by Fodor (1998). In a questionnaire study revealing NP2 attachment in Arabic, Abdelghany and Fodor (1999 as cited in Abdelghany, 2010) also asserted that the Implicit Prosody Hypothesis could account for NP2 attachment in Arabic because the prosody favours NP2 in Arabic.

The languages that fall into NP1 attachment category, on the other hand, included Dutch (Brysbaert & Mitchell, 1996), German (Hemfort et al., 1998), Afrikaans (Mitchell et al., 2000, as cited in Fernández, 2003), Spanish (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1999; Carreiras, Salillas, & Barber, 2004), French (Zagar et al., 1997), Russian (Sekerina, 1997), Polish (Nowak, 2000 as cited in Sekerina et al., 2004), Croatian (Lovrić, 2003), Bulgarian (Sekerina et al., 2004), Japanese (Kamide & Mitchell, 1997; Miyao & Omaki, 2006), Korean (Lee & Kweon, 2004), Persian (Arabmofrad & Marefat, 2008), Thai (Siriwittayakorn et al., 2014), and Greek (Papadopoulou & Clahsen, 2003). To start with, Brysbaert and Mitchell (1996) carried out a questionnaire study and two online experiments in order to investigate RC attachment preferences in Dutch, and indicated that the results seemed to be in line with the predictions of the accounts incorporating parsing mechanisms tuned by language experience. In offline and online tasks, Hemforth et al. (1998) observed NP1 attachment in German, and asserted that there must be a combination of multiple factors alongside syntax in order to account for the attachment preferences, and focused exclusively on anaphor binding considering that RC attachment is not only a syntactic question but also a matter of anaphor resolution. Zagar et al. (1997) conducted an eye-tracking experiment in French, and found NP1 attachment preference exhibited by first-pass reading times which are associated with initially preferred analysis. Using a questionnaire and an online task, Sekerina (1997) also found NP1 attachment in Russian, and asserted that Fodor's Implicit Prosody Hypothesis could account for the attachment preference due to the strong prosodic phrasing principles in Russian. Investigating RC attachment preferences in Croatian, Lovrić (2003) also indicated that the results supported Fodor's Implicit Prosody Hypothesis due to the distinctive pattern of prosodic phrasing which favours a prosodic break before a long RC rather than a short RC, and a prosodic break before the preposition in the prepositional

genitive construction, but not before non-prepositional variant of the construction. Using an offline task (pen-and-paper; untimed) in their first experiment, Sekerina et al. (2004) also found NP1 attachment in Bulgarian as in other Slavic languages such as Russian, Polish and Croatian. Sekerina and colleagues were of the opinion that semantic/ pragmatic complexity of the materials in the first experiment presented without immediate contextual referents might have revealed an overall NP1 attachment tendency in Bulgarian. Therefore, Instead of using NPs, like the brother of the teacher, NPs referring to abstract geometric shapes, like the tip of the triangle, were used and presented with corresponding visual contexts in the second and third experiments in different modalities; auditory and written respectively. The attachment preference shifted to NP2 in the second and third experiments containing visual materials, thereby suggesting that RC attachment preferences are sensitive to the task type. In Japanese, Kamide and Mitchell (1997) observed NP1 attachment preference in an offline task. Nonetheless, the online self-paced reading experiment showed that RCs are initially attached to NP2, and later assigned to NP1, at the end of the sentence followed by reanalysis process. Using both an offline and an online task, Lee and Kweon (2004), however, found NP1 attachment in Korean, a similar language to Japanese as a head-final language, without any asymmetry between the two task types. Given that the previous offline studies showed an NP1 attachment preference in Persian (Marefat & Meraji, 2005), Arabmofrad and Marefat (2008) indicated that they conducted an online study to provide a better understanding of the processing RC attachments in Persian. The consistent results confirmed that Persian has an NP1 attachment preference. Furthermore, comparing the reaction times to semantically disambiguated RC attachments (assuming that NP1 attachment would be faster when RCs are semantically disambiguated towards NP1 that when RCs are semantically disambiguated towards NP2 and vice versa), Arabmofrad and Marefat (2008) argued that L1 speakers used purely syntactic parsing strategies as opposed to the predictions of the constrained-based accounts. Siriwittayakorn et al. (2014) reported corpus and reading-time data for the attachment preferences in Thai. The authors asserted Thai favoured NP1 attachment unlike English though the two languages share many grammatical features such as rigid SVO word order. Siriwittayakorn and colleagues suggested that if a language allows constituents (e.g. adverbs, and adjectives) to intervene between a verb and a direct object, or the modified noun and RC could increase the likelihood of NP1 attachment preference, and proposed a generalized Modifier Straddling hypothesis (Cuetos & Mitchell, 1988).

All in all, the languages neither in NP1 nor in NP2 attachment category apparently have salient common properties which set these two categories apart from one another (Ehrlich et al., 1999). Besides, as Fernández (2003) noted, language-specific preferences in RC attachment are not actually very distinctive. The rates of attachment to either NP1 or NP2 in offline tasks are usually observed to be at around 60% (e.g. Abdelghany, 2010; DeVincenzi & Job, 1993; Cuetos & Mitchell, 1988; Sekerina et al., 2004; Zagar et al., 1997). Manipulations in the experimental materials, either in the complex genitive NP (Gilboy et al., 1995) or in RCs (Fernández, 2000; Hemforth et al., 2015), in the task type and the complexity of the material (Kamide & Mitchell, 1997; Sekerina et al., 2004) have resulted in variations in RC attachment preferences in languages. Individual differences such as working memory capacity might also contribute to variations in the attachment preference (Mendelson & Pearlmutter, 1999). Furthermore, the relevant literature has suggested that only a combination of multiple processes (e.g. syntactic, semantic, anaphoric etc.) could account for the cross-linguistic variations considering the fact that RC attachment preferences cannot be explained by a purely syntax-based mechanism (Hemfort et al., 1998).

Nonetheless, it is important to provide an understanding of why there are these language-specific differences and what they are.

With regard to Turkish, the language which is under investigation within the scope of this dissertation, there have been also some attempts in order to understand whether Turkish speakers have any attachment preferences or not, and which category Turkish fall into. For instance, Kırkıcı (2004) investigated the resolution of RC attachment ambiguity with an offline study. He constructed the experimental sentences in two different versions, containing a complex NP host with a genitive possessive construction as in (17a) or a postposition (i.e. *yanında* ; 'next to') as in (17b). The results showed that Turkish speakers did not display any clear attachment preferences in sentences where an ambiguous RC consisted of two animate NPs whereas they had an NP2 attachment tendency when two inanimate NPs existed as potential attachment hosts in such sentences. Furthermore, the results showed that Turkish speakers preferred to attach the ambiguous RC to NP2 in sentences where two potential animate NP hosts were joined with a postposition.

(17)   a.   Şoför, şehir merkezinde oturan profesörün sekreterini gördü.
                  'the driver saw the secretary of the professor who lives in the city centre'

         b.   Şoför, şehir merkezinde oturan profesörün yanındaki sekreteri gördü.
                  'the driver saw the secretary next to the professor who lives in the city centre'

Kırkıcı stated that the results seemed to be in line with the predictions of the Construal Hypothesis, which indicates that the presence of a theta-assigning pre-postposition leads to a stronger preference to attach the ambiguous RC to NP2 due to the thematic processing domain created by the postposition *yanında*. Furthermore, the results supports the idea that the ambiguity resolution is influenced by the lexical-semantic information. However, none of the sentence processing accounts can provide satisfactory explanation for that Turkish speakers had an NP2 attachment tendency in the inanimate condition whereas they did not display any clear attachment preference in the animate condition.

Table 3.
RC attachment preferences in L1

NP2 (Local) Attachment			NP1 (Non-local) Attachment		
Languages	**Researchers**	**Year**	**Languages**	**Researchers**	**Year**
English	Cuetos & Mitchell	1988	Dutch	Brysbaert & Mitchell	1996
	Carreiras & Clifton	1999	German	Hemforth, Konieczyn, Scheepers, & Strube	1998
Norwegian	Ehrlich, Fernández, Fodor, Stenshoel, & Vinereanu	1999	Afrikaans	Mitchell et al. (as cited in Fernández, 2003)	2000
Swedish			Spanish	Cuetos & Mitchell	1988
				Carreiras & Clifton	1999
Romanian				Carreiras, Salillas, & Barber	2004
Italian	DeVincenzi & Job	1993	Greek	Papadopoulou, & Clahsen	2003
Portuguese	Maia, Fernández, Costa, & Lourenço-Gomes	2007	French	Zagar, Pynte, & Rativeau	1997
			Russian	Sekerina	1997
Arabic	Abdelghany & Fodor (as cited in Abdelghany, 2010)	1999	Polish	Nowak (as cited in Sekerina et al., 2004)	2000
			Croatian	Lovrić	2003
			Bulgarian	Sekerina, Fernández, & Petrova	2004
			Japanese	Kamide & Mitchell	1997
				Miyao & Omaki	2006
			Korean	Lee & Kweon	2004
			Persian	Arabmofrad & Marefat	2008
			Thai	Siriwittayakorn, Miyamato, Ratitamkul, & Cho	2014

Kırkıcı suggested that a potential explanation could be sought within the framework of the Tuning theory, and a detailed analysis of corpora might provide explanation for this dissociation in Turkish. Besides, he added that another explanation for an NP2 attachment tendency in Turkish could be established in line with the Avoid Ambiguity Strategy, based on the Gricean maxim of quantity. In addition to the ambiguous RC structure [RC - NP2 - NP1] , Turkish allows an unambiguous RC structure [NP2 - RC -NP1] due to overt case marking if the intention is to modify NP1 as in (18) below. Then the structure is unambiguous, and the RC now only refers to *hizmetçi* ('the servant') as in the Saxon genitive.

(18)   Birisi [NP2 aktris-in] [balkon-da dur-an] [hizmetçi-si-ni] vurdu.
        Someone   actress-GEN   balcony-LOC   stand-PART   servant-3SG.POSS.ACC
        shoot-PAST
        'Someone shot the actress's servant who was standing on the balcony.'

This could explain Turkish speakers' overall NP2 attachment tendency in the inanimate condition. However, there is still a need for further research to shed further light on why Turkish speakers did not display any attachment preferences in the animate condition. Furthermore, the participants employed in this study were all students from an English-medium university even though they were all Turkish native speakers. Most probably they had an advanced level of English proficiency, and thus they may not be regarded as exactly monolingual Turkish speakers. Therefore, their L2 might have also influenced their attachment preferences in the Turkish offline study (Pavlenko, 2000).

2.3.1 English Sentence Structure and Genitive NPs Modified by RCs

English has a strict word order. The basic word order in English is SVO. Furthermore, it is identified as a head-initial language. A typical sentence consists of a subject and a predicate realised by a verb phrase as in *John likes Mary*. In general, modifiers could be classified as pre-Head modifiers and post-Head modifiers. The typical pre-Head modifier is an adjective or an adjective phrase (such as a nice jacket; a very difficult problem) (Strazny, 2005). The examples of the typical post-Head modifiers are usually the preposition phrases and relative clauses (such as the branch of the tree; the man who is wearing a red hat). However, these are not the only possibilities, nouns, for instance can function as modifiers such as the unemployment situation, and adverbs can be either a pre-Head modifier (as in *very deeply*) or a post-Head modifier (as in *she drives fast*). More precisely, the focus here, however, will be on the modification of noun phrases, genitive structure, and relative clauses in English.

The English noun phrase consists of a head (head word; noun) and optional constituents, known as modifiers of varying degrees of complexity, as in Turkish (Göksel & Kerslake, 2005). However, the modifiers in the English noun phrase can either precede or follow the head whereas all modifiers in the Turkish noun phrase, no matter how complex they are, precede the head. The pre-modifiers in English include articles (*a* car, *the* basket), demonstratives (*this* chair, *those* flowers), numbers (*two* cats, the *third* option), quantifiers (*some* lemons, *a lot of* noise) adjectives (a *small* gift, the *young* man), genitives (his, her, John's), participles (the *provided* words, a *walking* stick), nouns (two *bamboo* baskets, this *rubber* factory), and adverbs (the *above* table) while the post-modifiers are relative clauses (the book *that I showed you yesterday*), prepositional phrases (the mangoes *in the basket*), adverb phrase (those examples *above*; in the week *before*), apposition (Laila, *my girlfriend*;

Jakarta, *the capital of Indonesia*), and adjective phrase with a pronoun although this type of modifiers is rarely used (something *interesting*, someone *strange*) (Kristianto, 2009).

The genitive structure is used to express possession. Crystal's definition (2008) is as follows:

> One of the FORMS taken by a WORD, usually a NOUN or PRONOUN, in LANGUAGES which express GRAMMATICAL relationships by means of inflections. The genitive CASE typically expresses a possessive relationship (e.g. *the boy's book*), or some other similarly 'close' connection (e.g. *a summer's day*); but there is a great deal of variation between languages in the way this case is used. The term may also apply to CONSTRUCTIONS formally related to the case form, as in the 'post-modifying' genitive with *of* in English, e.g. *the car of the general* (*the general's car*). (p.210)

In English, there are two forms of the genitive; the Saxon genitive or also known as the inflected genitive and pre-modifying genitive (the *-s* genitive) and the Norman genitive or also known as the periphrastic genitive and post-modifying genitive (the *of* genitive) (Quirk, 1972). In the Saxon genitive, a genitive marker *-s* is added after the modifier noun phrase (modifier NP + -s + head NP) as in *the girl's father* or *the children's toys*. In the Norman genitive, on the other hand, the head noun phrase is followed by a preposition phrase, *of,* before the modifier noun phrase (head NP + of + modifier NP) as in *the father of the girl* or *the toys of the children*. Furthermore, both the modifier and the head can have modification such as *the naughty children's beautiful toys* or *the beautiful toys of the naughty children*.

The noun phrases can be modified by a relative clause such as *the pretty girl who is standing in the corner*, as pointed out above. Relative clauses are post-modifying clauses within a noun phrase (Crystal, 2008). Relative pronouns introduce relative clauses post-modifying noun phrases. They include wh- pronouns such as who, which, where, etc., and that or zero as displayed in (19) below.

(19)   I'd like to see the car *which / that / X /* you bought last week.

In the case of only one potential host NP, RC modifies that NP and the interpretation is obvious. If there are more than one potential host NPs which RC might modify as in (20), then the interpretation is not obvious due to the emerging ambiguity. This results in difficulty in RC attachment, which could be resolved depending on a number of factors, among which syntactic, semantic, pragmatic and contextual information available will prevail.

(20) a. Someone shot [$_{NP1}$the servant]of[$_{NP2}$the actress][$_{RC}$ who was standing on the balcony].

   b. Someone shot the actress's servant who was standing on the balcony.

In English, such ambiguity emerges only if the Norman genitive is used as in (20a) because RC could be attached either to NP1 or NP2. The Saxon genitive does not allow RC in a sentence as in (20b) above to be attached to the modifier NP (e.g. *the actress*), and thus the interpretation is not ambiguous.

2.3.2. Turkish Sentence Structure and Genitive NPs Modified by RCs

Turkish is a subject-object-verb (SOV) language with a relatively free-word order. It is an agglutinative language with rich derivational and inflectional morphology (Dinçtopal-Deniz, 2010). Turkish grammar requires that the head of phrase to be placed in phrase-final position. The Turkish equivalent of the construction given in the sentence (15) is as follows:

(21) Birisi [RC balkon-da duran] [NP2 aktris-in] [NP1 hizmetçi-si-ni] vurdu.
someone balcony-LOC stand-PART actress-GEN servant-3SG.POSS-ACC shoot-PAST
'someone shot the servant of the actress who was standing on the balcony'

Figure 2 below displays NP1 attachment interpretation(a), and NP2 attachment interpretation (b) in Turkish respectively.

a)

34
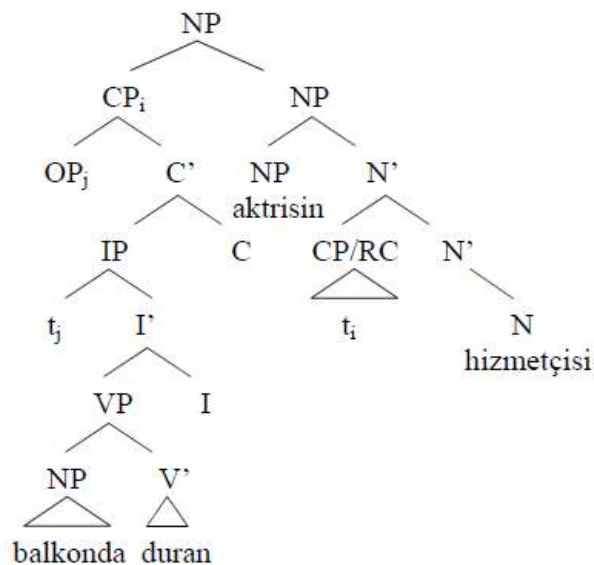
b)
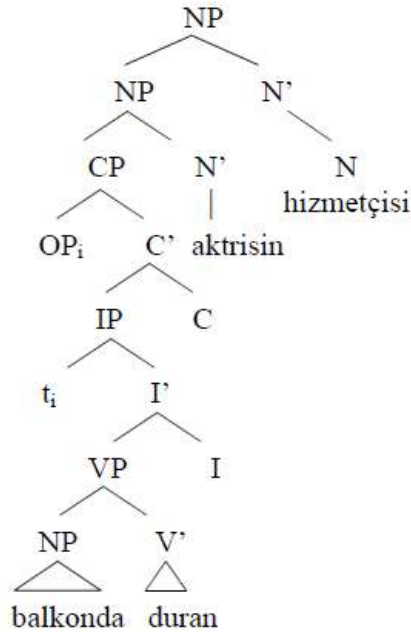
Figure 2. (a) NP1 attachment interpretation ("*balkonda duran* aktrisin *hizmetçisi* "; the servant was standing on the balcony); (b) NP2 attachment interpretation ("*balkonda duran aktrisin* hizmetçisi "; the actress was standing on the balcony). Retrieved from Dinçtopal (2007), pp.52-53.

Complex genitive NPs in English are realized as genitive possessive constructions in Turkish. They are marked with genitive (-in) and possessive suffixes (-i) on the first and second NP respectively. Furthermore, Turkish does not allow two vowels come together. Hence, the rule is that if a word ends with a vowel, a combining letter is used before adding the suffix. Thus, (-n) is used before the genitive (-in), for instance, 'elma-nın', and similarly (-s) is used before the possessive suffix (-i) if a word ends with a vowel as in 'hizmetçi-si' above. The last suffix in 'hizmetçi-si-ni' is the accusative marker (-i) with (-n) used since the word ends with a vowel. In Turkish, relative clauses are pre-nominal. RC precedes the noun it relativizes. There is not an overt wh- element in Turkish, and RCs in Turkish consist of a non-finite verb with a nominal participle. Furthermore, the participial suffix -An in the RC serves as the relativizing element in subject RCs in Turkish (Göksel & Kerslake, 2011). The relevant literature has demonstrated that the comprehension and production of subject RCs as in (22b) are easier as compared to those of object RCs as in (22a).

(22) a.   [kadın-ın   sev-diğ-i]   adam
             woman-GEN   love-OPart-3SG   man
             'the man who the woman loves'

      b.   [kadın-ı   sev-en]   adam
             woman-ACC   love-SPart   man
             'the man who loves the woman'

In Turkish there are two morphologically distinct types of RCs for the target as a direct object as in (23a) and the target as a subject as in (23b) below (Knecht, 1979).

(23) a.   kadın-ın   al-dığ-ı   halı
             woman-GEN   buy-PART-POSS   rug
             'the rug which the woman bought'

      b.   halı-yı   al-an   kadın
             rug-ACC   buy-PART   woman
             'the woman who bought the rug'

In both cases, the verbs of the RCs are formed with a participle suffix; namely -DIK and (y)An, both of which encode non-future tense. -(y)AcAK is used in RCs for the future tense, yet the focus here will be merely on the difference between -DIK, used for the relativization of a non-subject (an object) and -(y)An, used for the relativization of a subject. In the former, the object RC case exemplified in (23a) above, the subject of the participle takes a genitive mark (-ın) and the participle takes a possessive suffix (-ı), thereby forming a genitive-possessive compound. In the latter, the subject RC case as exemplified in (23b) above, the relativization is carried out by the participle -(y)An with no extra morphology.

Several efforts have been made to explain the relative difficulty of acquiring these different types of RCs. The research in Turkish shows that object RCs are less frequent than subject RCs, and that Turkish children have a higher accuracy in comprehension of subject RCs than object RCs (Özge, 2010). Furthermore, the complexity of -DIK construction leads to another difficulty. The genitive marking of the subject in object RCs is distant from the canonical clause structure in Turkish, and more problematic, thus the processing of subject RCs is easier than that of object RCs (Aydın, 2007). Furthermore, -DIK is ambiguous and serves several purposes. There is a morpho-phonological similarity of -DIK in RC as object relativizing participle and the part tense marker in the 1st person plural (-DI-K), as in the sentence *Araba al-dı-k* ('we bought a car'). Additionally, -DIK is also used in noun clauses such as *Ali'nin gel-diğ-i-ni duydum* ('I heard that Ali came') (Göksel & Kerslake, 2005).In this dissertation, however, following Kırkıcı (2004) and Dinçtopal-Deniz (2007; 2010), the experimental sentences consisted of RCs only with the participle -(y)An.

2.4. Relative Clause Ambiguity Resolution in L2

The interest in L2 processing of RC attachments has been driven by the question of if syntax is shared or separate in L2 learners. Many scholars have explored the issue across languages. A chronological review of some studies investigating L2 processing of RC attachments in a variety of languages will be presented here. In most of the studies, online (self-paced reading tasks, timed) and offline (pen-and-pencil, untimed) tasks displayed different attachment preferences. Table 4 below shows a summary of RC attachment preferences in L2.

To start with Fernández (2002) compared Spanish L1 and English L1 speakers with Spanish L2 and English L2 learners in terms of their attachment preferences both in offline and online tasks. The goal of the study was to distinguish initial analysis from reanalysis. The initial analysis was assumed to be influenced by purely syntactic information whereas reanalysis was believed to be shaped by non-syntactic components, as well.

Initial analysis was tested by evaluating mean reading times during a self-paced reading task. Both English L1 and Spanish L1 speakers had significantly shorter reading times when RCs were forced to be attached to NP2. Fernández (2002) suggested that the absence of cross-linguistic difference provided evidence for the idea that the initial analysis was made by purely syntactic information. However, L2 learners showed different results. In this regard, Fernández (2002) explained the difference observed in L2 learners with the decreased speed in reading due to the performance deficit experienced by L2 learners with linguistic tasks. Accordingly, English-dominant L2 speakers read English faster than they did Spanish. On the other hand, Spanish-dominant L2 speakers showed longer reading times than monolingual counterparts both in their dominant (i.e. Spanish) and in non-dominant language (i.e. English). The results are not surprising considering the fact that Spanish-dominant L2 speakers did not have much opportunity to maintain their literacy skills in their dominant language in New York City, and English-dominant L2 speakers did not have much opportunity to develop their skills in their non-dominant language (i.e. Spanish).

In order to measure the ultimate preferences of L1 speakers and L2 learners, an untimed pen-and-pencil task was used. The results of the questionnaire replicated the previous findings that Spanish L1 speakers showed an NP1 attachment tendency whereas English L1 speakers preferred NP2 attachment. As for the L2 learners, Spanish-dominant participants showed more NP1 attachment preferences than English-dominant participants. In this regard, Fernández (2002) asserted that the results provided evidence for language independent processing. More precisely, L2 learners were observed to exhibit attachment preferences which were displayed by monolingual speakers of their dominant language.

Dussias (2003) also investigated the parsing strategies used by English L1-Spanish L2 and Spanish L1-English L2 groups while reading ambiguous sentences including NP1-*of*-NP2-RC type of clause in their L1 and L2. The data was similarly collected by means of a pen-and-pencil questionnaire and a self-paced reading task. The results obtained for English L1-Spanish L2 group both in the English questionnaire and in their second language showed that their preferred parsing strategy favoured NP2 attachment. The online data, however, did not show any clear attachment preference for English L1-Spanish L2 group while reading in their L2. Therefore, Dussias suggested that this group of people did not seem to be performing syntactic analysis in their L2 in the same way Spanish L1 speakers do. On the other hand, considering the reading times for NP2 attachment forced sentences were shorter,

Dussias was of the opinion that English L1-Spanish L2 group had somewhat NP2 attachment tendency in their L2, as well.

The results obtained for Spanish L1-English L2 in the Spanish questionnaire showed that they had an NP2 attachment tendency while processing NP1-*of*-NP2-RC type of constructions in their L2. Furthermore, Dussias also found NP2 attachment preference in Spanish L1-English L2 group while reading in their L1 both in the offline and in the online task, unlike the previous research which showed NP1 attachment preference in Spanish L1. Therefore, Dussias pointed that it was not likely to say whether this group of participants followed the parsing strategies in their L1 or not while reading in English, their L2. In this regard, Dussias explained the reason why NP2 attachment was favoured by both groups of L2 speakers with the cognitive demand on bilingual language processor. She said "the cognitive pressure and memory-load demands associated with housing two linguistic systems constrain the bilingual parser to use operations such as late closure" (p. 552). The assumption put forth was that the processor favoured late closure to minimize processing delays, given that the bilingual brain cannot completely deactivate one of the languages even on a monolingual task and it manages both linguistic systems (Grosjean, 1997).

In order to examine whether L2 learners could acquire the parsing strategies of their L2 and the extent to which L2 processing is influenced by syntactic and non-syntactic information, Felser et al. (2003) conducted both an offline and an online task. The authors investigated the way L2 learners resolved RC attachment ambiguity. Two groups of advanced L2 learners of English with German L1 and Greek L1 background took part in the study. The results did not provide any evidence for the use of syntactic information while processing RC attachments. The participants did not show any clear attachment preferences for sentences containing complex genitive NPs modified by RCs. Therefore, Felser and colleagues asserted that advanced L2 learners primarily relied on lexical-semantic information in L2 processing.

Papadopoulou and Clahsen (2003) investigated RC attachment preferences of Greek L2 learners with Spanish L1, Russian L1, and German L1 background. The authors carried out a grammaticality judgment task, an acceptability judgment task, and a self-paced reading task. A control group of Greek L1 speakers was also included in the study. The results showed that Greek L1 speakers had a clear attachment preference to attach RCs to NP1. However, L2 learners did not show any clear attachment preferences. The three groups of L2 learners exhibited the same pattern irrespective of their L1 background. Thus, Papadopoulou and Clahsen suggested that L2 learners did not transfer parsing strategies directly from their L1.

In order to understand the parsing strategies of Korean L1- Japanese L2 speakers, Miyao and Omaki (2006) conducted an offline questionnaire with Korean L1 - Japanese L2 speakers who had intermediate to advanced level of Japanese and Japanese L1 speakers. The results of the offline study showed a clear NP1 attachment preference both in Japanese L1 and L2 groups. The authors also conducted an online self-paced reading task, which reveal better measures of initial attachment preferences. The results showed that Japanese L1 speakers showed an NP1 attachment preference whereas Korean L1- Japanese L2 speakers had an NP2 attachment tendency. According to the authors, NP1 attachment preference both by Japanese L1 and L2 speakers in the offline task showed that L2 learners either transferred their L1 parsing strategies (the previous research showed that Korean L1 speakers had NP1 attachment preference (e.g. Lee & Kweon, 2004)) or adopted the target-like strategy because Japanese L1 speakers also showed NP1 attachment preference in offline tasks. On the other

hand, the authors argued that Japanese L1 speakers in the online task also showed an NP1 attachment preference, unlike the findings of Kamide and Mitchell (1997) which showed an initial NP2 attachment. In this regard, Miyao and Omaki indicated that the reason why the previous online study showed an initial NP2 attachment preference could be related to the stimuli biasing NP2 attachment. The authors added that the consistency between the offline and online attachment preferences found in their research sounded more likely. However, the results cannot be explained with L1 transfer or L2 influence, given that Japanese L2 learners showed an NP2 attachment in the online task, unlike Japanese L1 speakers or Korean L1 speakers who showed NP1 attachment both in the offline and in the online task. In this regard, the authors suggested that L2 speakers showed NP2 attachment preference because NP2 attachment minimizes the cognitive demand and it is less costly in the online processing whereas they can reanalyse the sentences without time pressure in the offline processing. Furthermore, the authors claimed that the developmental stages in L2 could also affect the attachment preferences, the relative weight of L1 transfer and L2 influence. Accordingly, the assumption put forth is that there might be three phases; L1 transfer phase, intermediate phase, and target-like phase respectively. In the L1 transfer phase, L2 learners transfer L1 parsing strategies. In the intermediate phase, L2 learners develop their L2 grammar and parsing strategies, however the parser is still incomplete and not efficient in the sense that it is still influenced by L1 grammar and parsing strategies. Therefore, the parser prefers to minimize the cognitive demand in online processing. In the target-like phase, L2 learners achieve a target-like grammar and develop their L2 parsing strategies, and thus L2 learners start to show target-like attachment preferences. Miyao and Omaki suggested that the results of the studies conducted by Frenck-Mestre (1997, 2002) with Spanish L1 - French L2 group who had low proficiency and high proficiency in their L2 and their own study with this Korean L1- Japanese L2 group who had intermediate to advanced level of Japanese confirmed this assumption, however further research is essential to understand this relation.

Han (2012) carried out an offline task in order to reveal the parsing strategies of Korean L1 - English L2 speakers while resolving RC attachment ambiguity in English L2. Furthermore, based on the findings of the previous research, Han aimed to understand the extent to which L1 transfer operates in resolving RC attachment ambiguity, and whether there is any relation between L2 proficiency and RC attachment preferences. The results of the offline task did not show any significant relation between L2 proficiency and RC attachment preferences. Korean L1-English L2 speakers preferred NP1 attachment. The author suggested that the overall NP1 attachment could be explained by the Tuning hypothesis considering the fact that Korean L1-English L2 speakers had past experiences of resolving RC attachment ambiguity in their L1, which is towards NP1, and that L2 learners used their L1 experience. The lack of the relation between L2 proficiency and RC attachment preferences is also explained by the lack of L2 experience. Given that L2 learners' experience was restricted to classroom learning, Han assumed that their lack of experience on resolving RC attachment ambiguity in L2 resulted in more L1-like (NP1) and less L2-like (NP2) parsing.

More recently, Taheri et al. (2015) investigated the way Persian L1-English L2 speakers with intermediate level of L2 proficiency resolve RC attachment ambiguity with an offline questionnaire in English. The results showed that Persian L1-English L2 speakers opted for NP1 attachment as Persian L1 speakers do. The participants' English knowledge did not have strong effect on their choices, and if their L2 proficiency was higher, the authors claimed that the results could have been different, and influenced more by their L2 knowledge.

Given that L2 learners fail to show any clear attachment preferences in L2 due to their inability to apply the parsing strategies based on syntactic information, Bidaoui et al. (2016) also sought to investigate RC attachment preferences in Arabic L1 speakers, a Semitic language, and English L1- Arabic L2 speakers. The authors carried out both an offline task and an online self paced reading task. In the offline task, both L1 speakers and L2 learners showed NP1 attachment preference. However, only L2 learners showed NP1 attachment in the online self paced reading task. The authors asserted that the findings provided evidence for syntactic based accounts of RC attachment preferences, and they were in line with the predictions of the Predicate Proximity account (Gibson et al., 1996), given that Arabic allows verbs to be distant from their arguments. The authors stated that the findings contradicted the Shallow Structure hypothesis (Clahsen & Felser, 2006) since L2 learners showed a clear NP1 attachment preference. Furthermore, Bidaoui et al. (2016) claimed that the findings contradicted the prosody account which predicts NP2 attachment for the Arabic language (Abdelghany & Fodor, 1999, as cited in Abdelghany, 2010), yet it is important to remind that L1 speakers did not exhibit significant NP1 attachment preference in the online task in the study conducted by Bidaoui and colleagues although they had significant NP1 attachment preference in the offline task. In brief, although the attachment preferences of L2 learners are influenced by the task type, the stimuli, and L2 proficiency, the relevant literature has not revealed very consistent results with respect to the resolution of RC attachment ambiguity in L2 yet.

Dinçtopal-Deniz (2010) investigated RC attachment preferences of Turkish speakers of English. She tested the processing of RC attachment ambiguity by means of online self-paced reading tasks and offline pen-and-paper questionnaires. Monolingual Turkish speakers, highly proficient Turkish learners of English, and monolingual English speakers took part in the study. Experimental stimuli consisted of temporarily and globally ambiguous sentences. Temporarily ambiguous sentences were disambiguated using animacy information carried by the noun phrases (NPs) in the complex genitive NP. The results of both online and offline tasks revealed that both monolingual Turkish speakers and English native speakers preferred to attach RCs to NP2 both with animate and inanimate antecedents, which was in line with the predictions of *the Construal Hypothesis* (Frazier & Clifton, 1996).

Table 4.
RC attachment preferences in L2

Researchers	Year	Languages		Results	
		L1	**L2**	**Online Task**	**Offline Task**
Fernández	2002	English Spanish	Spanish English	Spanish L2 (No Clear Attachment Preference) English L2 (No Clear Attachment Preference)	Attachment Preference of the Dominant Language (If Spanish > NP1, If English> NP2)
Dussias	2003	English Spanish	Spanish English	Spanish L2 (No Clear Attachment Preference) English L2 (NP2 Attachment)	Spanish L2 (NP2 Attachment) English L2 (NP2 Attachment)
Felser, Roberts, Marinis, & Gross	2003	Greek German	English English	English L2 (No Clear Attachment Preference)	English L2 (No Clear Attachment Preference)
Papadopoulou & Clahsen	2003	Spanish Russian German	Greek Greek Greek	Greek L2 (No Clear Attachment Preference)	Greek L2 (No Clear Attachment Preference)
Miyao & Omaki	2006	Korean	Japanese	Japanese L2 (NP2 Attachment)	Japanese L2 (NP1 Attachment)
Han	2012	Korean	English	NA (Not Applicable)	English L2 (NP1 Attachment)
Taheri, Davodi, & Nasiri	2015	Persian	English	NA (Not Applicable)	English L2 (NP1 Attachment)
Bidaoui, Foote, & Abunasser	2016	English	Arabic	Arabic L2 (NP1 Attachment)	Arabic L2 (NP1 Attachment)

The L2 group, however, showed different results for the online and offline tasks, where the attachment preferences were not similar to the L1 groups. In the online task, they preferred to attach the RC to the NP1 with animate antecedents, but to NP2 with inanimate ones. In the offline task, on the other hand, they displayed an NP1 attachment preference throughout.

Table 5.
RC attachment preferences of Turkish L1, English L1, Turkish L1-English2 groups in online and offline tasks in Dinçtopal-Deniz's Study

Tasks	Turkish L1	English L1	Turkish L1-English L2
Online	NP2	NP2	NP1 (animate) NP2 (inanimate)
Offline	NP2	NP2	NP1

Thus, Dinçtopal-Deniz suggested that the attachment preferences of the L2 group may not be guided by syntactic information but the lexical-semantic information, in line with *the Shallow Structure Hypothesis* (Clahsen & Felser, 2006), yet she did not give further explanation on why the L2 group preferred to attach RCs to NP1 even though both L1 groups showed an NP2 attachment tendency. Furthermore, there is a need for further research to understand the attachment preference of monolingual Turkish speakers and Turkish learners of English, and to explain the influential factors guiding this attachment preferences. Therefore, the purpose of this study is to construct a set of unbiased and balanced ambiguous sentences, which is void of any confounding factors, i.e., sentences in which the likelihood to attach RC to either NP is equal, and to determine the confounding factors that play a role in the resolution of RC attachment ambiguity in Turkish.

2.5. Working Memory and RC Attachment Preferences

The extent to which and how exactly working memory capacity plays a role in RC attachment preferences both in L1 and L2 have been also of great interest to scholars. The literature has shown that working memory capacity and RC attachment preferences interact with each other. In this regard, Just and Carpenter (1992) posited a capacity theory, which predicts that working memory capacity constrains sentence comprehension. More precisely, the authors suggested that processing and storage are mediated by activation available in working memory, and that individual differences in working memory could account for differences observed in language comprehension. With respect to the resolution of syntactic ambiguity, Just and Carpenter indicated that the larger working memory capacity will enable individuals to maintain multiple interpretations. In order to investigate the interaction between working memory capacity and the resolution of RC attachment ambiguity, there have been several studies. Below Table 6 shows a summary of the studies investigating the relation between working memory (WM) and RC attachment preferences in L1.

Table 6.
Interaction between WM and RC attachment preferences in L1

Researchers	Year	L1	Results	
			Offline	**Online**
Mendelson and Pearlmutter	1999	English L1	(Low WM - NP1; High WM - No Clear Attachment Preference)	(Low WM - NP1; High WM - No Clear Attachment Preference)
Swets, Desmet, Hambrick and Ferreira	2007	English L1; Dutch L1	(Low WM- NP1 High WM- NP2)	NA (Not Applicable)
Traxler	2007	English L1	NA (Not Applicable)	*Eye-tracking* (High WM - NP1)
Kim & Christianson	2013	English L1; Korean L1	English L1 (Low WM- NP1 High WM- NP2) Korean L1 (No Clear Interaction)	English L1 (Low WM- NP1 High WM- NP2) Korean L1 (No Clear Interaction)

To start with, Mendelson and Pearlmutter (1999) investigated the interaction between working memory capacity and RC attachment preferences in English. The researchers conducted two experiments, an offline questionnaire and an online self paced reading task. The results of both experiments showed that low span readers preferred to attach RCs to NP1 more than high span readers. The authors suggested that the reason why high span readers attached less NP1 could be due to the ability to consider another genitive form available (i.e. Saxon genitive; *the actor's chauffer*), which unambiguously forces NP1 attachment, and that low span readers focus more on the matrix (main) verb and its arguments (namely NP1).

Swets et al. (2007) also conducted two studies with English L1 and Dutch L1 speakers. In the first study, Swets and colleagues tested offline RC attachment preferences presenting the sentences in full. The results of the first study showed that low span readers preferred to attach RCs to NP1 more than high span readers, which is consistent with the findings of Mendelson and Pearlmutter (1999). The pattern was identical in both languages. In order to provide a better understanding of why low span readers prefer to attach RCs to the more distant NP, Swets and colleagues conducted the second study. In the second study, the authors tested the chunking hypothesis. Accordingly, they forced subjects to separate the complex NP and RC into two segments. The sentences were presented into three separate pieces; first, the complex NP (*the maid of the princess*), second, RC (*who scratched herself in public*), and third the matrix verb phrase (*was terribly embarrassed*). The assumption was that if the individuals differed because low span readers internally chunk the constituents while reading, then with this design there should be no difference among individuals and they should behave like low span readers. The results showed that the average NP1

attachment percentage was higher than it was in the first study where the sentences were presented in full, and the interaction between working memory and attachment preferences was not significant. Therefore, the authors observed a moderating effect of working memory on the attachment preferences with the segmented presentation in the second study. Based on the results of the second study, the authors suggested a possible explanation for the relation between working memory capacity and RC attachment preference. Accordingly, Swets and colleagues predicted that low span readers might be inserting an implicit prosodic break between the complex NP and RC, thereby resulting in NP1 attachment whereas high span readers leave out such breaks, thereby resulting in NP2 attachment.

Following Swets et al. (2007), Traxler (2007) conducted an eye-tracking experiment, and aimed to see the interaction between English L1 readers' working memory capacity and online processing of ambiguous RC attachments. Both Swets et al. (2007) and Traxler (2007) used the same original stimuli with minor modifications (Traxler, 1998). The results showed that disambiguated sentences were harder to process than globally ambiguous sentences. Furthermore, as opposed to the offline results of Swets et al. (2007), Traxler found that high span readers were more likely to attach RCs to NP1 in online processing.

More recently, Kim and Christianson (2013) administered two self-paced reading experiment in order to understand how sentence complexity contributed to RC attachment preferences of English L1 and Korean L1 speakers with different working memory capacity. The first experiment with English L1 speakers showed that working memory capacity played a role in resolving RC attachment ambiguity both in offline and online tasks, yet syntactic complexity had no clear effect on the attachment preferences. More precisely, there was a significant negative correlation between the working memory capacity and RC attachment preferences, supporting the findings of the previous offline studies (e.g. Mendelson and Pearlmutter, 1999; Swets et al., 2007). In other words, low span readers showed a tendency to attach RCs to NP1. The online data also revealed longer reading times at NP2 by low span readers, providing evidence for the chunking hypothesis put forth by Swets et al. (2007).

The second experiment with Korean L1 speakers, on the other hand, showed that syntactic complexity increased NP1 attachment preferences because there is greater distance between integrating heads in Korean, yet working memory capacity had no effect this time. Kim and Christianson suggested that the difference between English and Korean is due to the effects of head-directionality. Therefore, the assumption was that working memory based accounts could provide a better explanation for cross-linguistic variations in RC attachment preferences rather than the previously proposed language-dependent accounts. In brief, the relevant literature on the interaction between working memory capacity and RC attachment preferences has shown that low span readers tend to attach RCs to NP1 possibly due to the chunking strategy as proposed by the researchers (e.g. Swets et al., 2007). However, it is not clear why the online data has shown different results (e.g. Traxler, 2007).

The relation between working memory capacity and RC attachment preferences in L2 has been previously investigated. The two examples of these studies and the summary of their results are presented in Table 7 below. Omaki (2005) conducted multiple experiments including offline and online tasks with English L1, and Japanese L1 - English L2 groups. A significant interaction between working memory capacity and RC attachment preferences emerged only in English L1 group. Accordingly, high span readers tended to attach RCs to NP2, which was consistent with the findings of the offline studies in L1 research reported

above (e.g. Swets et al., 2007; Kim & Christianson, 2013). Omaki, like Mendelson and Pearlmutter (1999), suggested that high span readers might be considering the alternative Saxon genitive in parallel, thereby resulting in more NP2 attachment preferences as a consequence of Avoid Ambiguity strategy. On the other hand, RC attachment preferences of Japanese L1 and Japanese L1- English L2 groups were not associated with working memory capacity. Japanese L1-English L2 group showed no clear attachment preference in the English tasks. The author claimed that the lack of effect in the English experiments could be related to the incomplete L2 knowledge of the participants. The experiment was also conducted in Japanese, the participants' L1. Unlike the previous study conducted by Kamide and Mitchell (1997), which found NP1 attachment in Japanese, Omaki observed NP2 attachment. The author explained that the difference might have resulted from the difference in complexity between the materials used in both studies. Furthermore, based on the slight NP2 attachment advantage in English, Omaki suggested that advanced L2 learners might behave like low span English L1 speakers, given that L2 learners experience greater processing difficulties.

More recently, Hopp (2014) also investigated working memory effects on L2 processing of ambiguous RC attachments. Hopp used an offline judgment task and conducted an eye-tracking experiment in order to collect reading time and response data. The participants involved German L1-English L2 speakers. For the L2 group, the results showed that working memory capacity was negatively correlated with NP1 attachment. Accordingly, high span readers tended to attach RCs to NP2, which replicated the previous research on L1 speakers. In this regard, Hopp also supported the predictions asserted by Swets et al. (2007). The assumption is that low span readers break up the sentence in two chunks; the complex NP and RC whereas high span readers do not rely on the chunking strategy. Thus, L2 learners seem to employ the same strategies used by L1 speakers. The results of the eye-tracking study did not show any significant effect of working memory. In the online task, L2 learners exhibited NP2 attachment preference in NP2 forced sentences while they did not exhibit any attachment preference in NP1 forced sentences. Hopp explained that this difference could be related to the lack of lexical automaticity in L2 learners, and based on the findings showing that L2 learners with more automatized lexical processing continued to show NP2 attachment tendency in NP1 forced sentences. Furthermore, even high span readers behaved like low span English L1 speakers in the study, and they could not perform exactly native-like, thereby supporting the idea that L2 processing is more costly than L1 processing.

Table 7.
Interaction between WM and RC attachment preferences in L2

Researchers	Year	Languages	Results	
			Offline	**Online**
Omaki	2005	English L1; Japanese L1 - English L2	English L1 (High WM- NP2) Japanese L1 (No Clear Interaction) Japanese L1-English L2 (No Clear Interaction)	English L1 (No Clear Interaction) Japanese L1- English L2 (No Clear Interaction)
Hopp	2014	English L1; German L1 - English L2	English L1 (No Clear Interaction) German L1- English L2 (Low WM- NP1 High WM- NP2)	*Eye-tracking* (No Clear Interaction)

In Turkish L1, Kaya (2010) investigated the interaction between working memory and relative clause attachment preferences through an eye-tracking study following Dinçtopal (2007). He recorded eye movements of Turkish participants while reading the sentences in Dinçtopal' s study. The sentences were disambiguated towards NP1 or NP2 attachment by making use of animacy information. Furthermore, the experimental sentences included globally ambiguous sentences in which both NP1 and NP2 were animate or vice versa. Kaya replicated the pattern observed in Dinçtopal. The longest total fixation time was observed in NP1 attachment forced condition followed by NP2 attachment forced condition and globally ambiguous sentences respectively. With respect to the interaction between animacy information and attachment preferences, Kaya observed a significant effect of attachment preference in inanimacy-forced condition. More precisely, animacy did not lead to a significant difference in NP2 attachment condition whereas inanimacy-forced sentences had longer total fixation time in NP1 attachment forced sentences. The sentences forcing both NP1 attachment and inanimacy had the highest total fixation time. Inanimacy forced condition also resulted in longer first-pass durations, which supported the assumption that the parser uses semantic information even in the initial analysis phase.

The analysis of the data related to the interaction between working memory scores and RC attachment preferences showed that high-span readers had significantly higher percentage of NP2 attachment preference, which is in line with the findings of the previous research in different languages, but not consistent with the findings of Traxler (2007) who found an NP1 attachment preference with high span readers through an eye-tracking study unlike especially the offline studies with English L1 speakers or native speakers of other languages (Mendelson & Pearlmutter, 1999; Swets et al., 2007; Kim & Christianson, 2013). Previously, Mendelson and Pearlmutter (1999) had suggested that the reason why high span readers attached more NP2 could be due to their ability to consider another genitive form available

which unambiguously forced NP1 attachment (i.e. Saxon genitive; *the actor's chauffer*). Similarly, with regard to more NP2 attachment preference, Kaya asserted that high span readers might be evaluating the alternative form in Turkish [NP2-RC-NP1] as displayed in (24) below, which unambiguously forces NP1 attachment.

(24)   [NP2Yazar-ın] [RC geçtiğimiz ay öldür-ül-en] [NP1baba-sı]

Kaya also investigated the regression ratios in order to see whether high-span readers make more regressions in resolving RC attachment ambiguity compared to low-span readers. The hypothesis put forth was that high-span readers might be processing multiple interpretations in parallel, and they might be left with two possible interpretations at the end of their initial analysis, which might be forcing them to reanalysis. However, he could not find any correlation between working memory scores and regression rations, and he could not find any clear difference between high and low- span readers in regression rations, either.

The above study conducted by Kaya is noteworthy in terms of understanding the relation between working memory and RC attachment preferences in Turkish. However, it is not still clear why many offline studies consistently showed more NP2 attachment preferences by high span readers across many languages both in L1 and L2 (e.g. Swets et al., 2007; Omaki, 2005; Kim & Christianson, 2013) whereas online studies, particularly eye-tracking studies (e.g. Traxler, 2007; Kaya, 2010; Hopp, 2014) did not have any consistent results. Besides, Korean L1, for instance, did not show the same pattern with the other languages (i.e. high span readers- more NP2; low span readers - more NP1 attachment preference). In this regard, Kim and Christianson (2013) explained this difference with head-directionality. Korean is a head-final language like Turkish. However, Turkish seems to exhibit the same pattern with the other languages. Therefore, there seems to be a need for further research for a better understanding of the relation between working memory and RC attachment preferences.

2.6. A Review of Syntactic Priming Research

Syntax determines the structure of an utterance. It is important in respect to language comprehension and production. Therefore, many scholars have studied this aspect of language by making use of a variety of mechanisms. Syntactic priming has also been one of the pre-eminent mechanisms preferred by scholars over the last three decades. Syntactic priming is the facilitation of processing which occurs when a sentence has the same syntactic form as a preceding sentence. Numerous studies have reported the effect of syntactic priming. In this part, the importance, and the evidence of syntactic priming, syntactic priming research in L2, eventually some studies which used syntactic priming in order to understand RC attachments will be presented, and the review will be summarized.

2.6.1. Importance of Syntactic Priming

Syntactic priming has implications for sentence processing in two ways. First of all, it gives information about the mechanisms of comprehension and production (Branigan et al, 1995). As previously mentioned, much of the controversy in sentence processing research concerns the question of whether particular factors influence the interpretation in the initial analysis or during reanalysis. Syntactic ambiguity resolution involves the interaction of syntactic features of alternative analyses, the plausibility of the analyses, the discourse context, and the prosody (e.g. Frazier & Clifton, 1996). Syntactic priming in comprehension, for instance,

demonstrates that syntactic information of the previous sentence also affects the comprehension of the following sentence (e.g. Branigan et al., 1995).

Secondly, syntactic priming is a promising means of investigating the mental representation of syntactic knowledge. The literature has provided strong evidence that syntactic priming can point to rule-guided linguistic distinctions at the time of testing (Branigan et al., 1995). It enables us to understand how different structures are distinguished and processed by speakers of various languages, and to reveal the elements of language where different parsing strategies are followed. Furthermore, syntactic priming provides richer information through a direct access to linguistic knowledge as compared to traditional grammaticality judgment tasks (Branigan et al. 2005; Bahadır, 2012).

In brief, syntactic priming has been regarded as a convenient tool in order to shed light on the shared or separate linguistic knowledge in sentence comprehension and production and to provide information about the representation of language to linguistic theories. Therefore, especially for the purposes of this dissertation, syntactic priming is expected to contribute to distinguish the elements guiding the resolution of RC attachment ambiguity.

2.6.2. Evidence of Syntactic Priming

The factors leading to a particular choice between syntactic alternatives have been investigated in the literature. It has been pointed out that syntactic choices are sensitive to syntactic priming, that is, speakers tend to choose the structures they have recently heard from their interlocutors or they themselves produced (Bock, 1986). If repetition in syntactic choices is above chance level, this effect is regarded as syntactic priming (Reitter, 2008). Many studies have demonstrated the effect of syntactic priming experimentally. In this regard, the seminal study was administered by Bock (1986). In her experiments, the participants repeated the priming sentences out loud, then viewed an unrelated picture and described it. The results showed that the probability of using a particular syntactic alternative increased when that structure occurred in the priming sentence. The primes were sentences with ditransitive verbs which could be constructed either with a prepositional object (PO) or a double object (DO), for instance, *The boy is handing a valentine to a girl* vs. *The boy is handing the girl a valentine*. It was observed that there was a tendency to use a DO target after a DO prime and similarly a PO after a PO. Further studies extended these results. Bock (1989) showed that the production of PO sentences was primed even if the prime and target consisted of different prepositions. In other words, *The secretary baked a cake for her boss* was as effective as *The secretary took a cake to her boss* in eliciting *The girl handed the paintbrush to the man*. Therefore, Bock (1989) argued that the effect was clearly peculiar to syntactic form, disfavouring a lexical account of syntactic persistence.

In the relevant literature, double object and prepositional object have been a widely studied alternation (Bock, 1986; Branigan et al., 1999; Kim, 2010). However, researchers have also investigated different alternations, variants of which are assumed to be synonymous. To illustrate, Weiner and Labov (1983) found that the passive alternant such as *An anecdote was told by the prince* is more inclined to be chosen rather than the active such as *The prince told an anecdote* by a speaker if there is a passive in the immediate discourse preceding the sentence. In another study, Cleland and Pickering (2003) investigated the effect of syntactic priming in noun phrase production in dialogue. They demonstrated that speakers used a complex noun phrase with a relative clause construction (e.g. *the square that is red*) more

often after having heard a syntactically similar noun phrase rather than a simple noun phrase with a pre-nominal construction (e.g. *the red square*). Furthermore, they observed that the effect of syntactic priming was enhanced when the head noun (e.g. *'square'*) was repeated.

Syntactic priming has been largely examined in controlled psycholinguistics experiments utilizing a variety of methods such as sentence completion (Pickering & Branigan, 1998; Branigan et al., 1999), sentence recall (Potter & Lombardi, 1998), and picture description (Bock, 1986). However, priming has also been affirmed in naturally occurring text or speech (Reitter et al., 2011). In an attempt to demonstrate that syntactic priming plays an important role in discourse production, Estival (1985) examined syntactic priming of the passive in English with a corpus-based study. He aimed to see whether this priming effect was truly a syntactic phenomenon. For this, he sought to control the confounding factors which might force people to use the passive voice such as the type of passive (i.e. lexical as in *'John is interested in music'* and transformational passive *'John was believed to have left'*), logical subject, discourse repetitions, logical object and grammatical subject, and he was of the opinion that the presence of the effect after controlling all these factors proved it to be truly syntactic priming. Gries (2005) also conducted a corpus-based study. Having analyzed two different pairs of syntactic patterns; namely dative alternation and particle placement of transitive phrasal verbs, Gries concluded that priming effects were verb-specific such that some verbs were much more responsive or resistant to priming. In other words, verbs which were strongly associated with one construction were observed to be more likely exhibit priming with that construction rather than with the other construction.

Several more studies have contributed to explaining the effect of syntactic priming in processing coordinate structures (Dubey et al., 2008), and revealing the long-term priming for a range of syntactic alternations in dialogue corpus (Szmrecsanyi, 2005). Reitter et al. (2006), from a wider perspective, showed that priming could be explained as an effect of the repetition of phrase structure rules. They used regression models to attest that the probability of a rule which will be chosen is increased with the previous occurrence of the same rule. Syntactic priming, as Reitter (2008) asserted, could be related to a general syntactic phenomenon, rather than being limited to specific syntactic alternations.

The size of priming effect depends on a range of other factors, among which cumulativity, and inverse frequency interaction prevail. With a corpus-based study, Jaeger and Snider (2007) displayed the cumulativity of priming. It was observed that the strength of priming effect elevated with the number of primes preceding the target in the corpus. For instance, Jaeger and Snider indicated that the probability of producing a *that* complementizer or producing passive construction increased with the number of similar constructions which were previously used. Inverse frequency interaction was also reported in priming research. It was revealed that low frequent syntactic constructions triggered more priming effect than high frequent ones (Scheepers, 2003; Jaeger and Snider, 2007).

Decay in syntactic priming has been also investigated in a broad range of studies, yet the results were not very consistent. Some studies showed that the effect of syntactic priming disappeared quickly when even only one sentence intervened the prime and target (Levelt &Kelter, 1982; Branigan et al., 1999) whereas other found no decay, and syntactic priming persisted even when ten sentences intervened (Bock & Griffin, 2000). In this regard, Hartsuiker et al. (2008) elicited prime-target pairs at varying temporal lags, manipulating verb overlaps in the prime and target sentence. The results revealed that the lexical boost

effect (i.e. syntactic priming effect enhanced with word overlap) decayed quickly with a temporal lag between the prime and target whereas abstract syntactic priming (i.e. syntactic priming without word overlap) persisted across intervening sentences, regardless of the modality of the prime and target (i.e. spoken or written). With a developmental approach, Rowland et al. (2012) tested the effect of priming in dative alternations comparing young children (3-4 years old), older children (5-6 years old), and adults. They evaluated the size of the lexically-independent priming effect (i.e. when prime and target sentences contained different verbs, e.g. *gave - sent* as in *Dora gave a rabbit to Boots / Boots a rabbit* and *Piglet sent a baby to Tiger / Tiger a baby*) and the size of the lexical boost effect (i.e. when prime and target shared a verb, e.g. *sent - sent* as in *The prince sent a car to the princess / the princess a cat* and *Dora sent a puppy to Boots / Boots a puppy*). Additionally, they assessed the size of the priming effect across development. The results showed that priming occurred in all three age groups, with a larger magnitude of priming effect size in young children than in older children and adults in the absence of verb overlap between the prime and target. The size of the lexical boost, however, increased across development. Only adults showed a large and significant lexical boost. Verb overlap seemed to produce a moderate lexical boost in older children, yet no effect on the size of priming was observed in young children. The researchers suggested that the greater abstract priming effect in young children sounded consistent with the literature revealing that priming could be larger in less skilled speakers (Pickering & Branigan, 1999). However, they had difficulty in explaining why young children did not show any lexical boost effect because they expected to observe some evidence of verb-specific generalizations based on the theories of development which posit that children's syntactic knowledge begins as verb-specific generalizations (Tomasello, 2000). Thus, Rowland and colleagues claimed that abstract syntactic knowledge should develop independently of verb-specific frames, and discussed why abstract priming and the lexical boost displayed different developmental profiles. Accordingly, a complementary systems account (McClelland et al., 1995; Chang et al., 2012) which partitions memory into hippocampal and neocortical components may contribute to a better understanding of the results. Rowland and colleagues explained the account:

> In these theories, long-term knowledge in cortical systems is updated through slow changing implicit learning mechanisms, while the hippocampus has a fast changing binding mechanism that quickly links different cortical representations. (p.60).

Hartsuiker et al. (2008) suggested that abstract priming is a form of implicit learning and much more long-lived whereas the lexical boost is short-lived. The complementary systems account would serve to explain the rapid decay of the lexical boost with the fast-binding in the hippocampus. In addition, as Rowland et al. (2012) pointed out, hippocampal systems bind several different types of cortical representations, which may explain why the lexical boost effects vary in magnitude across different tasks in adult priming literature. The sensitivity of the hippocampal system to task content may provide an explanation for the increase in the size of the lexical boost over age, as well. In this regard, Rowland et al. (2012) stated "if young children have more trouble maintaining a constant context across prime and target trials compared to adults, then their ability to use these bindings should be diminished and that could explain why the lexical boost is absent" (p.61). However, further research seems to be essential to make the details of these mechanisms more explicit.

This section focused on the syntactic alternations examined in a range of studies including experimental and corpus-based studies, and presented the issues such as lexical boost effect, decay, cumulativity and inverse frequency interaction in syntactic priming. The following subsections will focus mainly on syntactic priming within and across modalities; namely comprehension to comprehension priming and comprehension to production priming.

2.6.2.1. Comprehension to Comprehension Priming

The scholars have provided some evidence that comprehension of a sentence is influenced by the comprehension of the previous sentence which has a similar structure. One of the earliest studies was conducted by Mehler and Carey (1967). The authors reported that the auditory presentation of a sentence with a particular structure facilitated the comprehension of sentences including the same structure.

There have been more direct investigations of comprehension-to-comprehension priming. For instance, Branigan et al. (1995) conducted a comprehension-to-comprehension priming study, and obtained strong priming effects with locally ambiguous constructions. More precisely, Branigan and colleagues observed that subjects who read an 'early closure' sentence as in (25a) faster after they recently read an early closure sentence, and a 'late closure' sentence as in (25b) faster after they recently read a late closure sentence.

(25)   a. While the woman was eating the creamy soup went cold.
        b. While the woman was eating the creamy soup the pudding went cold.

(Branigan et al., 1995, p.495)

The authors noted that the prime sentences were semantically unrelated to the target sentences, and did not contain any of the same content words.

Branigan et al. (2005) used an expression-picture matching task so as to investigate whether syntactic priming affects ambiguity resolution in comprehension. The authors tested the resolution of ambiguous preposition phrases such as *the waitress prodding the clown with the umbrella.* The expression is ambiguous because the prepositional phrase (PP) could be interpreted as modifying the verb, or modifying the direct object. More precisely, the phrase *with the umbrella* in the example expression given above could be attached to the waitress meaning that the waitress used the umbrella to prod the clown, or to the clown meaning that the waitress prodded the clown who had the umbrella. In the experiment, the participants first read an expression and saw two pictures. The participants had to decide which picture matched the expression. On prime trials, one picture unambiguously corresponded to a clear interpretation, whereas the other picture corresponded to neither interpretation. On target trials, however, one picture unambiguously corresponded to one interpretation and the other picture corresponded to the other interpretation. Branigan and colleagues found that the participants were more likely to adopt an interpretation when they had just read a prime expression disambiguated to the same interpretation than to the different interpretation.
Eye-tracking has been also used in investigating comprehension-to-comprehension priming. For instance, Pickering and Traxler (2008, as cited in Pickering & Ferreira, 2008)) administered six eye-tracking experiments, and investigated the comprehension of reduced relative sentences such as (26):

(26) The speaker proposed by the group would work perfectly for the group.

The sentence above is temporarily ambiguous at *proposed* because the verb could be part of a reduced relative structure, in which it is a past participle, or part of a main clause structure, in which it is a past tense verb. Pickering and Traxler found that this difficulty was reduced following a reduced-relative prime, but only when the verb was repeated.

Traxler and Tooley (2008) used self-paced reading moving-window paradigm where subjects read the sentences word by word on a computer screen. Traxler and Tooley also tested the effect of syntactic priming in comprehension of reduced relatives. The authors aimed to understand whether readers used the prime sentences as a strategic cue or not. The results showed that syntactic priming in comprehension occurred when there was no valid cue whereas syntactic priming did not occur when there was a valid cue (e.g. word overlap). The authors suggested that self-paced reading paradigm is sensitive to syntactic priming. In conclusion, a number of studies have shown that priming persists in comprehension.

2.6.2.1. Comprehension to Production Priming

Bi-directional priming has been also of interest to many scholars. There have been some studies showing that merely comprehending the prime could affect the target production. For instance, Pickering and Branigan (1995, as cited in Branigan et al. 1995) observed comprehension-to-production priming in cases where there was no semantic relation between the prime and the target. The researchers asked the participants to complete the sentences as in (27a) containing a prepositional object prime and (27b) containing a double object prime:

(27)   a. A soldier was in court, accused of attacking a young man. The victim showed his injuries to the judge. The judge gave ...

         b. A soldier was in court, accused of attaching a young man. The victim showed the judge his injuries. The judge gave ...

In another study, Branigan et al. (2000) used the confederate-scripting technique in which pairs of speakers describe picture cards to each other and pick the card matching the their partner's description. One speaker who produced scripted descriptions systematically varying in syntactic structures was the confederate of the experimenter. The results showed that the syntactic structure of the confederate's description influenced the syntactic structure of the subject's subsequent description, thereby providing evidence for a shared level of representation in comprehension and production.

Similarly, Bock et al (2007) examined the persistence of syntactic priming from comprehension to production, as well. In this regard, they tested the persistence after immediate priming, and priming across interruptions by one to ten other utterances, and compared the strength and duration of the persistence. Bock and colleagues used a picture description priming paradigm. Accordingly, subjects were asked to listen to each auditorily presented sentence, and describe the event in each picture aloud, in one sentence. The assumption was that if the mechanisms of syntactic processing in comprehension and production differed, the difference in the strength and duration of persistence would be clear whereas if they did not, the difference would be less clear. In this regard, Bock and

colleagues stated "the most persuasive evidence for general structural mechanisms that are effective in both comprehension and production would be persistence that is similarly strong and similarly durable over time or intervening event" (p.442). The results showed few discernible differences in the strength of persistence and its endurance over the intervening sentences.

In this section, the evidence of syntactic priming, and priming within and across modalities were presented. A large number of studies have investigated syntactic priming in monolinguals. However, syntactic priming in second language, and cross-linguistic syntactic priming have been of great interest to scholars, as well. The following section will present studies on syntactic priming in L2, cross-linguistic priming, and the importance of these studies in term of understanding how L1 and L2 are represented and processed.

2.6.3. Syntactic Priming in L2

Over many years, syntactic priming has been extensively studied with native speakers of several languages. Nonetheless, the effect of syntactic priming in second language learners has also been of a growing interest in the recent years.

Cross-linguistic syntactic priming studies have been conducted with speakers of various languages, measuring the effect presenting the prime in one language and the target in another language. Bilinguals might be sharing syntactic representations across languages (Bernolet et al., 2013). The prediction is that cross-linguistic priming occurs only when linear precedence (i.e. ordering of phrases in a sequence) and immediate dominance (i.e. the hierarchical organization of phrases) are combined (Reitter et al., 2011). For instance, Pickering et al. (2002) found that shifted constructions such as *The racing driver showed to the helpful mechanic the problem with the car* (VP PP NP) failed to prime non-shifted constructions such as *The racing driver showed the extremely dirty and badly torn overall to the mechanic* (VP NP PP) although both constructions shared dominance relations, both a verb phrase dominating a verb, a noun phrase and a prepositional phrase. Some other studies have also appeared to support this prediction. To illustrate, Bernolet et al. (2007) investigated intra- and cross-linguistic priming of Dutch, English, and German relative clauses. The results showed that syntactic priming occurred from Dutch to German, both of which share the same word order as they both have verb-final relative clauses while it did not occur from Dutch to English since they differ in relative clause word order.

Similarly, Kim (2010) found no priming effect in dative alternation with Japanese-English bilinguals and Korean-English bilinguals, simply because dative alternation does not exist in Japanese and Korean native language. More recently, however, researchers presented contradictory evidence. To illustrate, Shin and Christianson (2009) revealed that cross-linguistic priming was observed between Korean postpositional and English prepositional dative structures, independent of argument order structure, thereby providing evidence for shared syntactic processing at abstract, functional level. Furthermore, Bernolet et al. (2013) questioned whether the representation of syntactic structures in L2 is immediately collapsed with the representation of equivalent structures in L1 or late bilinguals start with separate representations before moving to shared syntactic structures. In the experiment, they found that bilinguals with higher proficiency showed stronger cross-linguistic priming, thereby possibly suggesting a shift from language-specific to shared syntactic representations.

2.6.4. Syntactic Priming of Relative Clause Attachments

Syntactic priming of RC attachments has been also studied by several researchers. One of the seminal studies was conducted by Scheepers (2003). He reported three sentence completion experiments in which participants were asked to generate German equivalents of the construction [NP1-*of*-NP2-RC]. In first two experiments, ambiguous target sentences containing RCs were preceded by the prime sentences which were disambiguated either towards NP1 or NP2 attachment. In the third experiment, the prime sentences were structurally incongruent with the targets. More precisely, anaphoric adverbial clauses were encouraged instead of RCs in the prime sentence. The example of prime and target sentences used by Sheepers (2003) are as illustrated in (28) below:

(28)   a.   <u>NP1 Attachment Forced Prime</u>
            Die Assistentin verlas den Punktestand der Kandidatin, der ...
            The assistant announced the score [masc, sing] *of the candidate* [fem, sing]
            that [masc, sing] ...

        b.   <u>NP2 Attachment Forced Prime</u>
            Die Assistentin verlas den Punktestand der Kandidatin, die ...
            The assistant announced the score [masc, sing] *of the candidate* [fem, sing]
            that [fem, sing] ...

        c.   <u>Baseline Prime (Adverbial Clause)</u>
            Die Assistentin verlas den Punktestand der Kandidatin, bevor ...
            The assistant announced the score [masc, sing] *of the candidate* [fem, sing]
            before ...

        d.   <u>Target Sentence</u>
            Der Rentner schimpfte über die Autorin der Flugblätter, die ...
            The pensioner railed about the author [fem, sing] *of the fliers* [neut, plur]
            that [?] ...

                                        (Sheepers, 2003, p.185).

In the first two experiments, a significant priming effect was obtained whereas the third experiment did not exhibit any significant priming, thereby suggesting that syntactic priming in RC attachment is dependent on syntactic overlap between prime and target sentences.

Cross-linguistic priming of RC attachments has been also studied. Desmet and Declerq (2006) conducted three experiments with Dutch L1-English L2 speakers. The first experiment was the Dutch replication of Scheepers (2003). The researchers translated the items in German into Dutch, used the same methodology and design in order to investigate the syntactic priming effect. Similarly, Desmet and Declerq also used gender agreement in order to force RC attachment in the prime. The only difference was that they did not use a comma before RCs because unlike German, the comma is not mandatory in Dutch. The results of the first experiment replicated Scheepers (2003). Desmet and Declerq also found

that there was a significant priming effect in the presence of a syntactic overlap between the prime and target sentence. In the second experiment, the researchers sought to understand whether syntactic information is shared between two languages or represented separately. For this purpose, the same prime sentences in Dutch were used, but the target sentences were translated into English. The results showed that the syntactic information related to the hierarchical tree configuration is shared between languages. More precisely, the researchers reported that participants who just completed an NP1 attachment forced prime in Dutch were more likely to attach RC to NP1 in the English target sentence, as well than they do so after completing an NP2 attachment forced prime in Dutch. The third experiment was defined as a control experiment. Desmet and Declerq replaced the prime sentences in the second experiment with adverbial clauses, and expected not to find any significant syntactic priming effect if the effect they observed in the second experiment was truly a consequence of the syntactic overlap between the prime in Dutch and the target in English. The results of the third experiment were consistent with Scheepers (2003). The researchers did not find any priming effect in the absence of syntactic overlap between the prime and target sentence.

These first two studies by Scheepers (2003) and Desmet and Declerq (2006) investigated syntactic priming in production. Gertken (2013) examined whether there was any significant syntactic priming of RC attachment in comprehension in French as a first and a second language. Gertken conducted a self-paced reading study.

(29).   a. NP1 Attachment Forced Prime

Aurore aborde [NP(complex)[NP1le secrétaire] [PP des [NP2 dentistes]] [RC qui sort du métro].

Aurora approaches the secretary of the dentists who is exiting the subway.

b. Target Sentence

Gérard s'adresse au psychiatre du coiffeur qui mange un sandwich.

Gerard addresses the psychiatrist of the hairdresser who is eating a sandwich.

c. Baseline Prime (Adverbial Clause)

Aurore aborde [NP(complex)[NP1le secrétaire] [PP des [NP2 dentistes]] [AdvP pendant-que celui-là sort du métro].

Aurora approaches the secretary of the dentists while he (the former) *is exiting the subway.*

(Gertken, 2013, pp.98 -104)

The prime sentences including RCs were disambiguated using number agreement as in (29a). In this sentence, the singular verb *sort* requires disambiguation of the RC attachment towards NP1, *le secrétaire* which is the only singular NP. On the other hand, the target sentences were ambiguous. In (29b), the verb *mange*, for instance, does not distinguish NPs, both of which are singular. In addition to disambiguated prime and ambiguous target sentences

containing RCs, the researcher also included sentences preserving anaphoric binding and focus structure of RC sentences but differed in structures following Scheepers (2003) and Desmet and Declerq (2006). The sentence (29c) above is an example of a prime sentence including an adverbial clause.

The prime sentence including an adverbial phrase is identical to the prime sentences including an RC, apart from the fact that the relativizer *qui* followed by an disambiguating verbal information is replaced by the *parce que* (because) followed by a pronoun (*celui-là*; the former, *celui-ci*; the latter) to distinguish the association of the pronoun to NP1 or NP2. Gertken stated that the anaphoric binding is identical in both prime sentence types considering the fact that both contain pronouns referring to NP1 or NP2. Furthermore, focus structure is identical considering the fact that both sentences focalize NP1 or NP2 through the clauses elaborating on either one of the NPs. The results provided evidence for the priming of RC attachment in comprehension, which had been previously found in production (e.g. Scheepers, 2003; Desmet & Declerq, 2006). Similarly, there was no priming effect in French L1 speakers when the prime and target sentences differed in syntactic structure but shared discourse information such as focus structure and anaphoric binding, thereby suggesting that priming occurs at the level of abstract hierarchical configuration. However, Gertken observed priming effect in French L2 learners even when the sentences differed in syntactic structure but shared discourse information. Therefore, Gertken suggested that priming in L2 might be linked to discourse information, as well, and that non-syntactic representation persisted between the prime and target sentences.

In brief, the previous research has shown that the priming effect depends on syntactic overlap between the prime and the target sentence, especially in L1 processing, thereby suggesting that the priming occurs at the level of abstract hierarchical configuration. Furthermore, the previous studies on syntactic priming of RC attachment all used disambiguated sentences (i.e. NP1 or NP2 attachment forced sentences) as primes, and ambiguous sentences (where both NPs are potential attachment sites) as targets. It is important to note here that this methodology ignores some assumptions, such as those of serial processing which assumes that readers would rely on merely syntactic information available during their initial processing and that they would show bias to only one interpretation (Papadopoulou, 2006). This bias could be either a universal attachment preference or a particular attachment preference observed in the language. Given that there is not enough evidence for a universal attachment preference or that cross-linguistic variations in RC attachment preferences have not been explained yet, ambiguous sentences where RC attachment is not constrained can be used as target sentences to identify the effect of prime condition on attachment preference. The present study follows the same design in the investigation of syntactic priming of RC attachment in monolinguals and learners of English.

2.6.5. Summary

In this section, a review of syntactic priming research was presented. The relevant literature has provided strong evidence that syntactic priming could be used as a promising tool in order to understand the mental representation of languages and sentence processing. With respect to RC attachments, there have been also a few studies in the literature as reported above. However, considering the cross-linguistic variations in RC attachment preferences pointed out in the literature, research in syntactic priming of RC attachment is quite limited. Furthermore, as mentioned in Gertken (2013), there seems to be a difference in priming

effect between L1 and L2 processing, and needs further research for a better understanding. In this dissertation, syntactic priming is the primal means of investigating the RC attachment preferences (in both offline and online processing) of Turkish L1 speakers and Turkish L1-English L2 learners. We expect to obtain a better understanding of syntactic priming of RC attachments in both L1 and L2, and identify factors playing a role in ambiguity resolution.

The following chapter, Chapter 3, will explain the validation process of the stimulus set which was used in Experiment 1 and 2 conducted with monolingual Turkish speakers.

CHAPTER 3

3. VALIDATING THE STIMULUS SET 1

In this chapter, the reasoning behind and the design of the pilot studies which were conducted in order to prepare the stimulus set for the experiments are presented.

3.1. Pilot Study 1

In order to understand whether monolingual Turkish speakers and Turkish speakers of English have a particular tendency to attach RCs to NP1 or NP2, as mentioned above, there have been some important attempts including Kırkıcı (2004) and Dinçtopal-Deniz (2010). However, the contradictory findings, particularly regarding the effect of animacy / inanimacy on RC attachment preferences, forced us to evaluate these previously done studies and provide a further understanding of the attachment preferences of monolinguals in Turkish.

Most studies investigating RC attachment ambiguity resolution have utilized either number (e.g. Desmet & Declerq, 2006; Felser et al., 2003; Fernández, 2002) or gender agreement (e.g. Dussias, 2003; Papadopoulou & Clahsen, 2003; Scheepers, 2003). However, the agreement paradigm in Turkish does not allow to utilize them while choosing the possible host NP to be attached to RCs. Turkish does not show gender agreement (e.g. *'o' süt içiyor*; 'she/he/it' is drinking milk) and the marking of plurality on the verb is relatively optional. In other words, Turkish verbs optionally take plural marking in agreement with plural animate subjects such as *misafir-(ler) gel-iyor* [guest-(pl) come-prog] or *misafir-(ler) gel-iyor-(lar)* [guest-(pl) come-prog-(pl)] whereas they are invariably unmarked for number with plural inanimate subjects such as *telefon-(lar) çal-ıyor* [phone-(pl) ring-prog]. Therefore, the ambiguous sentences in both Kırkıcı (2004) and Dinçtopal-Deniz (2010) included either two animate or two inanimate NPs. Furthermore, Dinçtopal-Deniz also manipulated the syntactic positions of the NPs and the lexical information they carried (i.e. animate or inanimate) and used animacy information as a disambiguating cue. The sentences below are the example sentences Dinçtopal-Deniz used. Accordingly, (24a) is assumed to be a temporarily ambiguous sentence. Even though syntactically it is likely to attach the RC to either one of the potential host NPs, it allows only NP1 attachment (i.e. *'yazar'*; the author) because of the lexical-semantic information provided in the RC. Based on the real world facts, the inference obtained from (30a) would be that the author was killed, not the book considering the fact that the verb *'öldürmek'* (to kill) requires an animate argument such as a human being or an animal. On the other hand, (30b) is assumed to be globally ambiguous because both NPs are animate and both the author and the father might have been killed last month.

(30)   a.   [RC Geçtiğimiz ay öldür-ül-en]/ [NP2 kitap-ın] / [NP1 yazar-ı] / ünlü-ydü.
           last month kill-PASS-PART book-GEN author-3SG.POSS famous-
           PAST.COP
           'the author of the book that was killed last month was famous'

       b.   [RC Geçtiğimiz ay öldür-ül-en]/ [NP2 yazar-ın] / [NP1 baba-sı] / ünlü-ydü.
           last month kill-PASS-PART author-GEB father-3SG.POSS famous-
           PAST.COP
           'the father of the author that was killed last month was famous'

Nevertheless, there were some problems with this list of sentences which were supposed to be globally ambiguous. The sentences were not controlled for length. Furthermore, some words repeated multiple times in this list of sentences, and word overlaps might also have an impact such as lexical boost effect on the participants' preferences (Rowland et al., 2012). Thus, the sentences were adapted by controlling these factors and tested so as to see if they were truly globally ambiguous for monolingual Turkish speakers. In other words, this first study was conducted to validate the previously used sentences by Dinçtopal-Deniz (2010).

3.1.1. Participants

The participants were 100 monolingual Turkish speakers. 3 of them were excluded from the analysis because they did not complete the task. Thus, the data obtained from 97 participants were evaluated within the scope of this pilot study. The participants were freshman undergraduate university students, with beginner level of English. They all reported that they did not know any other languages, either.

3.1.2. Materials

The study was an offline task. The material included 30 sentences which were used in the previous study administered by Dinçtopal-Deniz (2010) and adapted considering the factors which may affect sentence processing, such as the length of the sentences and the repetition of some words in multiple sentences. The sentences included either two animate NPs or two inanimate NPs, assuming that RCs could be attached to either one of these NPs in these sentences as they were initially accepted as globally ambiguous in Dinçtopal-Deniz. Furthermore, two academicians who were instructors of the Turkish language at higher education level were requested to review these Turkish sentences. They both confirmed that all the sentences were grammatical and meaningful.

(31)   Kafe-de otur-an kadın-ın arkadaş-ı konuşkan birisi.
       cafe-LOC sit-PART woman-GEN friend-POSS a talkative person
       'the friend of the woman who is sitting at the cafe is a talkative person'

       Kafede oturan kimdir? / 'who is sitting at the cafe'
       a.   kadın / 'woman'   b.   arkadaşı / 'friend'

In the half of the 30 sentences, both NPs were inanimate whereas in the other half both NPs were animate. The sentences were given in a randomized order. The participants were asked

to answer a question as in (31) above after reading each sentence in order to understand how monolingual Turkish speakers would comprehend these sentences and whether the sentences were truly globally ambiguous, or they were already biased towards NP1 or NP2 attachment. The options given (a) and (b) were counterbalanced so as to make sure that the first and second NP appeared equally and randomly as (a) and (b) options throughout the task, and that the participants would not develop any answering strategies.

3.1.3. Procedure

The participants were instructed to read each sentence on the booklet distributed to them, and to indicate as spontaneously as possible for each item which of the possible interpretations they considered as the most appropriate on their own, without going backwards to check their previous responses. The task was completed within almost 15 minutes.

3.1.4. Data Analysis and Results

The data was first analysed by hand. The participants' responses for each item were written into a previously prepared table. For each item, the total number of NP1 and NP2 preferences was calculated. Table 8 below shows the total number of NP1 attachment preferences per sentence.

Table 8.
The total number of NP1 attachment preferences per sentence

Item	NP1 Attachment	Item	NP1 Attachment
01	36	16	36
02	63	17	30
03	30	18	32
04	33	19	50
05	35	20	34
06	31	21	34
07	31	22	36
08	24	23	32
09	21	24	45
10	16	25	21
11	59	26	46
12	32	27	68
13	50	28	49
14	36	29	40
15	17	30	43

The results showed that in the half of the sentences, the participants' preference of NP2 attachment doubled their preference of NP1. For instance, 61 participants out of 97 preferred NP2 attachment in the first sentence (i.e. Item 01). As for the other half, a great majority of the participants, which could be regarded as more than twice, preferred NP2 in 5 sentences. For instance, 80 participants preferred NP2 in the fifteenth sentence (i.e. Item 15). In 3 sentences, a great majority of the participants preferred NP1 this time, and in 7 sentences the

preferences of NP1 and NP2 in total were almost equal. For instance, 49 participants preferred NP1 whereas 48 preferred NP2 in the twenty eighth sentences (i.e. Item 28).

SPSS was run for an item-based analysis so as to find whether there was a significant difference between the participants' preference of NP1 and NP2. Furthermore, SPSS was run so as to see whether animacy information affected participants' preferences. For this purpose, the number of NP1 for each item was compared according to the animacy information they carried (i.e. animate or inanimate). Table 9 below displays the means and standard deviations of the responses provided for the experimental sentences. A mixed ANOVA was run to reveal further information. The results are as follows:

Table 9.
Means and standard deviations of the responses

	Animacy	Mean	SD	N
NP2 Attachment	Animate	52.67	13.626	15
	Inanimate	65.33	9.447	15
	Total	59.00	13.199	30
NP1 Attachment	Animate	44.33	13.626	15
	Inanimate	31.67	9.447	15
	Total	38.00	13.199	30

As seen in Table 9, the participants in Pilot Study 1 showed a higher preference to attach RCs to NP2 (59.00) than NP1 (38.00). The ANOVA revealed that there was a significant main effect of attachment, F (1, 28) = 24.063, $p < .001$, $\eta_p^2=,462$. Accordingly, the participants showed a tendency to attach RCs to NP2 more often. Additionally, there was a significant interaction between the participants' attachment preferences and animacy conditions, F (1, 28) = 8.755, $p < .05$, $\eta_p^2=,238$. The participants showed a higher tendency to attach RCs to NP2 especially in the inanimate condition as Dinçtopal-Deniz (2007; 2010) also found.

3.1.5. Discussion

The results of Pilot Study 1 adapted from Dinçtopal-Deniz (2010) showed that the participants had a tendency to attach RCs to NP2, especially in the inanimate condition, which replicated the results of the previous work done by Kırkıcı (2004) who found that monolingual Turkish speakers tended to attach RCs to NP2 in the inanimate condition and had no clear attachment preference in the animate condition in his offline task and Dinçtopal -Deniz (2007;2010) who observed that monolingual Turkish speakers tended to attach RCs to NP2 more often in both online and offline tasks, and found that this NP2 attachment preferences was stronger in the inanimate condition. Nonetheless, the results were still confusing. Even though these sentences must be globally ambiguous, there were some sentences which highly received more NP2 attachments from a great majority of the participants, which could be still understood if monolingual Turkish speakers had a general tendency to attach RCs to NP2. However, there were also some sentences which highly (or almost equally) received more NP1 from a great majority of the participants. A professor of the Turkish language and literature, two academicians, who had previously reviewed the sentences, and a group of the participants who took part in the study were interviewed after the data analysis. They were asked to justify why monolingual Turkish speakers preferred

NP2 more often in these sentences, and why a great majority of the participants went for NP1 in particular sentences. A closer inspection of the sentences showed that some sentences were semantically biased towards NP1 and NP2 attachment although they were assumed to be globally ambiguous sentences in which either one of the potential host NPs could be attached to RCs. Our hypothesis is that some RCs could be more likely to be attached to NP2 or NP1, and that the semantic relations established between the two NPs in the genitive construction (e.g. part-whole relations) and the semantic associations with the proximal and the distal predicate played a key role in the participants' attachment preferences. To illustrate, the RC in the sentence (32) was attached to NP2 by 76 of 97 participants in Pilot Study 1.

(32)   Daha yeni tamir edil-en ayakkabı-nın topuğ-u vuruyor.
         'the heel of the shoe which has been recently repaired hurts'

In this sentence, there is a part-whole relationship within the genitive-possessive construction, which makes it more likely to accept that the repaired one is the shoe. In the construction above, it is the genitive marked NP which expresses the whole (i.e. *ayakkabı-nın*) and it is the head NP which expresses the part (i.e. *topuğ-u*). The reason behind this could be explained with the notion of the partitive construction. Stefanowitsch (1998) pointed out that there is a hierarchical relationship between the part-whole relation and the partitive construction including the examples of the subpart-whole relation (e.g. *bezelyeler-in bazı-sı*; 'some of the peas', *para-nın büyük kısm-ı*; 'most of the money'), and that the part-whole relation could be also conceptualized as a special case of the partitive construction. The meaning of the head noun phrase seems to be, as in the partitive constructions, highly dependent on that of the modifier as it is this part which constitutes the whole entity (Göksel & Kerslake, 2005). Hence, this semantic dependency of the head NP upon the modifier might also result in the modifier (i.e. NP2) to be more likely attached to RCs in this type of ambiguous sentences. This could also explain why participants preferred NP2 attachment especially in the inanimate conditions considering the fact that this kind of part-whole relations was encountered most frequently in sentences of the inanimate condition in Pilot Study 1. This is an assumption which needs further research; however, an in-depth analysis of the sentences used in the test revealed that the sentences with this type of semantic relations distinctively received NP2 attachment.

In this regard, Gilboy et al. (1995) also argued the role of semantic relations between the host NPs on RC attachment preferences. They listed the possible relations as follows:

a) Kinship

The teacher was talking to the relative of the boy who was in the hospital.

b) Functional / Occupational

The explosion deafened the assistant of the inspector who was near the warehouse.

c) Possessives: Inanimate - Inanimate

The tourists admired the museum of the city that they visited in August.

d) Inherent Possession

Birds won't be able to nest in the branch of the tree that we cut last year.

e) Representational

I was surprised by the etching of the sculpture that was in the town hall.

f) Possessives: Inanimate - Animate

The professor read the book of the student that was in the dining room.

(p. 137)

For substance and quantity NPs, where NP2 is usually non-referential and lacks a determiner such as *a sweater of wool* and *a cup of sugar* respectively, Gilboy et al. (1995) claimed that there would be a tendency to attach RCs to NP1 which has a determiner and more referential according to the Referentiality principle. According to the Referentiality principle, readers prefer the host NP which is referential, introduces or refers to a discourse entity. Given that there was an abundance of these NPs in the Spanish questionnaire, Gilboy et al. (1995) claimed that this could be a reason why Spanish speakers showed an NP1 attachment bias.

As for the relations between the host NPs, Gilboy et al. (1995) explained only "Representational "and "Possessives: Inanimate-Animate" separately. For the presentational relations such as "the etching of the sculpture", Gilboy et al. (1995) indicated that NP1 was regarded as an argument of NP2, "*of* " as a case marker, and thus did not assign a thematic role. Therefore, they added that both NPs fall within the same theta-domain, and that both should be available as host NPs to the RC considering the fact that both NPs are referential. Therefore, they assumed that there would be no clear preference, but the factors such as recency and discourse prominence might influence readers to favour one over another. Gilboy et al. (1995) predicted that there would be more NP2 attachment preferences in this type of relation than there would be in substance and quantity NPs exemplified above, but they did not provide further explanation or evidence.

33   (a) * The relative who is of the boy was in the hospital.

        (b)   The book which is of the student was in the dining room.

34   (a) * Of whom did the professor read the book?

Gilboy et al. (1995) stated that "Possessives: Inanimate- Animate" are true alienable possessives and do not behave like other genitive NPs. They can have a predicate use as shown in (33b), but they do not allow extraction as shown in (34a).

In an alienable possessive, NP2 is accepted as an argument of the preposition "*of*", and assigned with the thematic role "possessor". Given that NP2 has an independent thematic role assigned by the preposition, the RC is attached to a thematic domain containing only one potential host, NP2. For the other relations, Gilboy et al. (1995) indicated that some structural differences between the different types might influence attachment preferences,

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they might be projected as external semantic functions and they may have a different attachment site than the representational NPs do. Therefore, in line with the assumptions of Gilboy et al. (1995), we propose that the semantic relations between the host NPs is an important determinant in the attachment preferences. In the pilot study, there was a significant effect of the type of relationships on the attachment preferences. Accordingly, there were more NP1 attachment preferences in the kinship category, which belongs to the inalienable possessives category as discussed in Gilboy et al. (1995), thus a high proportion of NP1 might be expected rather than NP2, and the results seems to confirm this assumption. Furthermore, the less amount of NP1 attachment was observed in the inherent possession type, containing only inanimate NPs. The inherent possession (or the part-whole relation) as in *the heel of the shoe,* and *the window of the pharmacy* seem to favour an NP2 attachment.

One-way ANOVA was run so as to understand whether the attachment preferences varied according to the type of relations in Pilot Study 1 conducted in order to validate the stimulus set 1 (the set including the sentences adapted from Dinçtopal-Deniz (2007). The results showed a statistically significant difference, F (3, 29) = 5, 285, p < .05 (p = .006). Accordingly, the attachment preferences in the ambiguous sentences containing either two animate NPs or two inanimate NPs varied according to the type of relations. In order to know which of the specific groups differed, we run the Tukey post-hoc test, and looked into the multiple comparisons. The results showed only a significant difference between the animate-kinship and inanimate-inherent possession groups, p < .05 (p = .003). NP1 attachment preference has the highest number in the animate kinship category, and the animate occupational and the inanimate possessive category followed it respectively. The inanimate inherent possession category had the lowest number of NP1 attachment.

These results seem to be one of the explanations why there was an overall NP2 attachment, particularly in the inanimate condition in Dinçtopal- Deniz (2007-2010). Therefore, this type of constructions was regarded as a confounding factor and avoided in the following studies. However, the number of items in each type were not equal in Pilot Study 1 since the purpose of the study was not to investigate the effect of the semantic relationships between the genitive NPs. There were 9 sentences in the animate-kinship, 6 in the animate- occupational, 11 in the inanimate-possessives, and 4 in the inanimate- inherent possession. Unfortunately, there is no further evidence supporting Gilboy et al. (1995), either. Therefore, further research is needed to understand the effect of semantic relations between the host NPs.

The semantic associations with the proximal and the distal predicate also played a key role in the participants' attachment preferences. For instance, the RC in the sentence (35) was attached to NP2 by 61 of 97 participants.

(35)   Yazıyı yeniden yaz-an yazar-ın editör-ü epey sinirliydi.
         'the editor of the author who rewrote the text was very angry'

In this sentence, the author is regarded as more likely to rewrite the text than the editor, thereby leading the participants to prefer NP2 attachment. In the sentence (36), as opposed to (32) and (35), 59 of the participants preferred to attach the RC to NP1 this time. The sentence is as follows:

(36)   Karakola gel-en hırsız-ın kardeş-i şüpheli davranıyordu.
         'the brother of the thief who came to the police office behaved suspiciously'

In this sentence, the justification is that it is more likely that the brother comes to the police office later, on his own, whereas the thief is taken there by the police officer, which would result in a higher number of NP1 attachment preference for this sentence. Furthermore, as indicated above, the justifications and analysis of the sentences in terms of the particular attachment preferences showed that not only the proximal but also the distal predicate in the main clause had an impact on the attachment preferences. To illustrate, the sentence (37) also syntactically allows both NP2 (i.e. the manager) and NP1(i.e. the wife) to be attached to the RC ('who is going to the bank'), yet 'being well-dressed', in fact the word *güzel* ('beautiful') in the Turkish equivalent, is justified as more likely to be associated to a woman, not a man. Thus, if both NPs are likely, language users seem to attach the NP which is strongly emphasized on the distal predicate as they are of the opinion that the RC must give information about the NP specifically pointed out by the main predicate here.

(37)   Bankaya gid-en müdür-ün karı-sı güzel giyimli.
         'the wife of the manager who is going to the bank is well-dressed'

In this regard, Gilboy et al. (1995) tested how the plausibility of a situation or relation influenced the likelihood of attaching the RC to either NP1 or NP2. In order to investigate whether the sets of the sentences differed in the plausibility of the relations in NP1 or NP2 interpretation, they divided the sentences containing complex genitive NPs modified by an RC into two separate sentences as in (38) below and tested their level of plausibility using a seven-point scale.

(38)   (a) The police arrested the chauffeur of the actor who was accused of dealing drugs.
         (b) The police arrested the chauffeur of the actor. The chauffeur was accused of dealing drugs.
         (c) The police arrested the chauffeur of the actor. The actor was accused of dealing drugs.

                                                            (Gilboy et al., 1995, p. 148)

The sets of items did not show a significant NP1-NP2 plausibility difference, even though there was an overall effect of the plausibility on the attachment preference looking into the items in general. The difference in terms of NP1 or NP2 attachment preference among the sets, however, were not attributed to the plausibility.

(39)   (a) It looks tall - the glass of water that was on the table.
         (b) It tasted good - the glass of water that was on the table.

                                                            (Gilboy et al., 1995, p. 152)

On the other hand, as Gilboy et al. (1995) pointed out, the likelihood of choosing a potential host NP could be slightly increased by placing focus on it. Gilboy et al. (1995) tested the effect of placing focus on one of the host NPs by adding semantically relevant adjectives before the host NPs as in (39).

Gilboy et al. (1995) did not look into the semantic association of the genitive NPs with the proximal and the distal predicate. However, as they suggested and the present study showed, strong semantic association with one of the host NPs might enhance the likelihood of

choosing that NP over the other. More sensitive research focusing on the effect of semantic association of the genitive NPs with the predicates might provide further evidence.

In brief, as opposed to the results of the previous research (Kırkıcı, 2004; Dinçtopal-Deniz, 2007, 2010), monolingual Turkish speakers might not have a tendency to attach RCs to NP2. These results might be only a consequence of the semantic factors aforementioned. Therefore, before starting to design and conduct the actual experiments based on a list of sentences in Turkish where we utilize lexical-semantic information (e.g. animacy) as a disambiguating cue, it is important to notice the influence of the semantic relations between the NPs in the genitive possessive construction and the semantic associations with both the proximal and the distal predicate. The following studies aimed to rewrite and to obtain a list of globally ambiguous sentences considering these confounding factors.

3.2. Pilot Study 2

In Pilot Study 2, a new list of sentences were written and tested with a group of monolingual Turkish speakers.

3.2.1. Participants

The participants of Pilot Study 2 were 31 monolingual Turkish speakers. They were all freshman undergraduate university students, with beginner level of English (i.e. A1 according to the description of CEFR - Common European Framework of Reference for Languages). None of them took part in the previous study. Furthermore, they all reported that they did not know any other languages, either.

3.2.2. Materials

The material of Pilot Study 2 was similar to that of Pilot Study 1. It included 30 sentences, but the sentences were written by the researcher considering the confounding factors aforementioned (i.e. length, word overlap, semantic relations between NPs, and semantic associations with the predicates) as much as possible. There were 15 sentences in the animate condition (where there were two animate host NPs) and 15 in the inanimate condition (where there were two inanimate host NPs). Two academicians who were instructors of the Turkish language at the higher education level reviewed the sentences and confirmed that the sentences were grammatical and meaningful.

3.2.3. Procedure

The procedure was the same as that of Pilot Study 1. It was an offline task (untimed, pen-and-paper task). The participants were instructed to read the sentences and to answer the questions as spontaneously as possible. They were warned not to return to a question once they answered it and not to change their initial responses. The task took almost 15 minutes.

3.2.4. Data Analysis and Results

The data was first analysed by hand. The participants' responses for each item were written into a previously prepared table. For each sentence, the total number of NP1 and NP2 attachment preferences was calculated. The results showed that the participants had a

tendency to attach RCs to NP1 more often as opposed to the results of Pilot Study 1. Table 10 below shows the total number of NP1 attachment preferences for each sentence.

Table 10.
The total number of NP1 attachment preferences per sentence

Item	NP1 Attachment	Item	NP1 Attachment
01	25	16	13
02	24	17	16
03	23	18	13
04	15	19	19
05	13	20	18
06	17	21	18
07	11	22	15
08	10	23	24
09	17	24	14
10	19	25	15
11	22	26	19
12	15	27	20
13	18	28	22
14	20	29	19
15	18	30	20

A repeated measures ANOVA was run for an item-based analysis so as to find whether there was a significant difference between the participants' preference of NP1 and NP2. Furthermore, we aimed to see whether animacy information affected participants' preferences and how. The results showed that there was a significant main effect of attachment, $F(1, 28) = 9.571$, $p < .05$ (p= .004). Accordingly, the participants showed a tendency to attach RCs to NP1 this time unlike the previous study. There was a non significant (*ns*) main effect of animacy, $F(1, 28)$, *ns*. Furthermore, there was no significant interaction between the participants' attachment preferences and animacy conditions, $F(1, 28) = .009$, $p > .05$ (*p*= .927). The participants' responses for the sentences in two different animacy conditions were not different, as opposed to the results of Pilot Study 1, which had revealed NP2 attachment tendency especially in the inanimate condition. The omission of the genitive possessive constructions where NPs had part-whole relations in Pilot Study 1 might explain the difference observed here in Pilot Study 2.

3.2.5. Discussion

The results of Pilot Study 1 changed as the confounding factors (i.e. the semantic relations between NPs and the semantic associations with the predicates) were controlled, yet revealing an NP1 attachment tendency this time. The semantic associations with the proximal and the distal predicate could explain the tendency here, as well. The sentence (40) below is one of the sentences which received a high number of NP1 attachment preferences in Pilot Study 2. In this sentence, for instance, *anahtar* ('the key') appeared to be more likely to be attached to the RC since it could be regarded as the entity which is more likely to be lost (the proximal predicate) and to be found (the distal predicate) as compared to its competitor *dolap* ('the closet') which could not be lost or found as easily as 'the key' could.

(40)   Yıllar evvel kaybol-an dolab-ın anahtar-ı daha yeni bulundu.
         'the key of the closet which lost years ago has been recently found'

In brief, the results of Pilot Study 1, which showed an NP2 attachment tendency with monolingual Turkish speakers in the offline task in parallel with Dinçtopal-Deniz (2007, 2010), especially in the inanimate condition, disappeared with meticulous choice of the semantic relations in the genitive possessive construction. However, there were still problems in adjusting the semantic associations with the predicates, which resulted in an NP1 attachment tendency this time. Nevertheless, we were able to identify some sentences which could be accepted as globally ambiguous sentences. In Pilot Study 2, there were sentences which received almost an equal number of NP1 and NP2 attachments from the participants. For instance, 15 of 31 participants preferred NP1 attachment whereas the rest, 16 of them, preferred NP2 attachment in Item 04 as shown in Table 10 above. Hence, those sentences which received either 15-16 or 14-17 NP1 or NP2 attachment preferences from the monolingual Turkish speakers in the study were accepted as globally ambiguous. The other sentences were reviewed such that the semantic associations which resulted in particular bias towards NP1 or NP2 attachment were avoided. It was also aimed to see whether and how the semantic associations with the predicates played a role in the attachment preference.

3.3. Pilot Study 3

In Pilot Study 3, the sentences in Pilot Study 2 were reviewed and tested again.

3.3.1. Participants

The participants of Pilot Study 3 were 31 monolingual Turkish speakers who previously took part in Pilot Study 2.

3.3.2. Materials

Pilot Study 3 included the sentences of Pilot Study 2 which were reviewed and rewritten considering the confounding factors. The material included 20 sentences in total.

3.3.3. Procedure

The procedure of Pilot Study 3 was the same as that of Pilot Study 1 and 2. It was again an offline (untimed, pen-and-paper) task. The participants were instructed to read the sentences and answer the comprehension questions as spontaneously as possible. The task took approximately 10 minutes.

3.3.4. Data Analysis and Results

The data was analysed by hand. The participants' answers for each sentence were written into a previously prepared table as 1 for NP1 attachment and 2 for NP2 attachment. For each sentence, the total number of NP1 and NP2 attachment preferences was calculated. Table 11 below shows the total number of NP1 attachments for each sentence.

Table 11.
The total number of NP1 attachment preferences per sentence

Item	NP1 Attachment	Item	NP1 Attachment
01	24	11	14
02	24	12	18
03	25	13	14
04	16	14	19
05	16	15	17
06	20	16	15
07	20	17	21
08	17	18	13
09	23	19	15
10	15	20	19

The sentences which received 15-16 or 14-17 (e.g. 15 NP1 attachments and 16 NP2 attachment from 31 participants in total) in Pilot Study 3 were accepted as ambiguous sentences. With Pilot Study 2and 3, 17 sentences (10 in the animate condition and 7 in the inanimate condition) were obtained for the list of globally ambiguous sentences.

3.3.5. Discussion

With Pilot Study 3, some of the reviewed sentences also were accepted as ambiguous sentences. We obtained 17 sentences in total as mentioned above. However, a final study was administered reviewing and rewriting the rest of the sentences in order to increase the number of ambiguous sentences as many as possible and to have an equal number of sentences for both animacy conditions (i.e. animate and inanimate). It is noteworthy to mention that there are several confounding factors such as the semantic relations between the NPs, semantic associations with the predicates, the length of the sentences, word overlaps, all of which might play a direct role in strengthening either one of the attachment preferences.

3.4. Pilot Study 4

In Pilot Study 4, the remaining sentences in Pilot Study 3 were reviewed and tested again.

3.4.1. Participants

The participants were 31 monolingual Turkish speakers who took part in the previous study.

3.4.2. Materials

The material of Pilot Study 4 included the reviewed and rewritten sentences from the previous study. There were 13 sentences in total.

3.4.3. Procedure

The same procedure in the previous study was followed in Pilot Study 4, as well.

3.4.4. Data Analysis and Results

The data was first analysed by hand. The participants' answers for each item were written into a previously prepared table. From Pilot Study 4, we added 4 more sentences to the list. One of them was excluded from the list in order to have an equal number of sentences for both of the animacy conditions. Therefore, in the end we had 20 globally ambiguous sentences including 10 for the animate and 10 for the inanimate condition. To note down here, there were not any huge differences between the participants' attachment preferences of NP1 and NP2 anymore. However, we included only those sentences which received almost an equal number of attachments (15-16 or at most 14-17 from 31 participants), and excluded the others so as to have a list of balanced sentences. Table 12 below shows the total number of NP1 attachments for each sentence.

Table 12.
The total number of NP1 attachment preferences per sentence

Item	NP1 Attachment	Item	NP1 Attachment
01	17	08	18
02	22	09	12
03	11	10	13
04	20	11	19
05	21	12	19
06	17	13	17
07	17		

Upon finalizing the list of ambiguous sentences, the percentages of the total NP1 attachments per sentence were calculated. Then one-sample t-test was run in order to see whether they were different from the chance level, 50%. One-sample Kolmogorov-Smirnov demonstrated the normal distribution (.229 > .05), and the result of the one-sample t-test showed that NP1 attachment percentages of the sentences were not different from 50%. There was no significant difference (t(19)= .785 p = .442, > .05). Thus, the list of the sentences obtained was accepted as balanced.

Table 13.
Means and standard deviations of the responses

	Animacy	Mean	SD	N
NP2 Attachment	Animate	15,70	1,160	10
	Inanimate	14,90	,994	10
	Total	15,30	1,129	20
NP1 Attachment	Animate	15,30	1,160	10
	Inanimate	16,10	,994	10
	Total	15,70	1,129	20

Furthermore, a repeated measures ANOVA was run in order to reveal whether there was a significant difference between the participants' NP1 and NP2 attachment preferences, and whether there was a significant interaction between the attachment preferences and the

animacy conditions. Table 13 above shows the means and standard deviations of the responses given to the sentences in the final list.

The analysis showed that there was no significant main effect of attachment, $F (1, 18) = .686, p= .418, > .05$. Thus, the participants' attachment site preferences could be taken as similar. Furthermore, there was no significant interaction between the attachment preferences and the animacy conditions, $F (1,18) = 2.743, p = .115, > .05$.

3.4.5. Discussion

This study was administered to validate the stimulus set for the syntactic priming experiments which would be conducted within the scope of this dissertation. Previously, Kırkıcı (2004) and Dinçtopal-Deniz (2007, 2010) aimed to reveal whether monolingual Turkish speakers had a particular tendency to attach RCs to either one of the potential host NPs, and even though they had slightly different result, they both found that monolingual Turkish speakers had an NP2 attachment tendency, especially with the inanimate NPs. The sentences used in Dinçtopal-Deniz (2010) were taken and slightly adapted because of the factors such as the length of the sentences and the word overlaps which might result in lexical boost effect, and Pilot Study 1 was conducted in order to see whether these sentences were truly globally ambiguous and whether we would get the same results with a different group of monolingual Turkish speakers. Pilot Study 1 replicated Dinçtopal-Deniz; however, a closer inspection suggested that some sentences might be semantically biased towards NP1 or NP2 attachment for monolingual Turkish speakers. There were two semantic factors which played a key role in the attachment preferences of monolinguals. The first one was the semantic relations (i.e. part-whole relation) between the two competing NPs of the complex genitive possessive construction. Accordingly, the semantic dependency of the head NP (i.e. the part, NP1) upon the modifier (i.e. the whole, NP2) might result in the modifier to be more likely attached to the RC. The second one was the semantic associations of the host NPs with the proximal and the distal predicate in the sentence. The analysis revealed that if an RC is equally likely to be attached to either one of the competing NPs, yet if the distal predicate strongly and distinctively highlights one of these NPs in terms of their characteristics or certain associations they usually have for the speakers of that language, language users are more likely to favour that NP. If the distal predicate is neutral or it does not distinctively highlight any NPs, yet if the proximal predicate could be more strongly associated to one of the NPs, then language users favour that NP instead of its competitor. Thus, we assumed that there would be no clear attachment preferences if all these confounding factors might be controlled or at least minimized. Three further studies were conducted. Pilot Study 2 showed that the NP2 attachment tendency disappeared when the semantic relations between NPs were controlled, and we started to obtain a few sentences which could be actually accepted as globally ambiguous to monolingual Turkish speakers. With Pilot Study 3 and 4, we completed the stimulus set for the experiments.

CHAPTER 4

4. SYNTACTIC PRIMING OF RC ATTACHMENT (WITH MONOLINGUAL TURKISH SPEAKERS) - ANIMACY EFFECT IN RC ATTACHMENT PREFERENCES

4.1. Experiment 1: Syntactic Priming of RC Attachment (with Monolingual Turkish Speakers) - from Comprehension to Comprehension

In Experiment 1, the goal was to find out whether there was any syntactic priming from comprehension to comprehension in monolingual Turkish speakers. This was an offline study. The details of study are presented and the results are discussed below.

4.1.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment?

2. How does the syntactic priming effect change depending on the animacy information involved in prime and target sentences? In other words, does using the same of the different animacy information in prime and target sentences change the effect?

4.1.2. Hypothesis

Based on the literature, we expected that the syntactic priming from comprehension to comprehension would be observed with monolingual Turkish speakers, as well. Thus, for instance, we expected that participants would be more likely to attach RCs to NP1 in the target when they read an NP1 attachment forced sentence in the prime. Furthermore, we expected to find a stronger syntactic priming effect when both the prime and the target shared the same animacy information, considering the fact that this lexical overlap would strengthen the priming effect, when compared to the condition in which they differed (such as the prime was from the inanimacy forced condition and the target was from the animate).

4.1.3. Participants

80 monolingual Turkish speakers participated in Experiment 1. The participants were first year undergraduate students with beginner level English proficiency. All students were taking English as a compulsory course at university level. The students had previously taken a proficiency exam in the beginning of the semester and those who failed at the exam (those who received lower than 50 over 100 - which means they do not have the pre-intermediate level English which they are assumed to reach at the end of their first year at university) had to take this course throughout the year. Nonetheless, we also gave participants a self-assessment grid prepared and shared in Turkish by the Council of Europe (see Appendix A3). Those who identified their level as A1 only took part in the study. Furthermore, the

participants were between the age of 18 and 23. The mean age of the participants was 19. In total 25 male and 55 female participants took part in the study. They all had normal or corrected-to-normal vision. None of them had any language disorder, or any other psychological or neurological problems which might influence their comprehension and performance on the task. The participants were unaware of the purpose of the study. None of the participants took part in another study administered within the scope of this dissertation.

4.1.4. Materials

In Experiment 1, 32 experimental sentences (16 prime and 16 target sentence) and 32 filler sentences were included. The prime sentences included NP1 and NP2 attachment forced RCs. 8 of the prime sentences were disambiguated towards the animate NP as in (41) below. 4 of them were NP1 attachment forced (41a) and the other 4 were NP2 attachment forced (41b). The other 8 sentences were disambiguated towards the inanimate NP as in (42). Similarly, 4 sentences were NP1 attachment forced (42a) whereas the other 4 were NP2 attachment forced (42b). As for the 16 target sentences, they included globally ambiguous sentences as in (41c) and (42c). 8 of them were chosen from Animate Condition and the other 8 were from Inanimate Condition. Table 14 below summarizes the number of the prime and the target sentences according to the conditions described here for Experiment 1.

Table 14.

Number of prime and target sentences in Experiment 1

Experimental Sentences	Animacy Forced Condition		Animate Condition	Inanimacy Forced Condition		Inanimate Condition
	NP1	NP2	Globally Ambiguous	NP1	NP2	Globally Ambiguous
Prime Sentences	4	4		4	4	
Target Sentences			8			8

(41) Animacy Condition

a.   [RC Geçtiğimiz ay öldür-ül-en] / [NP2 kitab-ın] / [NP1 yazar-ı] / ünlü-ydü.
         last month kill-PASS-PART book-GEN author-3SG.POSS famous-PAST.COP
         'The author of the book that was killed last month was famous.'
                                            (NP1 attachment forced)

b.   [RC Geçtiğimiz ay öldür-ül-en] / [NP2 yazar-ın] / [NP1 kitab-ı] / ünlü-ydü.
         last month kill-PASS-PART author-GEN book-3SG.POSS famous-PAST.COP
         'The book of the author that was killed last month was famous.'
                                            (NP2 attachment forced)

c.   [RC Geçtiğimiz ay öldür-ül-en] / [NP2 yazar-ın] / [NP1 baba-sı] / ünlü-ydü.
         last month kill-PASS-PART author-GEN father-3SG.POSS famous-PAST.COP
         'The father of the author that was killed last month was famous.'
                                            (Globally ambiguous)

(42) Inanimacy Condition

a.   [$_{RC}$ Maviye boya-nan] / [$_{NP2}$ kaptan-ın] / [$_{NP1}$ gemi-si] / muhteşem gör-ün-üyor.
          Blue paint-PART ship-GEN captain-3SG.POSS impressive see-PASS-IMPF
          'The ship of the captain that was painted blue looks impressive.'

                                                        (NP1 attachment forced)

b.   [$_{RC}$ Maviye boya-nan] / [$_{NP2}$ gemi-nin] / [$_{NP1}$ kaptan-ı] / muhteşem gör-ün-üyor.
          Blue paint-PART ship-GEN captain-3SG.POSS impressive see-PASS-IMPF
          'The captain of the ship that was painted blue looks impressive.'

                                                        (NP2 attachment forced)

c.   [$_{RC}$ Maviye boya-nan] / [$_{NP2}$ gemi-nin] / [$_{NP1}$ direğ-i] / muhteşem gör-ün-üyor.
          Blue paint-PART ship-GEN pole-3SG.POSS impressive see-PASS-IMPF
          'The pole of the ship that was painted last month looks impressive.'

                                                          (Globally ambiguous)

                                    (Retrieved from Dinçtopal-Deniz, 2010, pp.36-37)

In the experimental sentences (i.e. prime and target sentences), RCs included only passives, yet the predicates in the matrix sentences varied in terms of structure, including nominal predicates as well as actives and passives in verbal predicates. Thus, we tried to make sure that the primes and the targets shared the similar structures in the matrix sentences when they were paired in the task so as to avoid possible influence of the varying structures between the pairs on the syntactic priming effect under investigation although they were not the segments to be evaluated within the scope of this study (see Appendix C). As for the filler sentences, we included 32 filler sentences of various structures in order to divert the attention of the participants from the specific grammatical structure under investigation.

4.1.5. Procedure

This was an offline task, a pen-and-paper questionnaire. In this task, the participants were required to read the prime sentences which were given as full sentences and complete the following simple sentences given so that we could make sure that the participants read them all. These sentences could be also regarded as comprehension questions as they were probing which NP the RC given in a sentence modified as in (43) below. The reason why we decided on the sentence completion type in order to make sure that the participants actually read the prime sentences (and in order to reveal which NP they attach the RC to in the target sentences) was due to the fact that we aimed to avoid the risk of the participants reading only the questions not the full complex sentences aimed to be evaluated in order to complete the task. This would be the case, especially for the prime sentences in which there was the possibility of attaching RCs to a particular NP as the sentences were temporarily ambiguous and disambiguated towards either one of NPs by reading only the question but not the prime. For instance, for a prime sentence such as (43) below, previously we planned to ask a comprehension question with two options as in (43a). However, before the actual experiment, we asked four Turkish native speakers to review the material, and based on their suggestions about the design of the material, we decided not to include this type of questioning as they commented that there was no need to read the sentences in order to

answer some of the questions with two options. Therefore, in order to guarantee that they read the prime sentences, we redesigned the material and used the sentence completion questions as in (43b), which made it more likely that the participants read and comprehend the prime first. The participants were both given a written instruction with two examples on the first page of the booklet and they were also orally reminded to use only one single word to complete every single sentence in the task, thereby they would choose either 'fakülte' or 'dekan' in order to complete the simple sentences as in (43b), and they would not write 'fakültenin dekanı', and we would be able to reveal which NP they actually preferred to attach RCs to.

Prime Sentence (Animacy Forced Condition)

(43)   Sahtecilikle   suçla-nan   fakülte-nin   dekan-ı   görevden ayrıldı.
         forgery   accuse-3SG.PASS   faculty-GEN   dean-3SG.POSS left the job
         'the dean of the faculty that was accused of forgery left the job'

   a)   Sahtecilikle suçlanan hangisi?
          'Which one was accused of forgery?'
          a. fakülte   b. dekan
            'the faculty'   'the dean'
   b)
                                          _____ sahtecilikle suçlandı.
          '_____ was accused of forgery.'

Similarly, they read and completed the simple sentences aimed to measure their comprehension after they read the target sentences. In this way, we aimed to reveal which NP they were primed to. In other words, if the participants were primed to NP1 after reading an NP1 attachment forced prime sentence, for instance, we expected that they would choose NP1 to attach RCs in globally ambiguous sentences (i.e. target sentences) more often, i.e. above the chance level, as well. Participants also read and completed the comprehension question type of simple sentences related to the filler sentences in the study; however, the sentences did not ask NPs but they were mostly related to adverbs, predicates, and the sequences of events in those sentences. The entire task took almost 35 minutes.

In the study, there were 4 different conditions, and in each one of these conditions, we recruited 20 participants. The reason why we included 4 different conditions is that we aimed to test each target sentence paired with a different prime sentence from a different condition in order not to test them with only one single type of prime and target sentence matching but across alternative sentence pairs and focus on the syntactic features of the sentences only, avoiding any possible semantic effect.

The participants were distributed a booklet involving all the sentences and sentence completion questions with a brief instruction part at the top of the booklet. The participants were informed both orally and with the brief written instruction that they were expected to read all the sentences in order and answer as spontaneously as possible, and not to go back so as to change their previous responses once they completed a question. They were also reminded to write only one word in the simple sentence completion questions following the sentences by drawing their attention on the two example sentences provided. The booklet

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was designed in such a way that participants would not understand the purpose of the study. Every participant saw 8 target from the animate and 8 target from the inanimate condition in total. The target sentences were paired with 4 possible prime sentence alternative conditions including (i) NP1 attachment in Animacy Forced Condition, (ii) NP2 attachment in Animacy Forced Condition, (iii) NP1 attachment in Inanimacy Forced Condition, (iv) NP2 attachment in Inanimacy Forced Condition. Every participant saw the same prime and target sentence pair condition (e.g. prime: NP1 attachment in Animacy Forced Condition and target: Animacy Condition) twice throughout the task distributed to them.

The participants saw 6 sentences including the prime, target and filler sentences on each page of the booklet (except the final page on which they see only one pair of filler sentences and one pair of the prime and the target left). We decided on such a design because it was important for us that each page following one another does not repeat the previous one in order to avoid the risk that participants could develop answering strategies. We did not want the participants guess the structure coming on each one of the pages. When we designed it in a way that on each page they saw 6 sentences, the order of the pairs was more unpredictable. So, for example, they saw first 2 filler sentences, and the prime and the target sentence pair, and then the next 2 filler sentences on one page, and following that, on the next page, they started with the prime and the target sentence pair this time first, then they saw 2 filler sentences, and then the page ended with the prime and target sentence pair again. It could have been even better if we had each pair or each one of the sentences on a separate page, but even so we had 11 pages which were already quite long for many participants, and it would be more discouraging for the participants to complete the task.

4.1.6. Data Analysis and Results

As mentioned before, the prime sentences were disambiguated by using animacy information and thus there were two animacy conditions; animate and inanimate for the prime. Furthermore, they could have either NP1 attachment or NP2 attachment. The target sentences also had two animacy conditions; animate and inanimate, and they could have either NP1 attachment or NP2 attachment. The participants had 16 prime and target pairs. 8 pairs had animate target sentences and the other 8 had inanimate target sentences. The prime sentence appeared in four possible conditions; (i) NP1 Attachment in Animacy Forced Condition, (ii) NP2 Attachment in Animacy Forced Condition, (iii) NP1 Attachment in Inanimacy Forced Condition, and (iv) NP2 Attachment in Inanimacy Forced Condition. When these four prime conditions were paired with the target sentences, each participant saw the same prime-target pair condition twice in the study. We had four conditions according to the prime and target animacy, and in each one of these we had four scores for prime attachment site and target attachment site. In each one of the four major conditions, we had 320 responses received from the participants, and when divided into two according to the conditions when the prime is NP1 and the prime is NP2, we had 160 responses. Table 15 below shows the responses for each condition mentioned here and the relative frequencies are presented in parenthesis.

Table 15.

Numbers of NP1 and NP2 attachment in target sentences (columns) by levels of prime type (rows) across prime-target pairs in terms of animacy conditions in Experiment 1

Prime Animate - Target Animate

	Target NP2	Target NP1
Prime NP2	78 / 160 (48.75 %)	82 / 160 (51.25 %)
Prime NP1	65 / 160 (40.6 %)	95 / 160 (59.3 %)

Prime Inanimate - Target Animate

	Target NP2	Target NP1
Prime NP2	75 / 160 (46.8 %)	85 / 160 (53.1 %)
Prime NP1	80 / 160 (50 %)	80 / 160 (50 %)

Prime Animate - Target Inanimate

	Target NP2	Target NP1
Prime NP2	71 / 160 (44.3 %)	89 / 160 (55.6 %)
Prime NP1	60 / 160 (37.5 %)	100 / 160 (62.5 %)

Prime Inanimate - Target Inanimate

	Target NP2	Target NP1
Prime NP2	74 / 160 (46.25 %)	86 / 160 (53.75 %)
Prime NP1	64 / 160 (40 %)	96 / 160 (60 %)

Descriptively, there were more NP1 attachment preferences in the target sentences especially after the sentences in which NP1 attachment was forced in the prime compared to after the sentences in which NP2 attachment was forced. This difference was slightly higher when the target sentence was from the inanimate condition, and this difference was not present only in the second condition as shown in Table 15 above, where the prime was from the inanimacy forced condition and the target was from the animate condition.

In order to find out the priming effect, we compared the participants' NP1 and NP2 attachment preferences in the target sentences according to the prime attachment sites (i.e. NP1 and NP2 attachment again) in each one of these four conditions presented above. For this, we used repeated measures ANOVA. The results for each one of them are as follows;

Prime Animate - Target Animate

There was not a significant difference between the target attachment site preferences, $F(1,79) = 1.910$, $p > .05$ (p= .171), $\eta_p^2 = ,24$. Furthermore, there was not a significant interaction between the prime attachment sites given and the target attachment sites preferred by the participants, $F(1,79) = 3.891$, $p > .05$ (p= .052), $\eta_p^2 = ,047$, it is very close to be significant yet still only substantial, not significant).

Table 16.
Interaction between the prime and target attachment sites in the Prime Animate - Target Animate condition

Prime Attachment Site	Target Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	1,188	,091	1,007	1,368
	2	,813	,091	,632	,993
2	1	1,025	,083	,859	1,191
	2	,975	,083	,809	1,141

Above 1 means above chance level.

<u>Prime Inanimate - Target Animate</u>

There was not a significant difference between the target attachment site preferences, $F(1,79)= .181$, $p > .05$ (p= .672), $\eta_p^2 =,002$. Furthermore, there was not a significant interaction between the prime attachment sites given and the target attachment sites preferred by the participants, $F(1,79)= .507$, $p > .05$ (p= .479), $\eta_p^2 =,006$.

Table 17.
Interaction between the prime and target attachment sites in the Prime Inanimate - Target Animate condition

Prime Attachment Site	Target Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	1,000	,085	,830	1,170
	2	1,000	,085	,830	1,170
2	1	1,063	,086	,891	1,234
	2	,938	,086	,766	1,109

Above 1 means above chance level.

<u>Prime Animate - Target Inanimate</u>

There was a significant difference between the target attachment preferences, $F(1,79) = 7.383$, $p < .05$ (p= .008), $\eta_p^2 =,085$. The participants preferred NP1 attachment more often (Mean = 1.181) than NP2 attachment (Mean = .819). However, there was not a significant interaction between the prime attachment sites and the target attachment sites, $F(1,79) = 1.720$, $p > .05$ (p= .194), $\eta_p^2 =,021$.

Table 18.
Interaction between the prime and target attachment sites in the Prime Animate - Target Inanimate condition

Prime Attachment Site	Target Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	1,250	,084	1,082	1,418
	2	,750	,084	,582	,918
2	1	1,113	,085	,943	1,282
	2	,888	,085	,718	1,057

*Above 1 means above chance level.

<u>*Prime Inanimate - Target Inanimate*</u>

Again there was a significant difference between the target attachment preferences, $F(1,79)= 4.981$, $p < .05$ (p= .028), $\eta_p^2 =,059$. The participants preferred NP1 attachment more often (Mean = 1.138) than NP2 attachment (Mean = .863). However, there was not a significant interaction between the prime attachment sites and the target attachment sites, $F(1,79) = 1.357$, $p > .05$ (p= .247), $\eta_p^2 =,017$.

Table 19.
Interaction between the prime and target attachment sites in the Prime Inanimate - Target Inanimate condition

Prime Attachment Site	Target Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	1,200	,086	1,029	1,371
	2	,800	,086	,629	,971
2	1	1,075	,077	,922	1,228
	2	,925	,077	,772	1,078

*Above 1 means above chance level.

In brief, there was a significant difference between the target attachment preferences of the participants towards NP1 attachment but particularly in the conditions where the target sentences consisted of inanimate noun phrases (i.e. Prime Animate - Target Inanimate and Prime Inanimate - Target Inanimate conditions). However, it was not clear yet whether the participants preferred NP1 attachment more often in the target sentences (especially when the target sentences consisted of inanimate NPs) regardless of the prime attachment site (i.e. NP1 and NP2), or whether they preferred NP1 significantly more after a particular prime attachment site, which would tell us to which direction monolingual Turkish speakers had the effect of syntactic priming in the structure under investigation. In order to understand this, we did paired sample t-tests, and compared the target attachment preferences separately for both prime attachment sites. The results of the paired sample t-tests are presented below.

Prime Animate - Target Animate

Prime NP2

On average, when the prime attachment site was NP2, the participants did not show a significantly more preference to NP1 (M = 1.03, SE = .083) than to NP2 (M = .98, SE = .083) in the target sentence, $t(79) = .300$, $p > .05$ (p= .765).

Prime NP1

On average, when the prime attachment site was NP1, the participants showed a significantly more preference to NP1 (M = 1.19, SE = .091) than to NP2 (M = .81, SE = .091) in the target sentence, $t(79) = 2.063$, $p < .05$ (p=.042).

Target NP1

On average, NP1 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = 1.03, SE = .083) or NP1 (M = 1.19, SE = .091), $t(79) = 2.063$, $p > .05$ (p=.052).

Target NP2

On average, NP2 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = .98, SE = .083) or NP1 (M = .81, SE = .091), $t(79) = 1.973$, $p > .05$ (p = .052).

Prime Inanimate - Target Animate

Prime NP2

On average, when the prime attachment site was NP2, the participants did not show a significantly more preference to NP1 (M = 1.06, SE = .086) than to NP2 (M = .94, SE = .086) in the target sentence, $t(79) = .727$, $p > .05$ (p= .469).

Prime NP1

On average, when the prime attachment site was NP1, the participants did not show a significantly more preference to NP1 (M = 1.00, SE = .085) than to NP2 (M = 1.00, SE = .085) in the target sentence, $t(79) = .000$, $p > .05$ (p=1.000). The preferences were balanced.

Target NP1

On average, NP1 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = 1.06, SE = .086) or NP1 (M = 1.00, SE = .085), $t(79) = .712$, $p > .05$ (p=.479).

Target NP2

On average, NP2 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = .94, SE = .086) or NP1 (M = 1.00, SE = .085), $t(79) = -.712$, $p > .05$ (p = .479).

Prime Animate - Target Inanimate

Prime NP2

On average, when the prime attachment site was NP2, the participants did not show a significantly more preference to NP1 (M = 1.11, SE = .085) than to NP2 (M = .89, SE = .085) in the target sentence, $t(79) = .319$, $p > .05$ (p= .191).

Prime NP1

On average, when the prime attachment site was NP1, the participants showed a significantly more preference to NP1 (M = 1.25, SE = .084) than to NP2 (M = .75, SE = .084) in the target sentence, $t(79) = 2.963$, $p < .05$ (p=.004).

Target NP1

On average, NP1 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = 1.11, SE = .085) or NP1 (M = 1.25, SE = .084), $t(79) = -1.311$, $p > .05$ (p=.194).

Target NP2

On average, NP2 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = .89, SE = .085) or NP1 (M = .75, SE = .084), $t(79) = 1.311$, $p > .05$ (p = .194).

Prime Inanimate - Target Inanimate

Prime NP2

On average, when the prime attachment site was NP2, the participants did not show a significantly more preference to NP1 (M = 1.08, SE = .077) than to NP2 (M = .93, SE = .077) in the target sentence, $t(79) = .973$, $p > .05$ (p= .334).

Prime NP1

On average, when the prime attachment site was NP1, the participants showed a significantly more preference to NP1 (M = 1.20, SE = .086) than to NP2 (M = .80, SE = .086) in the target sentence, $t(79) = 2.324$, $p < .05$ (p=.023).

Target NP1

On average, NP1 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = 1.08, SE = .077) or NP1 (M = 1.20, SE = .086), $t(79) = -1.165$, $p > .05$ (p=.247).

Target NP2

On average, NP2 attachment preference in the target sentence did not show a significant difference when the prime was NP2 (M = .93, SE = .077) or NP1 (M = .80, SE = .086), $t(79) = 1.165$, $p > .05$ (p = .247).

4.1.7. Discussion

The results show that the participants preferred to attach RC to NP1 in the target sentence which were identified as globally ambiguous significantly more than NP2 after the prime attachment site was NP1 (except the condition Prime Inanimate - Target Animate where the attachment preferences in the target appear to be balanced). This was even more significant especially when the target sentence consisted of the inanimate noun phrases (i.e. Prime Inanimate - Target Animate, $p = .042$; Prime Animate - Target Inanimate, $p = .004$, Prime Inanimate - Target Inanimate, $p = .023$). Furthermore, there was not any attachment tendency after the prime attachment site was NP2. The results were always non-significant for that. The tendency to attach RC to NP1 more than NP2 after NP1 especially for the target sentences in the inanimate condition could be explained with the semantic effect of animacy information embedded in the experimental sentences and that priming effect might be stronger with NP1 attachment forced prime sentences rather than NP2 attachment forced. This might be due to the fact that for monolingual Turkish speakers, NP1 attachment in these type of sentences might be the more preferred syntactic structure, and there might be already a stronger preference bias for NP1 attachment than for NP2 attachment (Segaert et al., 2011). Furthermore, NP1 attachment in the inanimate condition could be also explained with the processing difficulty of inanimate NPs. It is asserted that inanimate NPs have higher processing cost in RC attachment as compared to animate NPs (Jackson &Roberts, 2010).

Nevertheless, we did not observe a significantly higher NP1 attachment after NP1 prime than NP2 prime and we did not observe a significantly higher NP2 attachment after NP2 prime than NP1 prime when we compared the prime attachment sites across prime and target animacy conditions. Therefore, even though we can say that we observed a tendency to attach RC to NP1 after NP1 prime, we cannot say that there is any syntactic priming effect observed in Experiment 1. Except the condition Prime Inanimate - Target Animate, where the preferences were balanced, all the other conditions show slightly more NP1 attachment after NP1 than NP2 prime and slightly more NP2 attachment in the target after NP2 than NP1 when we looked into the statistical analysis. Therefore, the reason why we could not observe any significant priming effect might be related to the fact that we worked with very small numbers of responses in Experiment 1. We had 8 conditions when the animacy and the attachment site conditions in the prime and the target were considered, and each participant saw only two pairs of them, and we evaluated their responses over 2, where 0 (zero) means no matching in the prime and the target attachment site, 1(one) means by chance, and 2 means matching in both examples appeared for that particular condition. This resulted in very small differences between the conditions, and that might explain why we did not obtain any significant priming effect even though there are slight effects observed.

4.2. Experiment 2: Syntactic Priming of RC Attachment (with Monolingual Turkish Speakers) - from Comprehension to Production

In Experiment 2, the goal was to find out the effect of syntactic priming in monolingual Turkish speakers with a comprehension to production study. An offline task was administered. The details of the study were explained and the results were discussed below.

4.2.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC, reading an alternative way of RC attachment - either a temporarily ambiguous or an unambiguous NP1 attachment enforcing structure) affect producing sentences requiring complex genitive possessive structure modified by RC in the target sentences?

2. How does the syntactic priming effect change depending on the animacy information involved in prime and target sentences? In other words, does using the same of the different animacy information in prime and target sentences change the effect?

4.2.2. Hypothesis

We expected that the effect of syntactic priming would be in parallel with Experiment 1 in terms of attachment preferences and the effect of animacy conditions. In other words, there would be still more NP1 attachment preferences following NP1 attachment forced prime sentences and this tendency will be stronger especially in the inanimate condition.

Furthermore, an unambiguous alternative way of RC attachment enforcing NP1 (i.e. NP2+RC+NP1) in Turkish was also tested in Experiment 2 together with the temporarily and globally ambiguous sentences used in Experiment 1 (i.e. RC+NP2+NP1). Therefore, we expected to observe a difference between these two alternatives, particularly a higher NP1 attachment preference where NP2+RC+NP1 structure is used in the prime since this structure is accepted syntactically unambiguous and based on the assumptions posited depending on the Avoid Ambiguity Strategy (Frazier & Clifton, 1996), Turkish speakers might show tendency to prefer this structure more if they aim to attach RCs to NP1 rather than a temporarily ambiguous alternative structure where it is syntactically possible to attach RCs to either one of the two NPs available (Kırkıcı, 2004; Dinçtopal, 2007; Kaya, 2010).

4.2.3. Participants

84 monolingual Turkish speakers participated in Experiment 2. There were 12 different conditions in the study (8 conditions, 56 participants in the first part and 4 conditions, 28 participants in the second part), and 7 participants took part in each one of them. The participants were all first year undergraduate students with beginner level English proficiency. All students were taking English as a compulsory course at university at the time of data collection. The students had taken a proficiency exam in the beginning of the semester and those who failed at the exam (i.e. those who received lower than 50 over 100 - which means they do not have the pre-intermediate level English which they are assumed to reach at the end of their first year at university) had to take this course throughout the year. Nonetheless, we also gave participants a self-assessment grid prepared and shared in Turkish by the Council of Europe (See Appendix A3) as we did in Experiment 1. Those who identified their level as A1 only took part in the study. The participants were between the age of 18 and 28. The mean age of the participants was 19. In total 36 male and 48 female took part in the study. Participants had normal or corrected-to-normal vision. None of them had any language disorder, or psychological or neurological problems which might influence

their performance on the task. The participants were unaware of the purpose of the study, and none of the participants took part in another study within the scope of this dissertation.

4.2.4. Materials

In Experiment 2, the same number of experimental and filler sentences in Experiment 1 was used (See Appendix D). The target sentences and the filler sentences were totally the same, but the prime sentences were revised according to the goals of this study. Furthermore, since Experiment 2 is a production study, the participants were expected to write RC segment in the target sentence themselves, complete the genitive possessive construction with the given noun phrase, and attach RCs to the most appropriate NP in the end. In this regard, RC segment in the target sentences and NP2 (i.e. the modifier, the local NP) were omitted from the original target sentences. Then the noun phrase and RCs (as simple sentences) were given in parenthesis as in (44) below. The simple sentence completion question followed the target sentence as in Experiment 1 so as to understand which one of the two NPs in the genitive possessive construction the participants attached RCs to. RCs were given as simple sentences in parenthesis in order not to imply that we expected the participants to use them to complete the sentences by using a particular structure (i.e. RC) and in order to avoid the risk of revealing the purpose of the study, which might have misguided the results.

(44)   [oyuncu;   'telefonda dolandırıldı']
        _____ ablası polise ifade verdi.
        _____ telefonda dolandırıldı.

The prime sentences were given in alternative ways of attaching RC to a particular NP in Turkish. For this, we included these two types; (i) unambiguous RC attachment (NP2+RC+NP1), and (ii) ambiguous RC attachment (RC+NP2+NP1), which had been previously tested in Experiment 1.

(45)   RC alternative 1 (NP2+RC+NP1);

        Fakülte-n-in sahtecilikle suçlan-an dekan-ı görevden ayrıldı.
        'the dean of the faculty that was accused of forgery resigned'

        RC alternative 2 (RC+NP2+NP1);

        Sahtecilikle suçlan-an fakülte-n-in dekan-ı görevden ayrıldı.
        'the dean of the faculty that was accused of forgery resigned'

In this way, we expected to see whether the participants would show a tendency to use a particular way of RC attachment (e.g. an unambiguous one) when they were allowed to do so, and to see the effect of syntactic priming in resolving complex sentence structures.

Apart from these, we had 2 parts in Experiment 2 which we labelled as Group A and B. We had 8 subgroups in Group A and 4 subgroups in Group B. In Group A, half of the prime sentences involved RC alternative 1 and the other half involved RC alternative 2. As mentioned above, RC alternative 1 already enforced NP1 attachment. For a better

comparison between these two alternative structures, we tried to make sure that the other half of the prime sentences involving RC alternative 2 also enforced NP1 attachment. Therefore, all of the prime sentences in Experiment 2 were NP1 attachment forced, so we could compare the strength and the effect of two alternative ways on the target sentence production in terms of RC alternative preference as well as NP1 attachment preference. Overall, we had 8 subgroups in Group A because as in Experiment 1, we tested each one of the target sentence with different prime sentences so as to avoid the possible influence of the semantic and lexical information provided with these different sentences. Table 20 shows the prime-target sentence pair matchings involved in Group A.

Table 20.

The details of the possible prime conditions paired with the target sentences in Group A

Group A

A1	Prime	S1	RC alternative 1 + Animacy Forced	
A2	Prime	S1	RC alternative 1 + Inanimacy Forced	
A3	Prime	S1	RC alternative 2 + Animacy Forced	
A4	Prime	S1	RC alternative 2 + Inanimacy Forced	
A5	Prime	S1	RC alternative 2 + Animacy Forced	(the alternative of A1)
A6	Prime	S1	RC alternative 2 + Inanimacy Forced	(the alternative of A2)
A7	Prime	S1	RC alternative 1 + Animacy Forced	(the alternative of A3)
A8	Prime	S1	RC alternative 1 + Inanimacy Forced	(the alternative of A4)
#	Target	S1	#	

*All the prime sentences were NP1 attachment forced in Group A.

In Group B, as opposed to Group A, half of the prime sentences this time involved the prime sentences forcing NP2 attachment. RC alternative 1 never enforces NP2 attachment in Turkish, therefore, only RC alternative 2 sentences were used for the half of the sentences in Group B, and for the other half, we used again RC alternative 1 sentences enforcing NP1 attachment. In Group B, there were 4 subgroups and the possible prime-target pairs demonstrated in Table 21 below.

Table 21.

The details of the possible prime conditions paired with the target sentences in Group B

Group B

B1	Prime S1	RC alternative 1 + Animacy Forced	NP1 attachment forced
B2	Prime S1	RC alternative 1 + Inanimacy Forced	NP1 attachment forced
B3	Prime S1	RC alternative 2 + Inanimacy Forced	NP2 attachment forced
B4	Prime S1	RC alternative 2 + Animacy Forced	NP2 attachment forced
#	Target S1	#	

The procedure of Experiment 2 and the instructions given to the participants were explained in detail below.

4.2.5. Procedure

This was an offline task. The participants were required to read the prime sentences which were given as full sentences and complete the following simple sentences. The participants were distributed a booklet involving all the sentences and sentence completion questions with a brief instruction part at the top of the booklet as in Experiment 1. The participants were both orally and with this brief instruction informed that they were expected to read all the sentences in order and to answer as immediately as possible, and they were warned not to go back so as to change their previous responses. They were also reminded to write only one word in the simple sentence completion questions following the complex sentences by drawing their attention on the two example sentences provided. They were also reminded that they had to use both the noun phrase and the simple sentence given in the parenthesis where they needed to produce the complex sentences. The booklet was designed in the same way in Experiment 1 that we aimed to make sure the participants would not understand the purpose of the study. Accordingly, the participants saw 6 sentences (prime, target and filler sentences) on each page of the booklet (except the final page on which they saw only one pair of filler sentence and one pair of the prime and the target left) similar to the previous study. We had 11 pages again, and the task took approximately 45 minutes.

4.2.6. Data Analysis and Results

Descriptively, the participants preferred to use RC alternative 2 more often (RC+NP2+NP1) as opposed to what we expected them to do and to attach RC to NP2 in both parts of the experiment (i.e. Group A and B). Table 22 below shows the total number of responses obtained in Experiment 2.

In Group A, half of the prime sentences included RC alternative 1 (NP2+RC+NP1). However, the participants preferred to use RC alternative 1 only in 1.78 % of all their productions in the target sentences. Therefore, we omitted these productions from the data analysis, and we only focused on NP attachment preference in RC alternative 2, which is globally ambiguous and NP attachment preference in this structure is in fact the primary focus of this study.

We had only NP1 attachment forced primes in Group A, therefore we would expect to see more (if not always) NP1 attachment if participants' responses had been influenced by prime sentences. (Previously we aimed to distinguish whether the participants would attach more NP1 after RC alternative 2 than RC alternative 1 or not. However, we omitted RC alternative 1 from the analysis because of a very small percentage of occurrence in the participants' production of the target sentences as pointed out above.) However, the participants appeared to attach RCs to NP1 only in 20.64 % of their target sentence productions and preferred to attach RCs to NP2 more with 63.83 % even though they did not see any NP2 attachment in the prime sentences throughout the study, which was quite unexpected. Furthermore, even though they did not see any -(s)I compounds (i.e. 'gözlük kutu-s-u)[1] in the prime, the participants used these compounds in production with 6.47 % of all the productions, especially when the target sentence consisted of inanimate NPs (with 6.25 %; 96.5 % of all -(s)I compounds produced in Group A). There were also other types of sentence structures produced (6% of all the productions in Group A). They were particularly subordinate clauses or simple sentences, such as another main clause which was separated from the rest of the sentence with a comma even though the participants were warned not to use any punctuation.

NP1 attachment preferences after RC alternative 1 and RC alternative 2 are analyzed using paired samples t-test across prime-target animacy conditions. The results are as follows:

Prime Animate - Target Animate:

On average, the participants did not show a significantly more preference to NP1 attachment after RC alternative 2 (M= .34, SE=.082) than RC alternative 1 (M= .38, SE= .079), $t(55)$= -.375, $p > .05$ (p=.709).

Prime Inanimate - Target Animate:

On average, the participants did not show a significantly more preference to NP1 attachment after RC alternative 2 (M= .46, SE= .084) than RC alternative 1 (M= .48, SE= .081), $t(55)$= -.184, $p >.05$ (p= .855).

Prime Animate - Target Inanimate:

On average, the participants did not show a significantly more preference to NP1 attachment after RC alternative 2 (M= .32, SE= .077) than RC alternative 1 (M= .34, SE= .069), $t(55)$=-.184, $p > .05$ (p= .855).

Prime Inanimate - Target Inanimate:

On average, the participants did not show a significantly more preference to NP1 attachment after RC alternative 2 (M= .54, SE= .084) than RC alternative 1 (M=.45, SE= .092), $t(55)$= .820, $p > .05$ (p= .416).

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[1] -(s)I compounds consist of two juxtaposed nouns, the first of which has no suffixes while the second is marked with the 3rd person possessive suffix -(s)I (Göksel & Kerslake, 2005).

Table 22.
Total number of responses obtained in Experiment 2

TARGET SENTENCE PRODUCTIONS	GROUP A (Total **896** sentences written by 7 participants in each one of the 8 different conditions for 16 prime-target pairs)		GROUP B (Total **448** sentences written by 7 participants in each one of the 4 different conditions for 16 prime-target pairs)	
	ANIMATE CONDITION	INANIMATE CONDITION	ANIMATE CONDITION	INANIMATE CONDITION
RC1 alternative types used by the participants in the target sentences	10	6	14	11
NP1 attachment in all ambiguous (RC2 alternative type) written for the target sentences	93	92	33	45
NP2 attachment in all ambiguous (RC2 alternative type) written for the target sentences	299	273	155	143
-*(s)I* compounds used (e.g. gözlük kutusu instead of full genitives; gözlüğün kutusu)	2	56	1	19
Other types of sentences (i.e. Subordinate clauses, or two main clauses separated by a comma)	40	13	21	6

Overall, there was not any significantly more NP1 attachment preference after participants read the sentences including the RC alternative 2 structure compared to after they read those including the RC alternative 1 structure. Thus, we cannot say that either one of them is more effective in terms of syntactic priming effect, or the participants are more sensitive to either one of these structures. However, this lack of syntactic priming effect could be related to the task and the design of the material only. This is explained in the discussion part below.

Furthermore, we ran a subject-based analysis by using a repeated measures ANOVA so as to see the main effect of RC alternative types, prime animacy, target animacy and the interaction of these variables. The analysis showed that there was a significant main effect of prime animacy only, $F_{(1,55)}= 8.148$, $p < .05$ ($p = .006$). Accordingly, NP1 attachment

preference was higher when the prime was from the inanimacy forced condition (M= .482) than when the prime was from the animacy forced condition (M= .344).

As for Group B, half of the prime sentences were again RC alternative 1 (NP2+RC+NP1) but the other half this time included the prime sentences enforcing NP2 attachment, those of which cannot be expressed with RC alternative 1 but only with RC alternative 2. Here we expected to see more NP2 attachment preferences and more RC alternative 2 after RC alternative 2 enforcing NP2 attachment than RC alternative 1 enforcing unambiguously NP1 attachment, and to see more NP1 attachment preferences and more RC alternative 1 after RC alternative 1 than RC alternative 2.

Descriptively, we did not have a high number of RC alternative 1 used when all the target sentence productions were considered (even though it was this time higher (5.58%) than in Group A (1.78%). However, these productions were also omitted here together with the -(s)I compounds (4.46%), and other types of structures (6.02%), and they were not evaluated. Similarly, we only focused on the productions which were globally ambiguous, and looked into NP attachment preferences in them. Overall, the relative percentage of NP1 attachment preferences (17.41%) were quite less than NP2 attachment preferences (66.51%).

Using a repeated measures ANOVA, we investigated the main effect of prime attachment site and target attachment site across animacy conditions and RC alternative types. The results showed that there was a significant difference between the attachment preferences and RC alternative types. The details of the analysis are as follows:

Prime Inanimate - Target Animate:

There was a significant difference between the target attachment site preferences of the participants, $F(1, 27)= 19.253$, $p < .001$ (p= .000). Accordingly, the participants showed a tendency to attach RC to NP2 (M= 1.464) more often than NP1 (M= .536). There was not any significant interaction between the prime attachment site and the target attachment site.

Prime Animate - Target Inanimate:

There was a significant difference between the target attachment site preferences of the participants, $F(1, 27)= 11.441$, $p < .05$ (p= .002). Accordingly, the participants showed a tendency to attach RC to NP2 (M= 1.357) more often than NP1 (M= .643). There was not any significant interaction between the prime attachmentsite and the target attachment site.

Prime Inanimate - Target Inanimate:

There was a significant difference between the target attachment site preferences of the participants, $F(1, 27)= 24.270$, $p < .001$ (p= .000). Accordingly, the participants showed a tendency to attach RC to NP2 (M= 1.482) more often than NP1 (M= .518). Furthermore, there was a significant interaction between the prime attachment site and the target attachment site, $F(1,27) = 6.451$, $p < .05$ (p= .017). Accordingly, the participants preferred to attach RC to NP2 regardless of the prime was NP1 or NP2 attachment forced. Table 23 below shows the interaction between the prime and target attachment sites in the Prime Inanimate-Target Inanimate condition.

Table 23.
Interaction between the prime and target attachment sites in the Prime Inanimate- Target Inanimate condition

Prime Attachment Site	Target Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	,357	,092	,168	,546
	2	1,643	,092	1,454	1,832
2	1	,679	,137	,398	,959
	2	,1,321	,137	1,041	1,602

Overall, in Group B, we also observed that the participants showed a tendency to attach RC to NP2 regardless of the prime attachment site (i.e. NP1 and NP2 attachment), yet there was not any significant effect of prime animacy unlike Group A. The results are discussed below.

4.2.7. Discussion

The results show that the participants preferred to attach RC to NP2 much more than NP1 regardless of the attachment site forced in the prime, and they preferred to use RC alternative 2 (RC+NP2+NP1) more often rather than RC alternative 1 (NP2+RC+NP1) in Experiment 2. This could be because of the nature of full genitive possessive constructions in Turkish. The two noun phrases in genitive possessive constructions were provided with their suffixes. The head NP was already given to the participants with possessive marker -(s)I, probably forcing the participants to complete this relation first, and then to write RC and attach it to either one of the NPs, where they might have resulted in attaching it to the latest or closest NP (i.e. NP2), in parallel with the assumptions of Late Closure Hypothesis (Frazier & Fodor, 1978).

Furthermore, Experiment 2 included two parts; Group A and Group B. In Group A, there was a significant main effect of prime animacy. Accordingly, the participants showed a tendency to attach RC to NP1 more often when the prime was from the inanimacy forced condition. However, Group B had only significant difference between the target attachment sites. The reason why we could not see the effect of prime animacy in Group B could be related to the fact that Group B distinctively focused on the differences between the target attachment sites (i.e. including RC alternative 1 enforcing NP1 attachment, and RC alternative 2 enforcing NP2 attachment) as opposed to Group A.

CHAPTER 5

5. VALDATING THE STIMULUS SET 2

5.1. Pilot Study 1

The target sentences (i.e. globally ambiguous sentences) used in the previous two experiments consisted of only passives in RCs even though they showed a variety in their matrix predicates. Therefore, we aimed to have a variety of structures in RCs for a better comparison, and understanding of any possible impact of particular structures embedded in RCs. For instance, we wanted to see whether syntactic priming would be stronger when RCs consisted of actives or passives. Thus, another study was conducted to obtain a new set of globally ambiguous sentences including actives and passives in their RCs.

5.1.1. Participants

The participants of this study were 31 monolingual Turkish speakers. They were all undergraduate university students, with beginner level of English (i.e. A1 according to the description of CEFR). 12 male and 19 female took part in the study. Their mean age was 19. None of them took part in the previous study.

5.1.2. Materials

The material used in this study consisted of 29 sentences which were expected to be globally ambiguous. The sentences included either two animate NPs or two inanimate NPs in their genitive possessive constructions. 17 sentences were in the animate condition. 9 of these sentences included active RCs. They all had action verbs. The remaining 8 sentences included passive RCs. 4 of them included action verbs and the other 4 included psychological verbs in their RC predicates. There were 12 sentences in the inanimate condition. 5 of these sentences included active RCs. They all had psychological verbs. The remaining 7 sentences included passive RCs. 4 of them had action verbs and the other 3 had psychological verbs in their RC predicates.

In the matrix predicates, we had the same structure. So they were all verbal predicates and consisted of past continuous, the suffixes for continuous (-(I)yor) and past (-(y)DI) (e.g. koş-u-yor-du) except for only 4 sentences in the inanimate condition. These 4 sentences were more meaningful when they were not used in the past continuous since there was an inanimate NP in the subject position which was not likely to progress any action. Hence, these sentences included passives and the suffix for past (-(y)DI) (e.g. göster-il-di). Table 24 below shows the structures of the sentences in both animate and inanimate condition.

Table 24.
Sentences used in Pilot Study 1

Animate				Inanimate			
Active		Passive		Active		Passive	
Action Verb	Psych. Verb	Action Verb	Psych. Verb	Action Verb	Psych. Verb	Action Verb	Psych. Verb
9	-	4	4	-	5	4	3
A total number of 17 sentences				A total number of 12 sentences			

Four Turkish native speakers also reviewed the sentences. Every sentence was followed by a question probing which NP the RC could be attached to. The questions included two options, (a) and (b). The options were counterbalanced in order to make sure that both appeared randomly, and that the participants would not develop any answering strategies.

5.1.3. Procedure

The participants were instructed to read the sentences in order and to indicate as spontaneously as possible for each one of the items which of the possible interpretations they considered as the most appropriate. They were warned not to return to the same question later once they answered it and not to change their initial choices. The task was completed within almost 15 minutes.

5.1.4. Data Analysis and Results

The data was first analysed by hand. The participants' answers for each item were written into a previously prepared table as 1 for NP1 attachment and 2 for NP2 attachment. For each sentence, the total number of NP1 and NP2 attachments was calculated. Table 25 below shows the total number of NP1 attachment preferences for each sentence.

The items in yellow background show the items which were identified as globally ambiguous. In this study, there were 31 participants in total. As in the previous studies through which we decided on the globally ambiguous sentences which could be used in our experiments, we accepted only those sentences which received almost an equal number of attachment preferences from both NP1 and NP2 attachment sites (15-16 and 14-17) and thus were balanced.

Table 25.
The total number of NP1 attachment preferences for
each item in Pilot Study 1

Animate Condition		Inanimate Condition	
Item	**Attachment**	**Item**	**Attachment**
01	14	18	25
02	12	19	25
03	11	20	23
04	14	21	23
05	12	22	24
06	14	23	18
07	10	24	20
08	12	25	20
09	06	26	24
10	11	27	23
11	12	28	23
12	13	29	21
13	14		
14	15		
15	08		
16	17		
17	15		

As seen in Table 25, none of the sentences in the inanimate condition were accepted as globally ambiguous. We obtained 7 sentences in the animate condition. 3 of these consisted of active RCs and the remaining 4 sentences consisted of passive RCs.

5.1.5. Discussion

In Pilot Study 1, we could not obtain any sentences in the inanimate condition, and all the items in the inanimate condition received NP1 attachment more compared to NP2 attachment preferences. In the material, the sentences were not presented in a randomized order. In other words, all 17 sentences in the animate condition first appeared and then all 12 sentences in the inanimate condition followed them. This might have led the participants to develop a pattern in their responses, which resulted in always more NP1 attachment in the inanimate condition. Therefore, we repeated the study again with the same group and also with another group who had not taken part in the study before after randomizing the order of the sentences in both animate and inanimate condition.

5.2. Pilot Study 2

In this study, the sentences used in Pilot Study 1 were tested again with the same group of participants and a different group so as to understand whether the reason why we could not obtain any ambiguous sentences especially in the inanimate condition was only because we did not randomize the order of the sentences in both animacy conditions and the participants

developed a pattern or an answering strategy for the similar animacy conditions which followed one another or because of other confounding factors that needs further attention.

5.2.1. Participants

There were two groups of participants in Pilot Study 2. The first group included the same participants in Pilot Study 1. Not all the participants took part in the present study, but we were able to reach out 24 of 31 students in the previous study. 11 of them were male and 13 of them were female. Their mean age was 19.5.

The second group had 36 participants. They were also monolingual Turkish speakers, with beginner level of English. There were 23 male and 13 female in this group. Their mean age was 19. Furthermore, none of the participants in this second group took part in the previous studies conducted within the scope of this dissertation.

5.2.2. Materials

The same material in Pilot Study 1 was also used in this study. The only difference was that the sentences in different animacy conditions were presented in a randomized order. (Also see Appendix E1).

5.2.3. Procedure

The same procedure in Pilot Study 1 was followed here, as well.

5.2.4. Data Analysis and Results

The data was first analysed by hand. The participants' answers for each item were written into a previously prepared table as 1 for NP1 and 2 for NP2 attachment. For each sentence, the total number of NP1 and NP2 was calculated. Table 26 below shows the total number of NP1 attachment preferences for each sentence by 24 participants in the first group. In Pilot Study 2 the sentences were presented to the participants in a randomized order this time, yet the table below shows the items in the same order as in Pilot Study 1 by grouping them according to their animacy information (i.e. Animate Condition and Inanimate Condition).

The items in yellow background above shows the sentences which could be counted as fine, globally ambiguous sentences in the study as they obtained NP1 attachments from half of the participants and NP2 attachments from the other half (12 to 12, 11 to 13 pairs of NP1 and NP2 attachment preferences), thereby showing that these were the most ambiguous sentences to this group of monolingual Turkish speakers. However, we still observed a tendency to attach RCs to NP1 more often as in Pilot Study 1 when the sentences were from the inanimate condition even though this time there was at least one fine sentence in the list.

Table 26.
The total number of NP1 attachment preferences of the
participants in the first group

Animate Condition		Inanimate Condition	
Item	**Attachment**	**Item**	**Attachment**
01	11	**18**	18
02	15	**19**	17
03	13	**20**	14
04	12	**21**	16
05	13	**22**	19
06	16	**23**	15
07	12	**24**	17
08	12	**25**	15
09	13	**26**	15
10	12	**27**	15
11	11	**28**	11
12	14	**29**	16
13	15		
14	17		
15	09		
16	14		
17	12		

Then SPSS was used for an item-based analysis so as to find out whether there was a significant difference between the participants' preference of NP1 and NP2 attachment. Furthermore, SPSS analysis was run in order to see how animacy information influenced the participants' choices. For this, a repeated measures ANOVA was run. Table 27 below shows the means and standard deviations of the responses provided for the experimental sentences.

Table 27.
Means and standard deviations of responses

	Animacy	Mean	Std. Deviation	N
NP1 Attachment	Animate	13,00	2,000	17
	Inanimate	15,67	2,060	12
	Total	14,10	2,396	29
NP2 Attachment	Animate	11,00	2,000	17
	Inanimate	8,33	2,060	12
	Total	9,90	2,396	29

As shown in the table above, the participants of the first group in Pilot Study 2 had a higher preference to attach RCs to NP1 (14,10), especially when the sentences were in the inanimate condition as compared to NP2 (9.90).

The repeated measures ANOVA showed that there was a significant main effect of attachment site, $F(1,27)=37,376$, $p < ,001$, $\eta_p^2 =,581$. Accordingly, the participants preferred to attach RCs to NP1 more often. Furthermore, there was a significant interaction between

the attachment site and the animacy information, $F(1, 27)= 12{,}204$, $p < {,}05$, $\eta_p^2 = {,}311$. Accordingly, the participants showed a higher tendency to attach RCs to NP1 rather than NP2 especially when the sentences were in the inanimate condition as shown in Table 28.

Table 28.
Interaction between animacy conditions and attachment sites

Animacy Info	Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Animate	1	13,000	,491	11,993	14,007
	2	11,000	,491	9,993	12,007
Inanimate	1	15,667	,584	14,468	16,866
	2	8,333	,584	7,134	9,532

For the second group, the total number of NP1 and NP2 attachment preferences was also calculated separately according to the participants' responses. Table 29 below shows the total number of NP1 attachment preferences for each sentence by 36 participants in the second group. In Pilot Study 2 the sentences were presented to the participants in a randomized order this time, yet the table below shows the items in the same order as in Pilot Study 1 again by grouping them according to their animacy information (i.e. Animate, Inanimate).

Table 29.
The total number of NP1 attachment preferences of the
participants in the second group

Animate Condition		Inanimate Condition	
Item	Attachment	Item	Attachment
01	16	18	32
02	21	19	32
03	19	20	24
04	15	21	27
05	13	22	28
06	20	23	24
07	19	24	21
08	18	25	29
09	14	26	23
10	18	27	26
11	19	28	24
12	21	29	25
13	19		
14	25		
15	16		
16	22		
17	17		

The items in yellow background above similarly show the sentences which could be counted as fine, globally ambiguous sentences in the study as they received NP1 attachments from

half of the participants and NP2 attachments from the other half (18 to 18 or 19 to 17 pairs of NP1 and NP2 attachment preference). However, there was still a tendency to attach RCs to NP1 more often as in Pilot Study 1 when the sentences were in the inanimate condition.

Then SPSS was run for an item-based analysis so as to find out whether there was a significant difference between the participants' preferences of NP1 and NP2 attachment. Furthermore, we wanted to see how the animacy information influenced the participants' choices in this group. For this, a repeated measures ANOVA was run. Table 30 below shows the means and standard deviations of the responses provided for the experimental sentences.

Table 30.
Means and standard deviations of responses

	Animacy	Mean	Std. Deviation	N
NP1 Attachment	Animate	18,35	3,040	17
	Inanimate	26,25	3,467	12
	Total	21,62	5,067	29
NP2 Attachment	Animate	17,65	3,040	17
	Inanimate	9,75	3,467	12
	Total	14,38	5,067	29

As can also be seen in the table above, the participants of the second group in Pilot Study 2 also showed a higher preference to attach RCs to NP1 (21,62), especially when the sentences were in the inanimate condition as compared to NP2 (14,38).

Table 31.
Interaction between animacy conditions and attachment sites

Animacy Info	Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Animate	1	18,353	,781	16,750	19,956
	2	17,647	,781	16,044	19,250
Inanimate	1	26,250	,930	24,342	28,158
	2	9,750	,930	7,842	11,658

The repeated measures ANOVA showed that there was a significant main effect of attachment site, $F(1, 27) = 50,180$, $p < ,001$, $\eta_p^2 = ,650$. Accordingly, the participants preferred to attach RCs to NP1 more often. Furthermore, there was a significant interaction between the attachment site and the animacy information, $F(1, 27) = 42, 283$, $p < ,001$, $\eta_p^2 = ,610$. Accordingly, the participants showed a higher tendency to attach RCs to NP1 rather than NP2 when the sentences were especially from the inanimate condition as shown in Table 31 above. In brief, we observed similar results in both groups tested in Pilot Study 2.

5.2.5. Discussion

In both Study 1 and Study 2, we observed similar results. The participants showed a tendency towards attaching RCs to NP1 and doing so more often especially when the sentences were from the inanimate condition. Furthermore, we could not obtain any globally

ambiguous sentence in the inanimate condition (except the first group resulting in only one globally ambiguous sentence from the inanimate condition). In the animate condition, however, we obtained 6 sentences, all of which were globally ambiguous both to the participants in the first group and to those in the second group. (See Appendix E2). 3 of these sentences had actives in RCs and the other 3 had passives in RCs.

The results require further investigation in order to explain why we could not obtain any globally ambiguous sentences in the inanimate condition even though we controlled all confounding factors which were considered in the previous studies (e.g. semantic relations between the noun phrases and the semantic associations between the predicates). There are three assumptions that we have. First, NP1 attachment preference, especially a higher tendency towards NP1 attachment preference in the inanimate condition could be regarded understandable considering the fact that previously we also observed that monolingual Turkish speakers have a tendency to attach RCs to NP1 more often when they encountered such ambiguous sentences with two inanimate NPs. However, we achieved to obtain fine sentences in the inanimate condition before, so this alone may not explain the picture here.

As for the second assumption regarding why we could not find any fine, globally ambiguous sentences in the inanimate condition even though we achieved this previously, this seems to be due to the fact that we ultimately used the similar structures (i.e. past continuous; '-yor-du') in the matrix predicates this time (e.g. parl-ı-yor-du, düş-ü-yor-du, and yuvarlan-ı-yor-du) as opposed to the previous studies. Previously we had a variety of structures in the matrix predicates including verbal predicates in different tenses as well as nominal or adjectival predicates. This might be one of the most important factors explaining why we had a different result this time. The participants might have developed a pattern or an answering strategy for the sentences tested due to this repetition.

Lastly, it is important that both NPs to which an RC could be attached have independently equal roles or functions for ambiguity. NPs should be conceptually similar such that an RC can refer to either one of these competing NPs (Gennari et al., 2012). This seems relatively easier to achieve with animate NPs. Thus, revising NPs in the inanimate condition and their relationship with one another, or rethinking the presence of inanimate NPs in the stimuli as well as considering the repetition of the same structure in the matrix predicate as a confounding factor might be convenient so as to obtain a list of stimulus set.

CHAPTER 6

6. VALIDATING THE STIMULUS SET 3

6.1. Pilot Study 1

In the previous studies, we observed that there was a significant effect of animacy information embedded in NPs presented in the stimulus sets. Furthermore, using animacy information as a disambiguating clue in the prime might have misguided us on the way of understanding the syntactic factors playing a role in ambiguity resolution. Therefore, we decided on preparing a list of sentences only involving animate NPs. The goal was to include a variety of structures (i.e. both active and passive constructions, unlike the initial stimulus set involving only passives) in RCs for better understanding the role of these structures on sentence processing. The details of this pilot study which aims to validate the new stimulus set involving only animate NPs are mentioned below.

6.1.1. Participants

Participants of this study were 30 monolingual Turkish speakers. They were undergraduate university students, with beginner level of English (i.e. A1 according to the description of CEFR). 17 female and 13 male students took part in the study. Their mean age was 19.8.

6.1.2. Materials

The stimulus set tested in this study consisted of 42 sentences, including 21 active and 21 passive RCs. Unlike the previous stimulus sets, all the sentences included only animate NPs. Therefore, the prime sentences were semantically disambiguated towards either NP1 or NP2 attachment. For instance, in the example (46a) below, it is more likely that the baby, not the mother, is sleeping in the crib. We wrote 12 prime sentences (half of them included active, and the other half included passive constructions in RCs), which were expected to be NP1 attachment forced, and another 12 (half of them included active, and the other half included passive constructions in RCs), which were expected to be NP2 attachment forced.

(46)   a. NP2 attachment forced / Active

       Beşikte uyuyan bebeğin annesi temizlik yapıyordu.
       'the mother of the baby who was sleeping in the crib was doing the cleaning'

      b. NP2 attachment forced / Passive

       Kasabada aranan katilin teyzesi ihbarda bulundu.
       'the aunt of the murderer who was wanted in the village reported him'

c. NP1 attachment forced / Active

Mutfağı düzenleyen ressamın hizmetçisi para buldu.
'the servant of the painter who tidied the kitchen found some money'

d. NP1 attachment forced / Passive

Okula kaydedilen müdürün yeğeni bahçede oynuyordu.
'the nephew of the principle who was enrolled in the school was playing in the garden'

e. Globally ambiguous / Active

Partiye katılan şarkıcının gitaristi otelde çalışıyordu.
'the guitarist of the singer who attended the party was working at a hotel'

f. Globally ambiguous / Passive

Telefonda dolandırılan oyuncunun ablası ifade verdi.
'the sister of the actress who was defrauded on the phone testified'

With regard to the target sentences, there was a total number of 18 sentences (half of them included active, and the other half included passive constructions in RCs), which were expected to be globally ambiguous. A majority of them were also the sentences which had been tested and already identified as globally ambiguous sentences. In the preparation of all these experimental sentences, we were careful about the previously mentioned confounding factors such as word repetition, and semantic associations of NPs with the proximal and the distal predicate, the semantic relation between the NPs used in the same sentence. Furthermore, the number of words in each one of these Turkish sentences was kept equal. There were always 6 words in the sentences (see Appendix F1). Other than the researchers, 2 Turkish native speakers also read and reviewed the sentences to check whether they were grammatical and meaningful. The sentences were followed by a question probing the NP which the RC could be attached to. The questions included two options, (a) and (b). The options were counterbalanced to make sure that both NPs appeared randomly in the test and that participants could not develop any strategy to answer.

6.1.3. Procedure

Participants were instructed to read the sentences in order, and to indicate as spontaneously as possible for each item which of the possible interpretations they considered as the most appropriate. They were warned not to go back to the items once they had answered the questions and not to change their choices. The task was completed within almost 15 minutes.

6.1.4. Data Analysis and Results

The data was analysed descriptively, by hand. Participants' answers for each item were written into a previously prepared table as 1 for NP1 attachment preference and 2 for NP2 attachment preference. For each item, the total number of NP1 and NP2 attachments was

calculated. Table 32 below shows the total number of NP2 attachment preferences for each sentence in the pilot study.

Table 32.
Total number of NP2 attachment preferences per sentence

Prime Sentences								Target Sentence			
NP2 attachment forced				NP1 attachment forced							
Active		Passive		Active		Passive		Active		Passive	
1	30	1	12	1	9	1	9	1	16	1	21
2	25	2	26	2	5	2	1	2	14	2	16
3	28	3	27	3	16	3	2	3	16	3	15
4	26	4	24	4	3	4	15	4	19	4	16
5	26	5	26	5	4	5	2	5	12	5	11
6	27	6	25	6	1	6	10	6	10	6	21
								7	15	7	9
								8	15	8	16
								9	14	9	15

The items in gray background are those which were identified as the experimental sentences. The one in pink under the category of NP1 attachment forced / Passive was also identified as a target sentence. For the prime sentences, those which received the highest NP2 attachments were accepted for NP2 attachment forced condition, and those which received the highest NP1 attachments (or the lowest NP2 attachments as seen in Table 32 above) were chosen for NP1 attachment forced condition. As for the target sentences, as previously done in order to validate the globally ambiguous sentences, only those sentences, which received an almost equal number of attachment preferences for NP1 and NP2 attachment sites (15-15 or 16-14 since there was a total number of 30 participants) were chosen for the study. There was only one missing passive target sentence. Luckily, one of the sentences which were initially written as an NP1 attachment forced prime came out as globally ambiguous and it was also counted as a target.

Table 33.
Distribution of the number of experimental sentences

Prime Sentences				Target Sentence	
NP2 attachment forced		NP1 attachment forced			
Active	Passive	Active	Passive	Active	Passive
3	3	3	3	6	6

Hence, we obtained 12 prime and 12 target sentences in total. 6 of the prime sentences wee NP2 attachment forced and the other 6 were NP1 attachment forced. Furthermore, half of these sentences were active in RC whereas the other half were passive. Similarly, of all 12 target sentences, 6 sentences consisted of active constructions in RCs, and the other 6 consisted of passives. Table 33 above shows the distribution of the number of experimental sentences obtained through this pilot study.

6.1.5. Discussion

In the study, a good number of balanced sentences was obtained. Most of the prime sentences whose RCs were either semantically forced to attach to NP1 or NP2 came out as expected. However, only those which received the highest attachments were chosen as the experimental sentences. Among the list of target sentences, 11 of them came out as good, balanced ambiguous sentences. Only 1 sentence in the passive category was missing, but luckily a sentence originally written by the researchers expecting to come out as NP1 attachment forced was observed to be ambiguous to monolingual Turkish speakers, and it was also added to the list of the target sentences. In the list of the target sentences, which were expected to be globally ambiguous, some sentences - even though not with higher differences between NP1 and NP2 attachment preferences as they were in the prime sentences, received more NP1 and some others received more NP2. They were not included in the list of the experimental sentences, but we wanted to know more about the individual factors which might have played a role in selecting more NP1 or NP2 in the ambiguous sentences. In order to investigate the extent to which and how working memory capacity influenced the participants' attachment preferences, we administered working memory tests (i.e. a Turkish reading span test and a Turkish word span test).

CHAPTER 7

7. INDIVIDUAL DIFFERENCES: WORKING MEMORY TEST RESULTS AND RC ATTACHMENT PREFERENCES

In this study, we aimed to investigate the extent to which and how working memory capacity of monolingual Turkish speakers influenced their RC attachment preferences.

7.1. Research Questions

The research question is as follows:

1. How does working memory influence RC attachment preferences of monolingual Turkish speakers? To what extent can the differences among individuals or tendencies of some individuals to prefer certain attachments be explained with working memory capacity?

7.2. Hypothesis

It is assumed that individuals who have different working memory capacities could adopt different syntactic parsing strategies. Therefore, there have been a few studies conducted to find out how working memory contributes to RC attachment processing. However, the results are controversial. For instance, Swets et al. (2007) found that those with lower working memory capacities were more likely to prefer NP1 compared to those with higher working memory capacities in the offline tasks, whereas Traxler (2007) found that those with higher working memory capacities were more likely to prefer NP1 in the online task. Investigating the eye movements of Turkish speakers, Kaya (2010) observed that those with higher working memory capacity preferred more NP2 attachments in the ambiguous sentences, although his results were not significant. In the offline tasks, he also observed that those with high working memory capacity preferred significantly less NP1 attachments.

It is claimed that readers with lower working memory capacities use a chunking strategy to segment RC into a separate prosodic phrase (Swets et al., 2007); Traxler, 2007; Hopp, 2014). Thus, as in Swets et al. (2007), those with lower working memory capacities are expected to prefer more NP1 attachment in the target sentences in the working memory test here, as well.

7.3. Participants

The participants are those who took part in the previous study, validating the stimulus set 3 (only with animate NPs). Unfortunately only 14 out of 30 participants were reached and they were involved in the working memory tests.

7.4. Materials and Procedure

For the purpose of this study, two working memory tests were used. Both of them were developed by Ünal (2008) within the scope of her Master's Thesis.

The first one was a Turkish reading span test (TRST) aimed at assessing complex working memory span (Daneman & Carpenter, 1980). The sentences for TRST for adults were chosen from school books. The sentences included a variety of widely known facts. In this test, there were sets of sentences from 2 sentences in the shortest set to 6 sentences in the longest set. Each set belonged to a bigger set within the test itself. In total, there were 3 sets, and each set consisted of 40 sentences. Participants were required to read the sentences aloud from the computer screen. Then they indicated whether the statement was true or false according to the best of their knowledge. Furthermore, there was underlined and bold target phrases presented in each one of the sentences. Participants were required to keep these target phrases in their mind cumulatively until they were asked to recall what they remembered. Participants were presented increasingly longer sets of sentences until they failed all three sets making two or more mistakes. Testing was terminated at that point. The total number of the remembered target phrases was taken as the memory score.

The second one was a word span test (WST), aimed at assessing simple verbal span, which was also developed by Ünal (2008). The test consisted of one-syllabic Turkish words of medium to high frequency, WST also consisted of various set sizes, the shortest 2 to the longest 8. Participants listened to the sets of words with increasing length. Similarly, the test was terminated when participants made two or more mistakes in the set. The number of the words correctly remembered was taken as the word span of each participant.

7.5. Data Analysis and Results

The data gathered was analysed statistically, and the effect of the participants' reading spans and their word spans on the attachment preferences was examined. The scores that the participants obtained from the reading span test were labelled as 1(Low Span), 2 (Medium Span), and 3 (High Span). Considering the fact that the stimulus set tested included both biased prime sentences and the globally ambiguous target sentences, first of all, the participants' responses for the target sentences only were analysed. A repeated measures ANOVA was run to see the effect of reading span on the attachment preferences. The results showed that there was a significant interaction between the reading span and the attachment preferences, $F(2,11)=4.666$, $p < .05$ (p=.034), $\eta_p^2 =,459$. Accordingly, the participants with low span preferred to attach RC to NP1 more often rather than NP2 whereas participants with medium and high span preferred to attach RC to NP2 more often rather than NP1 in the ambiguous target sentences.

Table 34.
Interaction between participants' reading spans and attachment preferences

Reading Span	Attachment Site	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Low	1	10,833	,955	8,732	12,935
	2	7,167	,955	5,065	9,268
Medium	1	6,833	,955	4,732	8,935
	2	11,167	,955	9,065	13,268
High	1	7,500	1,654	3,860	11,140
	2	10,500	1,654	6,860	14,140

Table 34 above displays the interaction between the participants' reading spans (across three levels of reading span) and their attachment preferences.

Furthermore, we looked into whether there was any difference when the sentences included an active or a passive construction in RC. The results showed that there was no significant effect or interaction between the presence of an active or a passive construction with the reading span and attachment preferences of the participants, $F(2, 11)=,783$, $p > .05$ ($p =,481$), $\eta_p^2 =,125$. Lastly, there was no significant interaction between the word span and the attachment preferences, $F(2,11)=.164$, $p > .05$ (p=.851), $\eta_p^2 =,029$ unlike what we observed with the participants' reading spans.

7.6. Discussion

Concerning offline tasks, the literature showed that reading span negatively correlated with NP1 attachment, such that participants with lower working memory span showed a higher proportion of NP1 attachment preference. The findings obtained for monolingual Turkish speakers in this study also replicated previous research on both native speakers of various languages and second language learners (Kim & Christianson, 2013; Omaki, 2005; Swets et al. 2007; Hopp, 2014). The results of the present study also seem to be consistent with the findings obtained by Kaya (2010), where he observed significantly less NP1 attachments with those who have higher working memory capacity. Low span readers might be using a chunking strategy while interpreting RC attachments as Hopp (2014) asserted. However, readers with higher working memory capacities might be relying on a chunking strategy less, instead of interpreting RC incrementally relative to the complex NP.

CHAPTER 8

**8. SYNTACTIC PRIMING OF RC ATTACHMENT (WITH MONOLINGUAL
TURKISH SPEAKERS) - OFFLINE TASKS**

**8.1. Experiment 3: Syntactic Priming of RC Attachment (with Monolingual Turkish
Speakers) from Comprehension to Comprehension - Directed Analysis of Prime
Attachment Sites**

The goal of Experiment 3 was to find out whether there was any syntactic priming effect
from comprehension to comprehension in monolingual Turkish speakers. Following the
study conducted by Scheepers (2003), correctness of prime completion (i.e. whether the
prime was interpreted by experimental manipulation or not) was also evaluated in this study.
Each sentence fragment was printed in a single line, followed by a line that marked the area
where a hand-written sentence completion needed to be provided. Participants had to
complete the sentences according to the most recent sentence they had read using only one
word. In this study, this was done on purpose in order to force participants to read the prime
sentences carefully, as well.

8.1.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the
comprehension of sentences involving globally ambiguous RC attachment in Turkish with
participants' directed assessment of prime attachment sites?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e.
active or passive) in RC? In other words, does the presence of an active or a passive
construction in RC change the effect on RC attachment preference?

8.1.2. Hypothesis

Unlike the results we obtained with the previous experiments where both animate and
inanimate NPs were included, yet only passive construction was used in RCs, we expect to
find a clearer syntactic priming effect this time considering the fact that we avoided the
complexity of animacy and inanimacy information involved both in the prime and target
attachment sites. In this experiment, we had only animate NPs both in the prime and target
sentences. Therefore, the ambiguity level of the sentences was further balanced this time,
and we expected to observe a clearer picture of syntactic priming effect. Furthermore, this
time a comparison of active and passive constructions in RC was also possible. Based on the
relevant literature, there might be a further facilitation effect for the forced attachment sites
in the active when the more preferred syntactic structure, the active, was repeated -
considering the fact that participants would have a stronger preference bias for actives than
for passives (Segaert et al., 2011).

8.1.3. Participants

30 monolingual Turkish speakers took part in Experiment 3. Participants were first year undergraduate students with beginner level of English proficiency. Of 30, 19 were female and 11 male. The mean age of the participants was 19. The participants were unaware of the purpose of the study. They all took part in the study on a voluntary basis. Furthermore, none of them took part in the previous studies administered within the scope of this dissertation.

8.1.4. Materials

In Experiment 3, 24 filler sentences and 24 experimental sentences (12 prime and 12 target) were used. As in the previous experiments, the prime sentences included NP1 and NP2 attachment forced RCs. However, unlike the previous experiments, only animate NPs were used this time. The prime sentences were semantically disambiguated as mentioned in the previous part (i.e. validating the stimulus set 3, only with animate NPs). Furthermore, half of the experimental sentences consisted of active RCs whereas the other half consisted of passives. We aimed to make sure that the prime and target sentences shared the same construction in RCs when they were paired for the task so that we could obtain a clear comparison avoiding the risk of any possible influence of the varying structures within the pairs on the syntactic priming effect we aimed to observe here. As for the filler sentences, they involved various structures so as to divert the attention of the participants from the structure under investigation.

8.1.5. Procedure

The current experiment was also an offline study. In this study, the participants were similarly instructed to read the sentences in the given order and complete the simple sentences testing their comprehension. The saw the sentences in a booklet starting with a consent form, demographic information page, and self-assessment grid for identifying their foreign language levels if they have any. Subsequently, the participants saw a brief instruction page including an example. The booklet was designed in such a way that participants could not easily understand the purpose of the study. There were 6 sentences including filler and experimental sentences on each single page. This was done because first we did not want to separate the prime and target pairs, and second we did not want the order of the sentences to repeat one another on every single page. So, the order of the sentences was unpredictable as much as possible. For instance, on the first page, participants saw the sentences in the following order; 2 filler sentences + prime and target sentence+ 2 filler sentences whereas on the next page the order continued as prime and target sentence+2 filler sentences+ prime and target sentence. It could have been a lot better if each sentence or at least each pair of the sentences were presented on a separate page, however, we had 11 pages, which was already found quite long by many participants, and it might be more discouraging for them to complete the task if we had done the otherwise (see Appendix G).

8.1.6. Data Analysis and Results

The data obtained was analysed both descriptively and statistically. Since we asked the participants also to evaluate the prime attachment site - even though the sentences were tested before and confirmed by a majority of monolingual Turkish speakers as unambiguous, we omitted the responses when a participants evaluated the prime attachment site differently compared to what we expected them to do. The number of such responses was few, yet we analysed the data both omitting them and including them as if they were responded to, as previously assumed by the researchers. So, for the first analysis where we omitted these responses, descriptively, there was a clear syntactic priming effect. In both active and passive conditions, there were more NP1 after NP1 prime and more NP2 after NP2 prime. Interestingly, the effect was stronger when the prime was NP1 in the passive condition whereas it was stronger when the prime was NP2 in the active condition. Table 35 below shows the attachment preferences of monolingual Turkish speakers per category in the study. There were 30 participants and for each condition we gathered a total number of 90 responses. However, some of the responses were omitted because the participants preferred a different attachment site from what we expected while evaluating the prime sentences.

Table 35.
Attachment preferences of Turkish learners of English in Experiment 3

Passive RC Construction

	Target NP1	Target NP2
Prime NP1	60 / 90 (66.6%)	29 / 90 (32.2%)
Prime NP2	30 / 90 (33.3%)	48 / 90 (53.3%)

Active RC Construction

	Target NP1	Target NP2
Prime NP1	48 / 90 (53.3%)	32 / 90 (35.5%)
Prime NP2	27 / 90 (30%)	59 / 90 (65.5%)

In order to find out if there was any significant syntactic priming effect, a repeated measures ANOVA was run. The results showed that there was a significant interaction between the prime attachment site and the target attachment preference, $F(1, 29)= 40.358$, $p < .001$, $\eta_p^2 =,582$ and a significant interaction between the prime attachment site and the active / passive construction, $F (1, 29)= 11.013$, $p < .05$ (p= .002), $\eta_p^2 =,275$. Accordingly, there were more NP1 attachment preferences in the target after NP1 primes and more NP2 attachment preferences after NP2 primes.

As for the second analysis where we included all of the sentences regardless of the participants' evaluation of the prime attachment site, descriptively we obtained similar results. There was a clear syntactic priming effect in all of the conditions. Table 36 shows the attachment preferences of monolingual Turkish speakers per category in the study according to this second analysis. We did not omit any responses this time, and evaluated the data according to the experimental manipulations. Therefore, we gathered a total number of 90 responses from 30 participants for each condition as demonstrated in the table below.

Table 36.
Attachment preferences of Turkish learners of English in Experiment 3

Passive RC Construction		
	Target NP1	Target NP2
Prime NP1	60 / 90 (66.6%)	30 / 90 (33.3%)
Prime NP2	39 / 90 (43.3%)	51 / 90 (56.6%)

Active RC Construction		
	Target NP1	Target NP2
Prime NP1	50 / 90 (55.5%)	40 / 90 (44.4%)
Prime NP2	31 / 90 (34.4%)	59 / 90 (65.5%)

In order to find out if there was any significant syntactic priming effect, a repeated measures ANOVA was run. The results showed that there was a significant interaction between the prime attachment site and the target attachment preference again, $F(1, 29)= 21.887$, $p < .001$, $\eta_p^2 =,430$. Accordingly, there were more NP1 after NP1 primes and likewise more NP2 after NP2 primes. Figure 3 below shows the syntactic priming effect observed in Experiment 3.
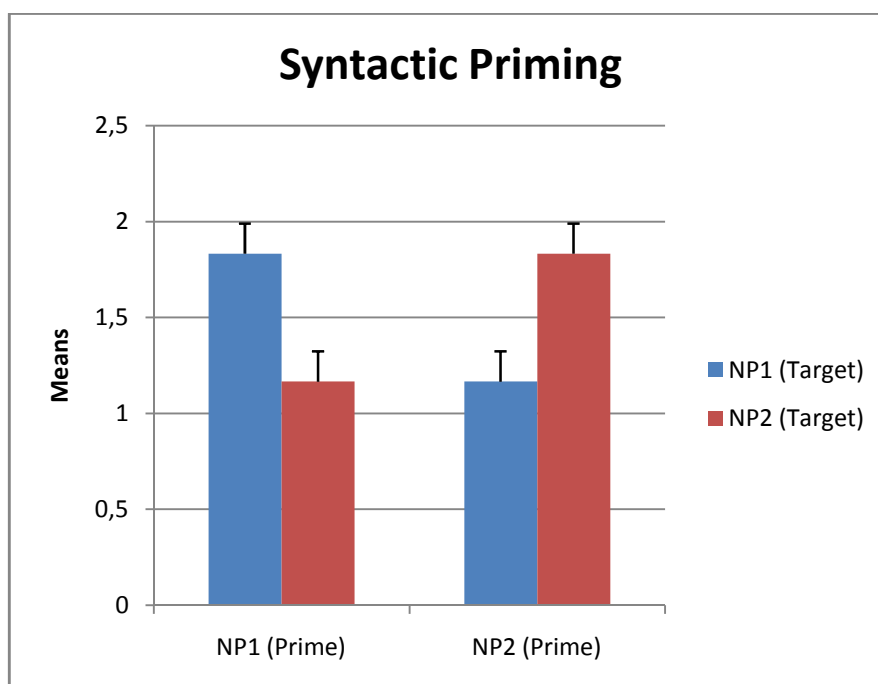
Figure 3. Syntactic priming effect observed in Experiment 3

Furthermore, there was a significant interaction between active / passive RC conditions and the target attachment preferences, $F (1, 29)= 5.118$, $p < .05$ (p=.031), $\eta_p^2 =,150$. Accordingly, there were more NP2 attachment preferences when there was an active RC, and more NP1 attachment preferences when there was a passive RC in the experimental sentences.
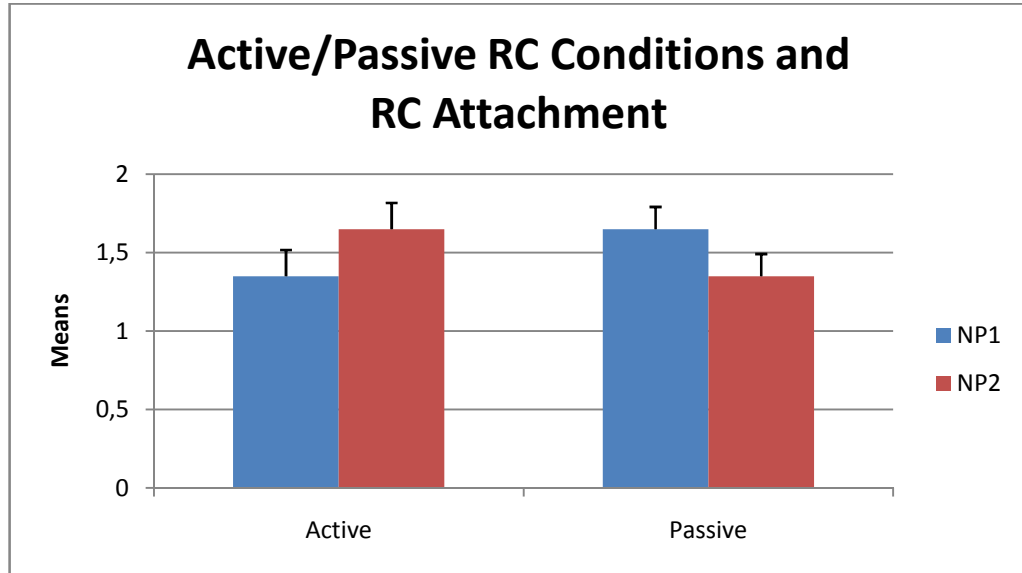
Figure 4. Interaction between active / passive RC conditions and RC attachment

The interaction between active / passive RC conditions and RC attachment is illustrated in Figure 4 above. This interaction was not significant, yet it was still substantial in the first analysis, $F(1, 29)= 4.005$, $p = .055$, $\eta_p^2=,121$.

For these analyses above, we looked into the complex interactions between the factors, namely prime attachment site (i.e. NP1 attachment forced or NP2 attachment forced), active /passive RC condition, and NP1/NP2 attachment preferences in the target sentences following Scheepers (2003). However, one can simply evaluate the relative proportion of attachment preferences for only one NP, for instance NP1, and take it as the dependent variable as in Desmet and Declerq (2006). For this experiment where a significant syntactic priming was obtained for the first time, a repeated measures ANOVA was also run by taking the relative proportions of NP1 attachment preferences as the dependent variable. The results showed a significant effect of prime attachment site on NP1 attachment preferences in the target sentence, $F(1, 29) = 25,044$, $p < .001$, $\eta_p^2 =, 463$. Furthermore, there was a significant effect of active / passive RC condition, $F(1, 29) = 6,443$, $p < .05$ ($p = , 017$), $\eta_p^2=,182$. Accordingly, there were more NP1 attachment preferences in the passive RC condition. As the two analyses produce identical results, we will continue with the interaction analysis.

8.1.7. Discussion

In this experiment, we investigated the syntactic priming effect from comprehension to comprehension with a group of monolingual Turkish speakers. The results showed indeed a significant interaction between the prime attachment site and the target attachment preferences. Accordingly, there were more NP1 after NP1 primes and likewise more NP2 after NP2 primes. Furthermore, there was a significant interaction between the active / passive construction and the target attachment preferences. Participants preferred even more NP2 attachment when the target sentence was active whereas they preferred even more NP1 attachment when the target sentence was passive. This could also explain why we obtained an overall NP1 attachment preference in our previous experiment, Experiment 1 where we

had used only passive RCs. The Late Closure Hypothesis (Frazier & Fodor, 1978), claiming a universal parsing strategy might explain stronger NP2 attachment preference especially when there was an active RC in a sentence. However, it does not explain why monolingual Turkish speakers tended to show a stronger NP1 attachment tendency when there was a passive RC. One explanation could be that speakers might tend to pause at the subject-verb boundary before attaching RCs to either one of the NPs if they encounter a syntactically complex structure as in passive RCs, which will allow time for them to consider the distant NP, i.e. NP1, as a possible attachment site (Ferreira, 1991; Townsend & Bever, 2001). Given the complexity of passive RCs and the complex NP, thus, participants might have showed a stronger tendency to attach RCs to NP1, the NP which is the closest and the most referential to the main predicate. Unlike the assumptions of Recency and Predicate Proximity Principle posited by Gibson et al. (1996), the strength of the main predicate might be determined by the complexity of the structures embedded in the sentence rather than the distance - which has not yet been clearly explained- of the head NP to the main predicate.

8.2. Experiment 4: Syntactic Priming of RC Attachment (with Monolingual Turkish Speakers) from Comprehension to Comprehension - Implicit Processing of Prime Attachment Sites

The goal of Experiment 4 was also to find out whether there was any syntactic priming effects from comprehension to comprehension in monolingual Turkish speakers. However, this time we did not ask participants to evaluate the prime attachment site as we had done in the previous study so as to test if we could get the same effect again or if the priming we had observed in the previous study was only a consequence of participants' directed assessment of the attachment site in the prime sentences.

8.2.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in Turkish with implicit processing of prime attachment sites?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

8.2.2. Hypothesis

The results are expected to be similar to those obtained in Experiment 3. However, since this time the participants are not directed to evaluate the prime attachment site, the significant level might be moderate as compared to the results observed in Experiment 3.

8.2.3. Participants

33 monolingual Turkish speakers took part in Experiment 4. Participants were first year undergraduate students with beginner level of English proficiency (i.e. A1 according to the description of CEFR). Of 33 participants, 20 were female and 13 male. The mean age of the

participants was 19. The participants were unaware of the purpose of the study. They all took part in the study on a voluntary basis. Furthermore, none of them took part in the previous studies administered within the scope of this dissertation.

8.2.4. Materials

The same filler and experimental sentences used in Experiment 3 were also used in this study. The only difference this time was that in the previous experiment we had asked the participants to evaluate the prime attachment site during the experiment following the study conducted by Scheepers (2003) particularly to make sure that participants read every single sentence, yet this might have resulted in conscious awareness of the forced attachment in the primes before they saw and evaluated the attachment site in the target sentences. Therefore, this time we aimed to avoid this potential influence. For this purpose, participants were not asked to evaluate the prime attachment site any more.

Furthermore, previously they were also supposed to complete the simple sentences following the filler sentences in order not to reveal the purpose of the study. This time, for the half of the filler sentences, they were not required to complete any sentence comprehension item. Participants saw only one simple sentence completion after every two sentence. For the prime and target pairs, the completion task assessing the attachment site of RC was always related to the target sentence. However, for the filler sentences, the completion task could be related either to the first or to the second sentence in the sequence. For the half of the filler sentences, the completion task was related to the first sentence whereas for the other half, the sentence completion was related to the second sentence in the sequence. Providing the sentence completion items only after the immediate sentence might lead participants not to read every single sentence, but only those followed by a sentence completion item.

Filler 1
Filler 2
Sentence Completion [Filler 1 Related]

Prime 1
Target 1
Sentence Completion [Target 1 Related]

Filler 3
Filler 4
Sentence Completion [Filler 4 Related]

Figure 5. The sequence of the sentences on a sample page in the booklet.

The distribution of the sentence completion items for the fillers was randomized to make sure that the flow of the sentences was unpredictable as much as possible. This design was followed in order to make sure that participants read every single sentence and that they would not be able to easily predict the sentences which the following sentence completion

item could be related to. Figure 5 above shows the sequence of the sentences and the simple sentence completion items on a page in the booklet. (Also see Appendix H).

8.2.5. Procedure

The same procedure in Experiment 3 was followed. The task took approximately 15 minutes.

8.2.6. Data Analysis and Results

The data gathered was analysed both descriptively and statistically. Descriptively, for the active RC condition, there were more NP1 attachment preferences in the target after NP1 prime and likewise more NP2 attachments after NP2 prime, which indicated that there might be a significant syntactic priming effect. However, the situation was somewhat different for the passive RC condition, where there seemed to be a reversed priming effect. Accordingly, there were more NP2 in the target sentences after NP1 prime and more NP1 after NP2 prime. Table 37 shows the attachment preferences of monolingual Turkish speakers per category in the study. There were 33 participants and for each condition we gathered a total number of 99 responses.

Table 37.
Attachment preferences of Turkish learners of English in Experiment 4

Passive RC Construction		
	Target NP1	Target NP2
Prime NP1	41 / 99 (41.4%)	58 / 99 (58.5%)
Prime NP2	51 / 99 (51.5%)	48 / 99 (48.4%)

Active RC Construction		
	Target NP1	Target NP2
Prime NP1	54 / 99 (54.5%)	45 / 99 (45.4%)
Prime NP2	42 / 99 (42.4%)	57 / 99 (57.5%)

In order to find out if there was any significant syntactic priming effect, a repeated measures ANOVA was run and the interaction between the prime attachment sites and the target attachment preferences was looked into. The results showed that there was no significant interaction between the prime attachment site and the target attachment preference, $F(1, 32)=$ .051, $p > .05$ (p =.823), $\eta_p^2 =,002$. However, there was a significant interaction between the prime attachment site, target attachment preferences and the active / passive construction in RCs, $F(1, 32)= 7.184$, $p < .05$ (p= .012), $\eta_p^2 =,183$. Table 38 below shows the interaction between them.

Table 38.
Interaction between prime attachment site, active/passive construction, and target attachment site

Prime attachment site	Active / passive	Target attachment site	Mean	Std. Error	95% Confidence interval	
					Lower Bound	Upper Bound
1	1	1	1,636	,184	1,262	2,011
		2	1,364	,184	,989	1,738
	2	1	1,242	,185	,866	1,619
		2	1,758	,185	1,381	2,134
2	1	1	1,273	,146	,975	1,570
		2	1,727	,146	1,430	2,025
	2	1	1,545	,205	1,129	1,962
		2	1,455	,205	1,038	1,871

Accordingly, there were more NP1 after NP1 primes and more NP2 after NP2 primes when the construction was active. However, there were more NP2 after NP1, and slightly more NP1 after NP2 primes when the construction was passive.

8.2.7. Discussion

In this experiment, we investigated the syntactic priming effect from comprehension to comprehension with another group of monolingual Turkish speakers. The results showed that there was no significant syntactic priming effect overall, yet there was a significant interaction between the prime attachment site, target attachment preferences and the active / passive construction in RCs. This means that syntactic priming effect differed between active and passive constructions. As pointed out above, if there was an active RC, participants preferentially attached RCs to NP1 after NP1 primes and to NP2 after NP2 primes, even though the results were not significant. However, if there was a passive RC, participants showed a tendency to attach RCs to NP2 more often after NP1 primes and somewhat more NP1 after NP2 primes. Thus, there was a reverse (though not significant) effect. In the literature, there has not been any study that compared attachments of active and passive RCs and obtained similar results, as far as we know. The reason why we obtained these results here, in Experiment 4, could be explained in comparison with the previous research we conducted (Experiment 3). From the previous research, we know that both with active and passive RCs, participants showed a significant syntactic priming effect. However, this time participants were not supposed to evaluate the attachment site in the prime sentences consciously, which might explain why we do not have a strong syntactic priming effect in Experiment 4 as we did in Experiment 3. With regard to passives, as both Experiment 1 (that we conducted only with passive RCs) and Experiment 3 (comparing actives and passives) showed, participants used different parsing strategies in ambiguity resolution of RC attachments when they encountered passives. They were not explicitly forced towards either NP1 or NP2 in the primes as in Experiment 3, which might have resulted in inhibition of the response initially triggered by the prime, and facilitated selecting the response alternative.

CHAPTER 9

9. SYNTACTIC PRIMING OF RC ATTACHMENT (WITH TURKISH LEARNERS OF ENGLISH) - OFFLINE TASKS

9.1. Experiment 5: Syntactic Priming of RC Attachment (with Turkish Learners of English - Intermediate) - from Comprehension to Comprehension - Implicit Processing of Prime Attachment Sites

Previously we established syntactic priming effects for RC attachment in monolingual Turkish speakers. Now we move to Turkish learners of English and investigate RC attachment preferences in their L2. On the backdrop of our previous findings we can compare if they display the same or different attachment preferences as monolingual speakers of Turkish do and whether there are similar priming effects or not.

9.1.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in English by Turkish speakers who have an intermediate level of English proficiency with implicit processing of prime attachment sites?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

9.1.2. Hypothesis

The expectation is that the effect of syntactic priming will be observed in Turkish learners of English. L2 learners are sensitive to lexical-thematic properties in RC attachment (Felser et al., 2003), yet the results in the relevant literature are controversial. Some studies have reported, for instance, the transfer of an NP1 attachment preference to L2 in both offline and online processing (e.g. Dussias, 2003; Fernández, 2002) whereas others have not observed any evidence of attachment preference in either offline or online tasks even though L1 and L2 share the same attachment preference (e.g. Felser et al., 2003; Papadopoulou & Clahsen, 2003). According to the Shallow Structure Hypothesis (Clahsen & Felser, 2006), L2 processing differs from L1 processing, and in that learners of an L2 "do not rely on structure-based parsing strategies when resolving ambiguities in the L2" (p.17). In this regard, L2 learners are argued to make random attachment preferences when there are no non-structural cues for disambiguation, which may result in an overall null preference (Hopp, 2014). Thus, we might expect Turkish learners of English to show overall random attachment preferences. However, the prime sentences in the experiment might give structural clues to disambiguate RC attachments as they did for monolingual Turkish speakers, and we might observe whether Turkish learner of English are influenced by these structural clues as well or not.

9.1.3. Participants

The participants of this study were 20 Turkish learners of English. They were all undergraduate students with intermediate level of English. They were all students of English translation and interpreting department, except one who was a student of French translation and interpreting. 8 of the participants did not report any other foreign language they know except English. 3 of the participants reported that they had a beginner level German proficiency (A2 according to CEFR). 1 participant reported that she had an advanced level of German and also a beginner level French proficiency. 7 participants reported that they had a beginner level of French (A1 and A2 according to CEFR). 1 participant reported that he had an intermediate level of both Spanish and French (B1 according to CEFR). Table 39 below summarized participants' foreign language knowledge.

Table 39.
Number of participants according to foreign languages they know other than English

German	French	German and French	Spanish and French	None
3	7	1	1	8

5 male and 15 female students took part in this study, and their age range was between 20 and 34. The mean age of the participants was 22. They had normal or corrected-to-normal vision. None of them had any language disorder, or any other psychological or neurological problems which might influence their comprehension and performance on the task. Participants were unaware of the purpose of the study, and they took part in the study on a voluntary basis. None of the participants took part in another study conducted within the scope of this dissertation.

9.1.4. Materials

For this experiment, the same sentences that had been used for Experiment 3 and 4 were translated into English. Two anonymous Turkish native speakers, who had advanced levels of English proficiency, reviewed the sentences for the equivalence of Turkish and English translations. Two anonymous English native speakers reviewed the sentences in order to make sure that the sentences were correct and sounded natural in English, as well. Furthermore, the English native speakers were asked to rate the ambiguity level of the sentences. Since half of the sentences were the prime sentences, we expected them to sound unambiguous in English, as well. Likewise, since the half of the sentences were the target sentences, we expected them to sound ambiguous in English for the purpose of the study. Even though both English raters had some different ratings for a few sentences, for the majority of the sentences they agreed on the ambiguity level of the sentences. Similar to their Turkish equivalents, they reported that the prime sentences were unambiguous whereas the target sentences were rated as 'a little ambiguous' or 'very ambiguous', as expected. For a total number of 24 experimental sentences, there was 79.2% agreement between the raters. Cohen's *K* was also run to determine whether there was agreement between the two raters on the ambiguity level of the experimental sentences or not. There was substantial agreement between the two raters, *K*= .661 (95% CI, .410 to .912) *p* < 0.001.

9.1.5. Procedure

The same procedure, as in Experiment 4, was followed. Participants were expected to read the filler and experimental sentences in the given order. They were instructed to appropriately complete the simple sentences depending on the previous sentences they read using only one word. As in Experiment 4, we did not ask participants to evaluate the prime attachment site. They were supposed to complete the sentences only related to the target sentences and half of the fillers.

9.1.6. Data Analysis and Results

The obtained data was analysed both descriptively and statistically. Descriptively, the participants preferred to attach RC to more NP1 regardless of the prime attachment site. Only when RC sentences involved active construction, there were slightly more NP1 following NP1 prime compared to those following NP2 prime, and likewise, there were slightly more NP2 attachment in the target sentences following NP2 prime compared to those following NP1 prime. Table 40 shows the attachment preferences of Turkish learners of English for each category in the study. There were 20 participants and for each category we obtained 60 responses in total.

Table 40.
Attachment preferences of Turkish learners of English in Experiment 5

Passive RC Construction

	Target NP1	Target NP2
Prime NP1	46 /60 (76.6%)	14 / 60 (23.3%)
Prime NP2	46 /60 (76.6%)	14 / 60 (23.3%)

Active RC Construction

	Target NP1	Target NP2
Prime NP1	49 / 60 (81.6%)	11 / 60 (18.3%)
Prime NP2	40 / 60 (66.6%)	20 / 60 (33.3%)

In order to reveal whether there was any significant priming effect, a repeated measures ANOVA was run and the interaction between the prime attachment sites and target attachment preferences was analyzed. The result showed that there was a significant difference between target attachment preferences, $F(1,19)= 20.678$, $p < 0.001$, $\eta_p^2 =,521$. Accordingly, the participants preferred more NP1 attachment in the target sentences rather than NP2 overall. However, there was no significant interaction between the prime and target attachment site, $F(1,19)= 2.335$, $p > .05$ ($p = .143$), $\eta_p^2 =,109$, i.e. there was no syntactic priming. The interaction of the active- passive construction in RCs and the attachment sites in the prime and target sentences was not significant, either, $F(1,19)= ,906$, $p >.05$ ($p = .353$), $\eta_p^2 =,046$.

In brief, even though there were descriptively slightly more NP1 after NP1 prime compared to NP2 prime and slightly more NP2 after NP2 prime compared to NP1 prime in the active RC condition, this difference was not significant. As for the passive, there wasn't any difference between the target attachment preferences depending on the prime attachment site forced in the sentences, and the results obtained were totally equal for both prime conditions.

9.1.7. Discussion

In this experiment, we investigated the syntactic priming effect from comprehension to comprehension with Turkish learners of English. The results showed that there was no significant syntactic priming effect. Participants showed a tendency to attach RCs to NP1 regardless of the prime attachment site and active / passive construction. The results are in fact somewhat consistent with Dinçtopal-Deniz (2010) who found a tendency for NP1 attachment in the offline task with Turkish learners of English regardless of animacy information unlike their native counterparts who showed NP2 attachment with the same sentences in Turkish and English (also in the online task but only with animate NPs; there was no significant attachment tendency with inanimate NPs). Therefore, irrespective of other confounding factors which might force or facilitate RC attachment to either NP1 or NP2 (such as animacy information, active / passive, prime attachment sites), Turkish learners of English seem to have an overall tendency towards NP1 attachment especially in the offline tasks. The Shallow Structure Hypothesis (Clahsen & Felser, 2006) suggested that L2 learners differed from both children and native speakers in their sentence processing. Accordingly, L2 learners may not rely on structure-based parsing strategies while processing in their L2. Therefore, they might not have processed syntactic constructions including complex hierarchical structures as native speakers do. However, the Shallow Structure Hypothesis alone does not explain why participants showed an overall tendency to NP1 attachment. The way they assigned prosody, the way they used chunking strategies as well as working memory constraints might have influenced their responses in the L2 offline task.

9.2. Experiment 6: Syntactic Priming of RC Attachment (with Turkish Learners of English - Intermediate) - from Comprehension to Comprehension - Directed Analysis of Prime Attachment Sites

In Experiment 5, we investigated whether Turkish learners of English with intermediate level would show similar or different syntactic priming effects with monolingual Turkish speakers. For this, we first focused on the implicit processing of the prime attachment. In other words, we did not ask participants to evaluate the prime attachment sites. However, we did not observe any syntactic priming effect unlike monolingual Turkish speakers. In Experiment 6, we would like to see if and how the results would change when we asked participants to evaluate the prime attachment site, as well.

9.2.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in English by Turkish speakers who have an intermediate level of English proficiency with participants' directed assessment of prime attachment sites?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

9.2.2. Hypothesis

As opposed to the results of Experiment 5, where the participants did not explicitly evaluate the prime attachment sites, it is expected that there will be a stronger priming effect in Experiment 6. The results may not be alike to monolingual Turkish speakers. The experiment will be in English again. It is likely that Turkish learners of English will rely on lexical information more while resolving ambiguity in their second language as the literature has showed (Dinçtopal-Deniz, 2007; Felser et al., 2003, and Papadopoulou & Clahsen, 2003) and they could be less influenced by the effect of syntactic priming under investigation.

9.2.3. Participants

The participants of this study were 20 Turkish learners of English. They were undergraduate students with intermediate level of English. Participants were students of English translation and interpreting department. 7 male and 13 female students took part in the study. The mean age of the participants is 18.

Participants were unaware of the purpose of the study, and they took part in the study on a voluntary basis. Participants had normal or corrected-to-normal vision. None of them had any language disorder, or any other psychological or neurological problems which might influence their comprehension or performance on the task. None of the participants took part in another study conducted within the scope of this dissertation.

9.2.4. Materials

For Experiment 6, the same sentences that had been used in the previous experiment with Turkish learners of English were used. The only difference was that participants were expected to evaluate the prime attachment sites in this experiment. That's why, they also saw a simple sentence completion item after each prime sentence.

9.2.5. Procedure

The same procedure in the previous offline experiments was followed here, as well. Participants were asked to read the sentences in order. They were instructed to appropriately complete the simple sentences according o the previous, relevant sentences they read by using only one single word, not a genitive construction or a pronoun.

9.2.6. Data Analysis and Results

The obtained data was analysed both descriptively and statistically. Descriptively, the participants preferred to attach RC to NP1 more often regardless of the prime condition, yet the difference between NP1 and NP2 attachment preference in the target sentence when the sentences consisted of active RCs was rather subtle compared to those of Experiment 5.

Table 41.
Attachment preferences of Turkish learners of English in Experiment 6

Passive RC Construction

	Target NP1	Target NP2
Prime NP1	46 /60 (76.6%)	14 / 60 (23.3%)
Prime NP2	39 / 60 (65%)	21 /60 (35%)

Active RC Construction

	Target NP1	Target NP2
Prime NP1	38 / 60 (63.3%)	22 / 60 (36.6%)
Prime NP2	32 / 60 (53.3%)	28 / 60 (46.6%)

Table 41 above shows the attachment preferences of Turkish learners of English for each category in the study. There were 20 participants and thus we obtained 60 responses in total for each one of these categories.

In order to reveal whether there was any significant priming effect, a repeated measures ANOVA was run and the two-way and three-way interactions between the prime attachment site, target attachment preferences, and active/passive conditions were analyzed.

The results showed that there was a significant interaction between the prime attachment site and target attachment preference, F (1, 19) = 9.701, p < .05 (p = .006), η_p^2 =,338. Accordingly, there was significantly more NP1 attachment, especially when the prime was NP1 attachment forced. Furthermore, there was a significant two-way interaction between the active/passive condition and the target attachment preference, F (1,19) = 12.042, p < .05 (p = . 003), η_p^2 =,338. This shows that participants preferred to attach RCs to NP1 especially in the passive condition.

Besides, one-way ANOVA was run so as to understand the effect of L2 proficiency on NP1 attachment preferences in L2 learners. The results did not show a significant difference. Accordingly, participants' NP1 attachment preferences did not differ depending on their L2 proficiency. Additionally, another one-way ANOVA was also run so as to understand the effect of the task requirements on NP1 attachment preferences in L2 learners with intermediate level of proficiency. The results showed a statistically significant difference, F (1, 39) = 11, 015, p < .05 (p = .002). Accordingly, participants' NP1 attachment preferences were significantly higher in the task which required their implicit processing of RC attachment preferences.

9.2.7. Discussion

In this experiment, we investigated the syntactic priming effect from comprehension to comprehension with Turkish learners of English. As in Experiment 5, the group of participants tested in this experiment had intermediate level of English. As opposed to Experiment 5, however, the participants were required to evaluate the prime attachment site explicitly in this experiment. As expected, the results of the study including directed analysis of the prime attachment site showed a stronger interaction between the prime attachment site and target attachment preference, which was not observed in the previous experiment.

However, the results were not still alike monolingual Turkish speakers who showed a strong priming effect in the case of directed analysis of the prime attachment site. The results are consistent with the expectations of the previous research suggesting that L2 participants would be less influenced by the effect of syntactic priming under investigation (Dinçtopal-Deniz, 2007; Felser et al., 2003, and Papadopoulou & Clahsen, 2003).

9.3. Experiment 7: Syntactic Priming of RC Attachment (with Turkish Learners of English - Upper-Intermediate) - from Comprehension to Comprehension - Implicit Processing of Prime Attachment Sites

With Experiment 7, we aim to provide a comparison of Turkish learners of English who have an intermediate level of English proficiency with those who have an upper-intermediate level in terms of understanding the effect of syntactic priming while resolving ambiguity in RC attachments with implicit processing of prime attachment sites.

9.3.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in English by Turkish speakers who have an upper-intermediate level of English proficiency with implicit processing of prime attachment sites?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

9.3.2. Hypothesis

In Experiment 5, we investigated whether Turkish learners of English were influenced by the effect syntactic priming while resolving ambiguity in RC attachments, yet we could not find any syntactic priming effect with the group of intermediate level of English proficiency. The literature actually suggests that L2 learners heavily rely on lexical information. However, this alone does not explain why we could not observe that syntactic priming was effective. The previous research has confirmed that syntactic priming is also effective in a foreign language (Kim & McDonough, 2008), and what seems to be lacking in the previous experiment could have resulted from processing difficulties in L2 (Juffs & Harrington, 1995), and non-natives who have native-like proficiency might show native-like syntactic processing (Hopp, 2014). There have been some studies revealing that syntactic processing in L2 is primed without being affected by L2 proficiency and that the same pattern is observed across levels (Kim & McDonough, 2008; Fujita, 2016). However, learners rely on lexical items more in early stages, and as their abstract linguistic representations develop, their reliance on individual lexical items might decrease, which may allow learners to benefit syntactical clues. Thus, the results of this study which compares two levels of English proficiency (i.e. intermediate and upper-intermediate levels) will be very revealing in terms of understanding the acquisition of complex structures (i.e. RC attachments in English) by Turkish learners of English and sentence processing in L2.

9.3.3. Participants

The participants of this study were 21 Turkish learners of English. They were undergraduate students with upper-intermediate level of English. Participants were students of English translation and interpreting department. 7 male and 14 female participants took part in the study. The mean age of the participants was 20.

Participants were unaware of the purpose of the study, and they took part in the study on a voluntary basis. Participants had normal or corrected-to-normal vision. None of them had any language disorder, or any other psychological or neurological problems which might influence their comprehension or performance on the task. None of the participants took part in another study conducted within the scope of this dissertation.

9.3.4. Materials

For Experiment 7, the same sentences that had been used in Experiment 5 with Turkish learners of English who had an intermediate level of English proficiency were used. Participants' implicit processing of the prime attachment sites was investigated in this study, therefore, they were not asked to evaluate the prime attachment sites.

9.3.5. Procedure

The same procedure in Experiment 5 were followed in this experiment.

9.3.6. Data Analysis and Results

The data gathered was analyzed both descriptively and statistically. Descriptively, the participants preferred to attach more NP1 regardless of the prime attachment site. However, there were slightly more NP2 attachment preference when the prime was NP2 attachment forced as compared to the case where it was forced towards NP1, and similarly, there were slightly more NP1 attachment forced when the prime was NP1 attachment forced as compared to the case where it was forced towards NP2 in both active and passive RC conditions. Table 42 below shows the attachment preferences of Turkish learners of English for each category in the study. There were 21 participants and for each one of the categories we obtained 63 responses in total.

In order to reveal whether there was a significant priming effect, a repeated measures ANOVA was run and the two-way and three-way interactions between the prime attachment site, active/passive condition, and the target attachment preference were analyzed. The results showed that there was a significant effect of target attachment preference, $F(1, 20) = 10.800$, $p < .05$ ($p = .004$), $\eta_p^2 = ,351$. Accordingly, there was significantly more NP1 attachment preference in the target sentences regardless of the prime.

Table 42.
Attachment preferences of Turkish learners of English in Experiment 7

Passive RC Construction

	Target NP1	Target NP2
Prime NP1	48 /63 (76.1 %)	15 / 63 (23.8%)
Prime NP2	44 / 63 (69.8%)	19 / 63 (30%)

Active RC Construction

	Target NP1	Target NP2
Prime NP1	47 / 63 (74.6 %)	16 / 63 (25.3%)
Prime NP2	41 / 63 (65 %)	22 / 63 (34.9%)

Even though there was an overall NP1 attachment preference, there was also a significant priming effect, $F (1, 20) = 4.950$, $p < .05$ ($p = .038$), $\eta_p^2 =,198$. This shows that participants preferred to attach NP1 even more after an NP1 prime, and similarly they preferred to attach NP2 even more after an NP2 prime.

9.3.7. Discussion

In this experiment, we investigated the syntactic priming effect with a group of Turkish learners of English. The experiment was similar to Experiment 5 where the participants were required to fulfil implicit processing of prime attachment sites. The only difference between the two experiments was that Experiment 7 was conducted with those who had a higher level of English proficiency. Unlike Experiment 5, the present study resulted in significant priming effect. The results confirmed that the syntactic priming is not only effective and observed in L1 but also in L2 (Kim & McDonough, 2008). On the contrary to the previous research suggesting that syntactic processing would be primed without being affected by L2 proficiency (Kim & McDonough, 2008; Fujita, 2016), however, the present study demonstrated that L2 learners could only benefit syntactic clues when their abstract linguistic representations developed at later stages of acquisition following decreasing reliance on lexical items, as Juffs and Harrington (1995) also put forth previously.

9.4. Experiment 8: Syntactic Priming of RC Attachment (with Turkish Learners of English - Advanced) - from Comprehension to Comprehension - Directed Analysis of Prime Attachment Sites

With Experiment 8, we aimed to provide a comparison of Turkish learners of English who have an intermediate level of English proficiency with those who have an upper-intermediate level in terms of understanding the effect of syntactic priming while resolving ambiguity in RC attachments with participants' directed assessment of the prime attachment sites.

9.4.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in English by

Turkish speakers who have an upper-intermediate level of English proficiency with participants' directed assessment of the prime attachment sites?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

9.4.2. Hypothesis

As opposed to the results of Experiment 7, where the participants with advanced level of English proficiency only processed the prime attachment sites implicitly, yet still resulted in a significant priming effect, it is expected that there will be a stronger priming effect in Experiment 8 where the participants will be required to evaluate the prime attachment sites.

9.4.3. Participants

The participants of this study were 21 Turkish learners of English. They were undergraduate students with upper-intermediate level of English. Participants were students of English translation and interpreting department. 9 male and 13 female participants took part in the study. The mean age of the participants was 21.

Participants were unaware of the purpose of the study, and they took part in the study on a voluntary basis. Participants had normal or corrected-to-normal vision. None of them had any language disorder, or any other psychological or neurological problems which might influence their comprehension or performance on the task. None of the participants took part in another study conducted within the scope of this dissertation.

9.4.4. Materials

For Experiment 8, the same sentences that had been used in Experiment 6 with Turkish learners of English who had an intermediate level of English proficiency were used. Participants' directed assessment of the prime attachment sites was investigated in this study, therefore, they were asked to evaluate the prime attachment sites.

9.4.5. Procedure

The same procedure in Experiment 6 were followed in this experiment.

9.4.6. Data Analysis and Results

The data was analyzed both descriptively and statistically. Descriptively, the participants preferred to attach RCs to NP1 more often after an NP1 prime, and similarly they preferred to attach RCs to NP2 more after an NP2 prime in both active and passive RC conditions.

Table 43.
Attachment preferences of Turkish learners of English in Experiment 8

Passive RC Construction		
	Target NP1	Target NP2
Prime NP1	39 / 63 (61.9 %)	24 / 63 (38 %)
Prime NP2	30 / 63 (47.6 %)	33 / 63 (52.3%)

Active RC Construction		
	Target NP1	Target NP2
Prime NP1	31 / 63 (49.2 %)	32 / 63 (50.7 %)
Prime NP2	27 / 63 (42.8 %)	36 / 63 (57.1 %)

Table 43 above shows the attachment preferences of Turkish learners of English for each category in the study. There were 21 participants and for each category we obtained 63 responses in total.

In order to reveal whether there was any significant priming effect, a repeated measures ANOVA was run again and the two-way and three-way interactions between the prime attachment site, active/passive and the target attachment preferences were analyzed. The results showed that there was a significant priming effect, $F (1, 20) = 6,637$, $p < .05$ ($p = .018$), $\eta_p^2 = ,249$. Accordingly, participants showed a tendency to attach RCs to NP1 after an NP1 prime and NP2 after an NP2 prime. There was no other significant interaction effect.

Besides, one-way ANOVA was run so as to understand the effect of L2 proficiency on NP1 attachment preferences in L2 learners. The results did not show a significant difference. Accordingly, participants' NP1 attachment preferences did not differ depending on their L2 proficiency. Additionally, another one-way ANOVA was also run so as to understand the effect of the task requirements on NP1 attachment preferences in L2 learners with upper-intermediate level of proficiency. The results showed a statistically significant difference, $F (1, 41) = 5, 374$, $p < .05$ ($p = .026$). Accordingly, participants' NP1 attachment preferences were significantly higher in the task which required their implicit processing of RC attachment preferences.

9.4.7. Discussion

In this experiment, we investigated the effect of syntactic priming with Turkish learners of English. Unlike the previous study, Experiment 7, the participants were required to evaluate the prime attachment sites explicitly. As it was expected, the participants who had an upper-intermediate level of English showed syntactic priming effect while resolving ambiguity in the complex sentences under investigation with the directed assessment of the prime attachment site. The results, as in Experiment 7, also confirmed that L2 learners benefit from syntactic clues as their abstract linguistic representations develop. However, the effect of syntactic priming was not significantly different between the two levels of proficiency in English. This could be due to the fact that there was not a great difference between the two levels. On the other hand, there was an effect of the task requirements. Participants' NP1 attachment preferences decreased with the directed attention to the prime attachment site.

CHAPTER 10

10. EXPERIMENT 9: SYNTACTIC PRIMING OF RC ATTACHMENT (WITH MONOLINGUAL TURKISH SPEAKERS) - ONLINE TASK

This is an online (computerized self-paced reading) task conducted with monolingual Turkish speakers.

10.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in monolingual Turkish speakers with participants' implicit processing of the prime attachment sites in an online (self-paced reading) task?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC while reading online? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

3. How does working memory capacity influence RC attachment preferences of monolingual Turkish speakers in an online task? To what extent can the differences among individuals or tendencies of some individuals to prefer certain attachments be explained with working memory capacity?

10.2. Hypothesis

The previous research conducted by Dinçtopal-Deniz (2007, 2010) showed that monolingual Turkish speakers had higher RTs and longer pause when RCs were disambiguated towards NP1 attachment while reading online, which indicates that they showed an NP2 attachment preference. RTs at the critical regions were not that high when NP2 attachment was forced or when the sentence was ambiguous. The models of sentence processing assume that if readers prefer serial processing, they will show shorter RTs in ambiguous sentences because they are believed to make an initial analysis by using syntactic information available only, thereby resulting in bias to only one interpretation whereas if they prefer parallel processing, then they will show longer RTs in ambiguous sentences than they do in disambiguated RCs because they will have access to both syntactic and lexical information from the very beginning (Papadopoulou, 2006). Dinçtopal-Deniz (2007, 2010) showed that monolingual Turkish speakers had an initial attachment preference (i.e. NP2 attachment), which seemed to be an evidence for serial processing. However, it was also observed that the participants had access to lexical information (i.e. animacy information) and their RC attachment preferences were sensitive to differences in animacy conditions (monolingual Turkish speakers preferred to attach RCs to NP2 more in the inanimate condition). Therefore, she was of the opinion that the results confirmed the predictions of the Unrestricted Race Model (van Gompel et al., 2000), which argues that the parser commits to an initial analysis using

both syntactic and lexical information, and when the initial analysis proves to be incorrect, then a reanalysis stage might be observed.

Turkish is a head-final language, thus the RCs appear in the first region (i.e. [$_{RC}$ Beşikte uyu-y-an]). The second (i.e. [$_{NP2}$ bebeğ-in]) and the third region (i.e. [$_{NP1}$ anne-si]), where the NPs of the complex genitive possessive construction are presented, are critical for the experiment in Turkish. In this online syntactic priming study, for us, it is important to see whether the recency of reading an NP1 or NP2 attachment forced sentence facilitates resolving ambiguity in RC attachments in the target sentences. Thus, participants are expected to show similar patterns with the prime sentences. In those target sentences, following an NP1 attachment prime, they are expected to have NP1 attachment already in mind, and similarly following an NP2 attachment prime, they are expected to have NP2 attachment already in mind. Accordingly, there will be a comparison of the ambiguous sentences following NP1 attachment forced primes and those following NP2 attachment forced primes in terms of RTs.

However, if priming is not effective, readers are expected to show shorter RTs in ambiguous sentences (regardless of the prime sentence conditions) compared to disambiguated RCs if they already make an initial attachments suggested by models of serial processing or the Unrestricted Race model, or they are expected to show longer RTs (regardless of the prime sentence conditions) than disambiguated RCs if they follow parallel processing because they will be considering all possible information simultaneously.

With regard to the relation between the working memory capacity and RC attachment preferences, the expectation is that the current study will replicate the previous online tasks investigating the issue (Mendelson & Pearlmutter, 1999; Kim & Christianson, 2013) since we found a clear interaction between the working memory capacity and RC attachment preferences in the offline task before unlike the study conducted with Korean L1 speakers (Kim & Christianson) and Japanese L1 speakers (Omaki, 2005) (i.e. speakers of two head-final languages like Turkish, though) who were not observed to have any clear interaction (neither in the offline nor in the online studies). The results should be consistent with the findings of Kaya (2010), where he found significantly less NP1 attachment preferences with those who have higher working memory capacity.

10.3. Participants

In this online task, 21 monolingual Turkish speakers took part in the study. Participants were first year undergraduate students with beginner-level English proficiency (i.e. A1 according to CEFR). The mean age of the participants was 19. They had normal or corrected-to normal vision. The participants were unaware of the purpose of the study, and took part in the study on a voluntary basis. None of the participants participated in another study administered within the scope of this study.

10.4. Materials

The same filler and experimental sentences (prime and target sentences) used in the previous offline studies with monolingual Turkish speakers were also used in this experiment. In brief, there were 24 filler and 24 experimental sentences (12 prime and 12 target). Half of the experimental sentences included active RCs whereas the other half included passive RCs.

With regard to the filler sentences, they included a variety of structures used to divert the attention of participants from the actual purpose of the study.

The sentences were divided into four regions following Dinçtopal-Deniz (2007, 2010) for the investigation of reading times and pauses at the critical regions (i.e. the attachment sites). The sentence (47) below shows an example of the regions divided with slashes in an experimental sentence.

(47)   [RC Beşikte uyuyan] / [NP2 bebeğin] / [NP1 annesi] / temizlik yapıyordu.
         'the mother of the baby who was sleeping in the crib was cleaning'

The length of the experimental sentences and the words that appeared in the critical regions (i.e. the attachment sites; region 2 and region 3) were balanced in order to control for the effect of length on participants' reading time. Accordingly, there were always 6 words in sentences and the words in the critical regions consisted of 3-5 syllables (mean= 3,5 and 5-syllable- word occurred only in one sentence) .

Besides, in order to investigate the interaction between the working memory capacity of the participants and their RC attachment preferences, the Turkish reading span test (TRST) developed by Ünal (2008), which was described before, was used in this study, as well.

10.5. Procedure

Participants were tested individually in a quiet room. First they were asked to fill out a demographic information and consent form. Then they started the experiment. Participants were told only that this would be a reading comprehension experiment in Turkish, and they were given instructions about the experiment. Participants saw 4 trial sentences for the practice session before they started the actual experiment.

The experiment was designed using Open Sesame 3.1.7. The stimuli were presented in a self-paced, phrase by phrase, in MS Sans Serif, in font size of 24. We employed the moving window display technique to collect online measures of processing RC attachments (Juffs & Harrington, 1995). Accordingly, the sentences were divided into four regions as aforementioned. The regions appeared in the centre of the computer screen, one at a time. In order to see each region and to complete reading each sentence, participants needed to press 'space bar' on the keyboard.

The target sentences were always immediately followed by a comprehension question probing the NP to which the RC could be attached, and half of the filler sentences were followed by a question. The questions had two options; a and b. Participants responded to each question by pressing either 'a' or 'b' on the keyboard.

Participants' reading times for each region of every sentence and their responses to the questions as well as the time they took for answering these questions were recorded by the program in milliseconds.

As for the Turkish reading span test, the same procedure described in the offline study investigating the relation between WM and RC attachment preferences was followed here.

10.6. Data Analysis and Results

For the purposes of the study, the data collected was analysed under four subtitles; analysis of the priming effect; working memory and RC attachment preference; analysis of RTs in critical regions; analysis of the prime regions. Each is explained in detail below.

10.6.1 Analysis of the priming effect

The data collected was analysed both descriptively and statistically. Descriptively, the participants preferred more NP2 after an NP2 prime and likewise they preferred to attach RCs to more NP1 after an NP1 prime. However, this pattern seems to be more obvious in the passive condition whereas in the active condition, the pattern does not seem consistent. Although there is more NP2 after an NP2 prime, there is also more NP2 after an NP1 prime

Table 44.
Attachment preferences of monolingual Turkish speakers in Experiment 9

Passive RC Construction		
	Target NP1	Target NP2
Prime NP1	37 / 63 (58.7 %)	26 / 63 (41.2 %)
Prime NP2	23 / 63 (36.5 %)	40 / 63 (63.4 %)

Active RC Construction		
	Target NP1	Target NP2
Prime NP1	24 / 63 (38 %)	39 / 63 (61.9 %)
Prime NP2	21 / 63 (33.3 %)	42 / 63 (66.6 %)

Table 44 above shows the attachment preferences of monolingual Turkish speakers for each category in the online task. There were 21 participants and for each category we obtained 63 responses in total.

In order to reveal whether there was any significant priming effect, a repeated measures ANOVA was run and the two-way and three-way interactions among prime attachment sites, target attachment preferences, and active / passive conditions were also examined. The results did not show any significant priming effect. Furthermore, there was no significant main effect of target attachment site. In other words, there was not any significant attachment preference towards either NP1 or NP2.

However, there was a significant interaction among the prime attachment site, active/passive condition, and the target attachment preference, F (1, 20) = 8.869, p < .05 (p = .007), η_p^2 =,307 . Accordingly, as descriptively seen above, there are more NP1 after an NP1 and more NP2 after an NP2 in the passive condition whereas there are slightly more NP2 after an NP2 and also more NP2 after an NP1 prime in the active condition. In order to understand these interactions better, paired-samples t-test analysis was run. Accordingly, only the interaction in the passive conditions are significant. In other words, there are significantly more NP2 after an NP2 (M = .667, SE = .199), t (20) = 3.344, p < .05 (p = .003) and significantly more NP1 after an NP1 (M = -.667, SE = .199), t (20) = -3.344, p < .05 (p = .003) in the passive condition. The interactions in the active condition neither when the prime was NP1

forced (M = -.286, SE = .240), t (20) = -1.188, p > .05 (p = .249) nor the prime was NP2 forced (M = .286, SE = .240), t (20) = 1.188, p > .05 (p = .249) is significantly different.

10.6.2. Working memory and RC attachment preference

The data gathered was analysed statistically, and the effect of the participants' reading spans on their RC attachment preferences was examined. The scores that the participants obtained from the reading span test were labelled as 1 (Low Span) and 2 (High Span). A repeated measures ANOVA was run in order to see the effect of reading span on the RC attachment preferences. The result did not show any significant effect of reading span, F (1, 19) = 1.292, p > .05 (p = .270), η_p^2 =,064. Furthermore, there was not any significant interaction between the active / passive condition with the reading span and the RC attachment preferences.
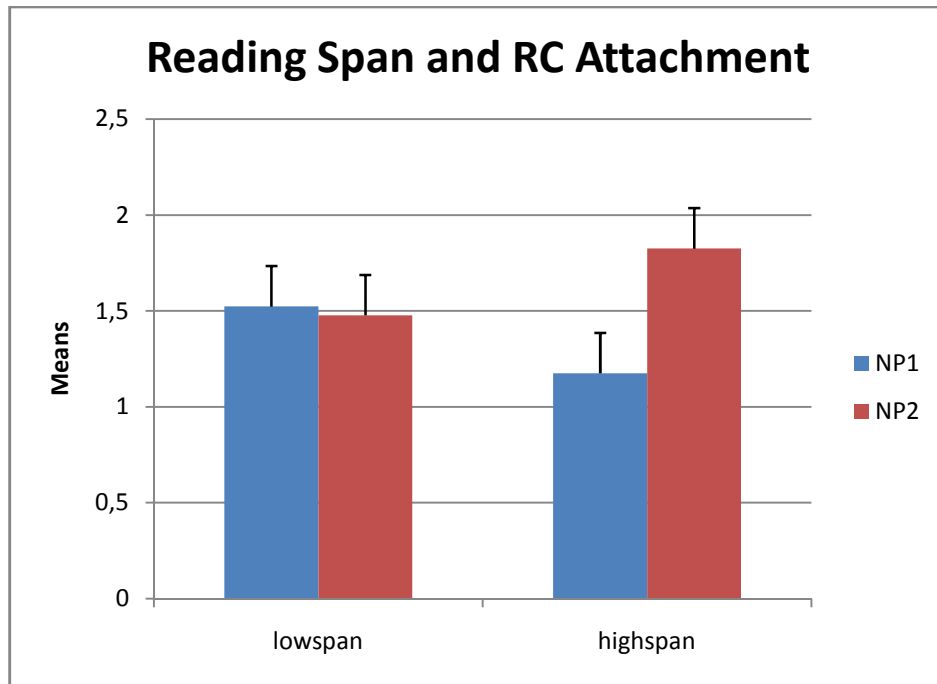
Figure 6. Interaction between participants' reading spans and attachment preferences

However, there was slightly more NP1 for low span readers and more NP2 for high spans. Figure 6 above showed the interaction between the reading span and RC attachment preferences although the interaction is not found significant, and the difference is subtle.

10.6.3. Analysis of RTs in the critical regions

The critical regions in the Turkish target sentences were the second (i.e. [NP2 bebeğ-in]) and the third region (i.e. [NP1 anne-si]), where the NPs of the complex genitive possessive construction were presented as described above. In this online syntactic priming study, for us, it was important to see whether the recency of reading an NP1 or NP2 attachment forced sentence facilitated resolving ambiguity in RC attachments in the target sentences. Thus, participants were expected to show similar patterns with the prime sentences. In those target

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sentences, following an NP1 attachment prime, they were expected to have an NP1 attachment already in their mind, and similarly following an NP2 attachment prime, they were expected to have an NP2 attachment already in their mind. Accordingly, a comparison of the ambiguous sentences following NP1 attachment forced primes and those following NP2 attachment forced primes would differ in terms of their RTs. However, since there was no significant priming effect found as explained in the previous analysis, the expectation is that there will be no significant difference in the critical regions in terms of RTs, either. In order to see whether this assumption was valid or not, a repeated measures ANOVA was run. The results did not show any significant difference between RTs. There was no significant difference between RTs of the critical regions depending on the prime attachment site. Furthermore, there was no significant effect or interaction of active/passive condition.

10.6.4. Analysis of the prime regions

In order to see whether monolingual Turkish speakers had any clear attachment preference in the first place in the online task while reading the prime sentence. RTs in the critical regions of the prime sentence were also examined. As in the target sentences in Turkish, the critical regions were the second and third regions. A repeated measures ANOVA was run to see the effects and interactions between the conditions. The analysis of the critical regions showed that there was no significant effect of the prime attachment site (i.e. whether it was forced to NP1 attachment or NP2 attachment). There is only a subtle interaction between the prime attachment site and critical regions, $F(1, 20) = 3.908$, $p > .05$ ($p = .062$), $\eta_p^2 = ,163$. Accordingly, monolingual Turkish speakers had slightly longer RTs in the second region (i.e. where NP2 is located) when the prime was forced to NP1 attachment.

Besides, in order to reveal whether it takes shorter for monolingual Turkish speakers to process ambiguous sentences as compared to the attachment forced prime sentences as serial processing would predict, a comparison of the RTs in the critical regions between the prime sentences and the target sentences was aimed. A repeated measures ANOVA was run. The results did not show any significant difference between the prime and target sentences.

10.7. Discussion

In the previous research conducted by Dinçtopal-Deniz (2007,2010), monolingual Turkish speakers were found to have higher RTs and longer pause when RCs were disambiguated towards NP1 attachment while reading online, thereby suggesting that monolingual Turkish speakers had an initial attachment preference towards NP2 attachment. RTs at the critical regions were not that high when NP2 attachment forced or when the sentence was ambiguous. In the current study with monolingual Turkish speakers, participants did not show any significant differences at the critical regions in terms of RTs while reading an attachment forced prime sentence or an ambiguous sentence online. However, there was a subtly interaction between the prime attachment site and the critical regions, which could be regarded in line with the findings of Dinçtopal-Deniz (2007, 2010). Monolingual Turkish speakers had slightly longer RTs in the second region (i.e. where NP2 is located) when the prime was forced to NP1 attachment. Therefore, monolingual Turkish speakers seem to have an initial tendency -though quite subtle - towards NP2 attachment while reading complex sentences including genitive NPs modified by RCs online.

In the current online task, there was no significant priming effect. Furthermore, there was no significant attachment preference either towards NP1 or NP2. However, there was a significant three-way interaction among the prime attachment site, active/passive condition, and target attachment preferences. Accordingly, monolingual Turkish speakers had more NP1 after an NP1 prime and more NP2 after an NP2 prime in the passive condition. In the passive condition, monolingual Turkish speakers are influenced by the prime. However, they had more NP2 attachment preference in the active condition regardless of the prime condition. The critical regions of the sentences for the analysis of the priming effect were the second and the third regions in Turkish, where the NPs of the complex genitive possessive construction were presented. The analysis of the RTs, however, did not show any significant difference in the critical regions of the target sentences. In brief, monolingual Turkish speakers have only significant priming effect in the passive condition whereas they have a slightly more NP2 attachment preference in the active condition. The reason why participants had stronger priming effect in the passive condition whereas they seem to have an overall NP2 preference in the active condition could be explained with the fact that syntactic priming occurs more often with marked syntactic forms (Hartsuiker & Westenberg, 2000; Pickering & Ferreira, 2008).

As for the relation between the working memory capacity and RC attachment preferences in the ambiguous sentences, the current study did not show any significant interaction. However, low span readers had slightly more NP1 preference whereas high span readers had slightly more NP2 preference. The reason why there was not any significant result even though the pattern seems similar to the findings of the previous research conducted in several languages (Mendelson & Pearlmutter, 1999; Swets, et al., 2007) could be related to different factors. One reason could be related to head-directionality. Kim and Christianson (2013) could not also observed any clear interaction between the working memory capacity and RC attachment preferences in Korean which is also a head-final language like Turkish. However, although they could not find any interaction in the online task as well as in the offline. The previous study we conducted offline resulted in a similar pattern outlined in the literature, showing low span readers preferred more NP1 attachment and high span readers preferred more NP2 attachment. The other reason could be related to an unbalanced distribution of low and high span readers or some participants might have responded to the questions randomly. Thus, even though the underlying patter seems in line with the literature in general, the interaction is not significant.

Lastly, it is important to note it here that the target sentences consisted of ambiguous sentences following the previous studies investigating syntactic priming of RC attachment in offline and online self-paced reading tasks whereas the prime sentences consisted of disambiguated sentences (Scheepers, 2003; Desmet and Declerq, 2006; Gertken, 2013). However, given that there are hypotheses that readers would rely merely on syntactic information available during initial processing, and when encountered ambiguous sentences, they would simply show bias to only one interpretation, thereby reading ambiguous sentences faster than a disambiguated sentence (Papadopoulou, 2006; Dinçtopal-Deniz, 2010), disambiguated sentences could be also used as target sentences in order to investigate the effect of syntactic priming, and this might also provide informative results.

CHAPTER 11

11. EXPERIMENT 10: SYNTACTIC PRIMING OF RC ATTACHMENT (WITH TURKISH LEARNERS OF ENGLISH) - ONLINE TASK

This is an online (computerized self-paced reading) task conducted with Turkish learners of English who have advanced level of English proficiency.

11.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the comprehension of sentences involving globally ambiguous RC attachment in Turkish learners of English who have advanced level of English proficiency with participants' implicit processing of the prime attachment sites in an online (self-paced reading) task?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC while reading online? In other words, does the presence of an active or a passive construction in RC change the effect on RC attachment preference?

3. How does working memory capacity influence RC attachment preferences of monolingual Turkish speakers in an online task? To what extent can the differences among individuals or tendencies of some individuals to prefer certain attachments be explained with working memory capacity?

11.2. Hypothesis

The previous research conducted by Dinçtopal-Deniz (2007, 2010) showed that Turkish learners of English had almost the same RTs in all three conditions (i.e. NP1 attachment forced, NP2 attachment forced, and ambiguous sentences). However, they showed a tendency to attach RCs to an NP1 when the RC referred to an animate, and to an NP2 like a native English speaker only when it referred to an inanimate, thereby suggesting that L2 learners relied on lexical information.

English is a head-initial language, thus the RCs appear in the third region (i.e. [$_{RC}$ who was sleeping in the crib]). As the third region is the disambiguating segment of each sentence for the English sentences, the third region is accepted as the critical region following Dinçtopal-Deniz (2007, 2010). In this online syntactic priming study, for us, it is important to see whether the recency of reading an NP1 or NP2 attachment forced sentence facilitates resolving ambiguity in RC attachments in the target sentences. Thus, participants are expected to show similar patterns with the prime sentences. In those target sentences, following an NP1 attachment prime, they are expected to have NP1 attachment already in mind, and similarly following an NP2 attachment prime, they are expected to have NP2 attachment already in mind. Accordingly, there will be a comparison of the ambiguous

sentences following NP1 attachment forced primes and those following NP2 attachment forced primes in terms of RTs in order to see the facilitator role of the priming effect.

However, if priming is not effective, readers are expected to show shorter RTs in ambiguous sentences (regardless of the prime sentence conditions) compared to disambiguated RCs if they already make an initial attachment suggested by models of serial processing or the Unrestricted Race model, or they are expected to show longer RTs (regardless of the prime sentence conditions) than disambiguated RCs if they follow parallel processing because they will be considering all possible information simultaneously.

As for the relation between the working memory capacity and RC attachment preferences, the expectation is that the results could be consistent with Kaya (2010) again. In fact, although several offline studies consistently showed that low span readers preferred more NP1 attachment whereas high span readers preferred more NP2 attachment, online studies especially in L2 failed to find any clear interaction (Omaki, 2005; Hopp, 2014). However, these studies failed to find any clear interaction even in the offline task with L1 speakers. Therefore, considering the fact that the previous studies conducted within the scope of this dissertation found significant interaction between the working memory capacity and RC attachment preferences, it is more likely that the results would be consistent with Kaya (2010). Furthermore, since the offline studies with L2 speakers provided evidence that those with higher proficiency showed the same priming effects in RC attachment preferences as the monolingual Turkish speakers, it is also highly expected to observe somewhat interaction between WM and RC attachment preferences as opposed to Omaki (2005) who asserted that they could not observe any clear interaction because of incomplete L2 knowledge.

11.3. Participants

In this online task, 15 Turkish learners of English took part in the study. Participants were undergraduate and/ or graduate students and educators with advanced level of English proficiency (i.e. C1 or C2 according to CEFR). The mean age of the participants was 25. They had normal or corrected-to normal vision. The participants were unaware of the purpose of the study, and took part in the study on a voluntary basis. None of the participants participated in another study administered within the scope of this study.

11.4. Materials

The same filler and experimental sentences (prime and target sentences) used in the previous offline studies with Turkish learners of English were also used in this experiment. In brief, there were 24 filler and 24 experimental sentences (12 prime and 12 target). Half of the experimental sentences included active RCs whereas the other half included passive RCs. With regard to the filler sentences, they included a variety of structures used to divert the attention of participants from the actual purpose of the study.

(48)   [NP1 The baby] / [NP2 of the mother] / [RC who was sleeping in the crib] / was cleaning.

The sentences were divided into four regions following Dinçtopal-Deniz (2007, 2010) for the investigation of reading times and pauses at the critical regions (i.e. the attachment sites). The sentence (48) above shows an example of the regions divided with slashes in an experimental sentence.

The length of the experimental sentences and the words that appeared in the critical regions (i.e. the attachment sites; region 2 and region 3) were balanced in order to control for the effect of length on participants' reading time. Accordingly, there were 10-16 words in sentences (mean= 13) and the words in the critical regions consisted of 1-4 syllables (mean= 2,35). It is noteworthy here indicating that the control of length were not as restricted as it was with the Turkish sentences. These sentences were the English translations of those Turkish sentences, and since the previous studies we conducted showed the importance and impact of lexical-semantic information carried with the experimental sentences, it was more crucial to us to protect their meanings as much as possible for the experiment in English.

Besides, in order to investigate the interaction between the working memory capacity of the participants and their RC attachment preferences, the Turkish reading span test (TRST) developed by Ünal (2008), which was described before, was used in this study, as well.

11.5. Procedure

The same procedure in Experiment 9 was also followed here. Participants were tested individually in a quiet room. First they were asked to fill out a demographic information and consent form. Then they started the experiment. Participants were told only that this would be a reading comprehension experiment in Turkish, and they were given instructions about the experiment. Participants saw 4 trial sentences for the practice session before they started the actual experiment.

The experiment was designed using Open Sesame 3.1.7. The stimuli were presented in a self-paced, phrase by phrase, in MS Sans Serif, in font size of 24. We employed the moving window display technique to collect online measures of processing RC attachments (Juffs & Harrington, 1995). Accordingly, the sentences were divided into four regions as aforementioned. The regions appeared in the centre of the computer screen, one at a time. In order to see each region and to complete reading each sentence, participants needed to press 'space bar' on the keyboard.

The target sentences were always immediately followed by a comprehension question probing the NP to which the RC could be attached, and half of the filler sentences were followed by a question. The questions had two options; a and b. Participants responded to each question by pressing either 'a' or 'b' on the keyboard.

Participants' reading times for each region of every sentence and their responses to the questions as well as the time they took for answering these questions were recorded by the program in milliseconds.

As for the Turkish reading span test, the same procedure described in the offline study investigating the relation between WM and RC attachment preferences was followed here.

11.6. Data Analysis and Results

For the purposes of the study, the data collected was analysed under four subtitles; analysis of the priming effect; working memory and RC attachment preference; analysis of RTs in critical regions; analysis of the prime regions. Each is explained in detail below.

11.6.1. Analysis of the priming effect

The data collected was analysed both descriptively and statistically. Descriptively, the participants preferred to attach RCs to NP1 more often regardless of the prime condition. Table 45 below shows the attachment preferences of Turkish learners of English for each category in the online task. There were 15 participants and for each category we obtained 45 responses in total.

Table 45.
Attachment preferences of Turkish learners of English in Experiment 10

Passive RC Construction

	Target NP1	Target NP2
Prime NP1	29 / 45 (64.4 %)	16 / 45 (35.5 %)
Prime NP2	27 / 45 (60 %)	18 / 45 (40 %)

Active RC Construction

	Target NP1	Target NP2
Prime NP1	27 / 45 (60 %)	18 / 45 (40 %)
Prime NP2	28 / 45 (62.2 %)	17 / 45 (37.7 %)

In order to reveal whether there was any significant priming effect, or any significant two-way or three-way interaction among the prime attachment sites, active/passive conditions, and the target attachment preferences, a repeated measures ANOVA was run. The results did not show any significant interaction between the prime attachment site and target attachment preferences. There was no significant priming effect. However, there was a substantial effect of the target attachment preferences $F (1, 14) = 4.397$, $p > .05$ ($p = .055$), $\eta_p^2 = ,239$. Furthermore, there was not any two-way or three- way interaction among the prime attachment site, active/passive condition, and the target attachment preference.

11.6.2. Working memory and RC attachment preference

The data gathered was analysed statistically, and the effect of the participants' reading spans on their RC attachment preferences was examined. The scores that the participants obtained from the reading span test was labelled as 1 (Low Span) and 2 (High Span) as described previously. A repeated measures ANOVA was run in order to see the effect of reading span on the RC attachment preferences. The results showed a significant interaction between the reading span and target attachment preferences, $F (1, 13) = 12.929$, $p < .05$ ($p = .003$), $\eta_p^2 = ,499$. Accordingly, low span readers preferred significantly more NP1 attachment whereas high span readers preferred more NP2 attachment as displayed in Figure 7 below.
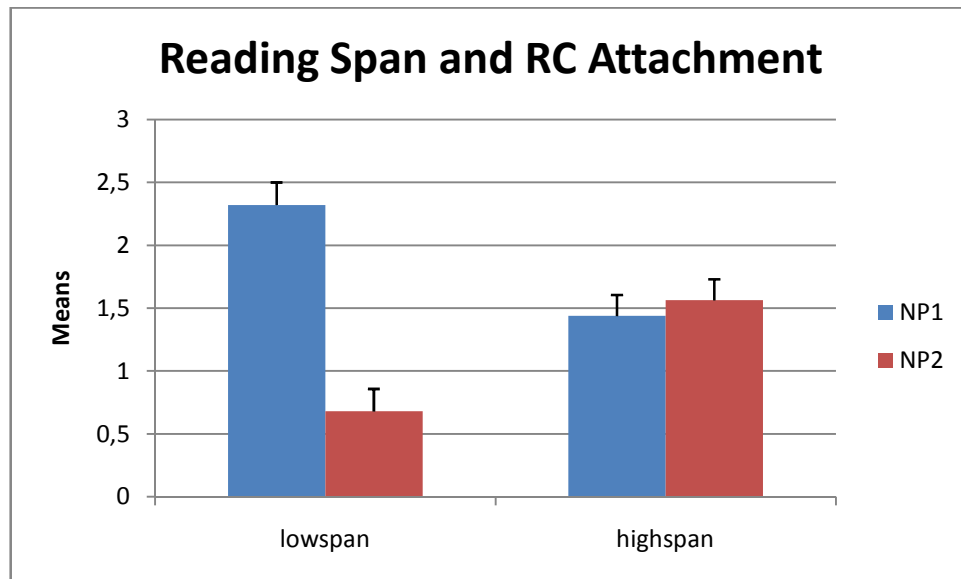
Figure 7. Interaction between participants' reading span and attachment preferences

Furthermore, there was a significant interaction among the prime attachment site, active/passive condition, target attachment preferences, and the reading spans, $F (1, 13) =$ 5.200, $p < . 05$ ($p = .040$), $\eta_p^2 =,286$. Accordingly, low span readers preferred more NP1 in the target sentences regardless of the prime attachment site and active/passive condition. However, high span readers preferred more NP2 in the active condition and more NP1 in the passive condition when the prime attachment site was forced towards NP1, and they preferred more NP2 in the passive when the prime attachment site was forced towards NP2. High span readers had a balanced score for NP1 and NP2 attachment preference when the sentence included an active RC and NP2 attachment forced. Apparently, although low span readers seem to have an obvious tendency towards NP1 attachment regardless of the prime attachment site and active/passive conditions, high span readers had distinct attachment preferences depending on the prime attachment site and active/passive conditions.

11.6.3. Analysis of RTs in the critical regions

The critical region in the English target sentences was the third region where the RCs appeared (i.e. [RC who was sleeping in the crib]) as described previously. In this online syntactic priming study, for us, it was important to see whether the recency of reading an NP1 or NP2 attachment forced sentence facilitated resolving ambiguity in RC attachments in the target sentences. Thus, participants were expected to show similar patterns with the prime sentences. In those target sentences, following an NP1 attachment prime, they were expected to have NP1 attachment already in mind, and similarly following an NP2 attachment prime, they were expected to have NP2 attachment already in mind, which would make it easier to attach RCs either to NP1 or NP2 in an ambiguous target sentence. Accordingly, a comparison of the ambiguous sentences following NP1 attachment forced primes and those following NP2 attachment forced primes in terms of RTs was aimed in order to see the facilitator role of the priming effect. However, since there was no significant priming effect as explained in the previous analysis, the expectation is that there will be no

significant difference in the critical region in terms of RTs depending on the prime attachment site (i.e. whether the prime was forced towards NP1 or NP2 attachment), either. In order to see whether this assumption was valid or not, a repeated measures ANOVA was run. The results did not show any significant effect of the prime attachment site, as expected. However, there was a significant effect of active/passive conditions, $F (1, 14) = 10.092$, $p <. 05$ ($p = .007$), $\eta_p^2 =,419$. Accordingly, Turkish learners of English had significantly longer RTs in the passive condition as compared to the active condition while reading ambiguous sentences - although they were not influenced by the prime attachment site and they did not show any significant priming effect.

11.6.4. Analysis of the prime regions

In order to see whether Turkish learners of English had any clear attachment preference in the first place in the online task, and whether they had any longer RTs in the passive while reading the prime sentence, as well. RTs in the critical region of the prime sentence were also examined. As in the target sentences in English, the critical region was the third region. A repeated measures ANOVA was run to see the effects and interactions between the conditions. The results showed that there was no significant difference between NP2 and NP2 attachment forced primes in terms of RTs. However, as in the target sentences, there was a significant effect of active/passive conditions, $F (1, 14) = 9.321$, $p < .05$ ($p = .009$), $\eta_p^2 =,400$. Accordingly, Turkish learners of English had longer RTs in the critical region (i.e. the third region) while reading a prime sentence including a passive RC as in the target sentences.

Besides, in order to reveal whether it takes shorter for Turkish learners of English to process ambiguous sentences as compared to the attachment forced prime sentences as serial processing would predict, a comparison of the RTs in the critical region between the prime sentences and the target sentences was aimed. A repeated measures ANOVA was run. The results showed only a significant effect of active/passive condition, $F (1, 14) = 13.397$, $p < .05$ ($p = .003$), $\eta_p^2 =,489$. Accordingly, participants had only longer RTs in the passive condition regardless of the attachment forced prime condition or the ambiguous sentence condition. In other words, RTs in ambiguous sentences were neither shorter as predicted by models of serial processing nor longer as predicted by those of parallel processing. The reason could be related to the subtle effect of the prime sentences even though there was no significant priming effect, the presence of the prime sentences might have guided the participants.

Table 46.
Difference between prime and target sentences in terms of RTs

Prime/Target	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Prime	2489,450	219,886	2017,842	2961,058
Target	2542,450	247,812	2010,946	3073,954

Furthermore, as displayed in Table 46 above, even though the difference is not significant, the results showed that RTs in the critical region of the ambiguous sentences (i.e. target

sentence) was slightly longer than those in the critical region of the attachment forced prime sentences. Yet, this difference is too subtle to say anything about the way of processing.

11.7. Discussion

In the previous study conducted by Dinçtopal-Deniz (2007, 2010), Turkish learners of English had almost the same RTs in all three conditions (i.e. NP1 attachment forced, NP2 attachment forced, and ambiguous sentences). Yet, she observed that Turkish learners of English had a tendency to attach RCs to NP1 if an RC referred to an animate NP whereas they preferred to attach RCs to NP2 if it referred to an inanimate. Therefore, she asserted that Turkish learners of English relied on lexical information in second language processing.

In the current study, participants did not show any significant difference between RTs in the critical region of the attachment forced prime sentences and the ambiguous target sentences. However, both in the prime and in the target sentences, there was a significant effect of active / passive condition. Accordingly, Turkish learners of English had longer RTs in the critical region (i.e. the third region where RC is located) while resolving ambiguity in the complex sentences under investigation. In other words, Turkish learners of English did not have any initial attachment preference towards either NP1 or NP2, but only difficulty in processing passive RCs both in the prime and the target sentences.

Besides, there was no significant priming effect, but only a substantial (not significant) effect of the target attachment preference. Turkish learners of English required to attach RCs to NP1 more often as they had done in the previous offline studies which required implicit processing of the prime attachment sites and also similar to other offline studies conducted in head-final languages as shown in a study conducted with Korean learners of English (Han, 2012). In brief, Turkish learners of English showed a tendency towards attaching RCs to NP1 more often, unlike monolingual Turkish speakers who did not show any clear attachment preference but only a subtle initial attachment to NP2 and native English speakers who were found to prefer NP2 attachment in the previous research (Cuetos & Mitchell, 1988; Dinçtopal-Deniz, 2007). Han (2012) explained that NP1 attachment preference in English by Korean learners of English could be due to their past experiences of resolving RC attachment ambiguity in Korean, which was towards, NP1. However, for Turkish learners of English, this explanation does not seem valid as monolingual Turkish speakers do not show a tendency towards NP1 attachment. NP1 attachment preference could be explained though the structural complexity. The syntactic complexity of the sentences might have increased NP1 attachment in the studies with Turkish learners of English. Given that the preference towards NP1 attachment was observed to have decreased as the English proficiency level of learners increased and when the design of the study required the participants to evaluate the prime attachment sites explicitly, (i.e. directing their attention to the particular structure under investigation) Turkish learners of English seem to show a tendency towards NP1 attachment when they had difficulty in processing the embedded RC , and resolving ambiguity. Considering the fact that NP1s in the sentences are also the subject of the main clause, Turkish learners of English seem to choose the most topically relevant NP in the case of ambiguity.

As for the relation between the working memory capacity and RC attachment preferences in the online task, there was a significant interaction between the reading span and RC attachment preferences in the ambiguous sentences. Accordingly, low span readers preferred

more NP1 attachment as Kaya (2010) had observed before. Furthermore, there was a significant interaction between the prime attachment site, active/passive condition, and target attachment preferences. Even though low span readers preferred more NP1 in the target sentences regardless of the prime or active/passive condition, high span readers preferred more NP2 in the active condition, and their preference changed in the passive condition depending on the prime condition (i.e. whether it was forced towards NP1 or NP2). These, however, are not consistent with the previous studies which did not find any clear relation between the working memory capacity and RC attachment preferences in the online tasks conducted with Japanese learners of English and German learners of English (Omaki, 2005; Hopp, 2014). Previously, Omaki (2005) and Hopp (2014) explained that the reason why they could not find any clear relation could be due to the fact that learners of English had great difficulty in the tasks.

CHAPTER 12

12. EXPERIMENT 11: SYNTACTIC PRIMING OF RC ATTACHMENT (WITH MONOLINGUAL TURKISH SPEAKERS) - EYE-TRACKING STUDY

This is an eye-tracking study conducted with monolingual Turkish speakers.

12.1. Research Questions

The research questions are as follows:

1. How does the recency of use (i.e. reading an NP1 or NP2 attachment forced RC) affect the monolingual Turkish speakers' comprehension of sentences involving globally ambiguous RC attachment in an eye-tracking study?

2. How does the syntactic priming effect change depending on the syntactic construction (i.e. active or passive) in RC while reading online? In other words, does the presence of an active or a passive construction change the effect on RC attachment preference?

3. Is there a significant difference between critical regions (i.e. the regions where NPs are located) in terms of total fixation durations, and visit counts, and thus any evidence for or against the facilitator role of syntactic priming in ambiguity resolution?

4. Is there a significant difference between critical regions (i.e. the regions where NPs are located in terms of first fixation durations, which gives further explanations on the initial attachment preferences and processing strategies?

12.2. Hypothesis

This study was conducted to investigate the syntactic priming of RC attachments in monolingual Turkish speakers. Unlike the previous offline and online tasks, the eye-tracking methodology enabled us to collect more detailed data involving participants' backtrackings, first fixation durations, and total fixation durations at critical regions. In the previous online task with monolingual Turkish speakers, we were not able to find any significant priming effect whereas there was a significant priming in the offline task, especially when the directed assessment of the prime attachment site was required (but not when the implicit processing of the prime attachment site was required, see Chapter 8). Apparently, as shown in the previous tasks and the literature (i.e. Fernandez, 2002), participants' attachment preferences are heavily influenced by the task type. Therefore, the results might not be similar to the previous task with monolingual Turkish speakers even though it was also an online task, the presentation of the stimuli was different. It is possible to observe syntactic priming effect as participants will see each sentence as a whole, not divided into four parts.

The hypothesis regarding the third and the fourth questions is that if there is any significant syntactic priming, the RTs (i.e. total fixation durations and first fixation durations) will be shorter at the critical regions (i.e. either NP1 or NP) of the target sentences following a prime

sentence forced towards NP1 or NP2 attachment. For instance, if the prime is NP1 attachment forced, participants are expected to have an NP1 attachment already in mind. Accordingly, there will be a comparison of the ambiguous sentences following NP1 attachment forced primes and those following NP2 attachment forced primes in terms of RTs. The first fixation durations especially in the prime sentences, where attachments were semantically disambiguated, are expected to reveal whether monolingual Turkish speakers use serial or parallel processing while reading these complex sentences. Furthermore, backtrackings to the critical regions as well as the RC region will reveal how participants resolve ambiguity, in which parts of the sentences they seek further information.

12.3. Participants

In this eye-tracking study, 31 monolingual Turkish speakers took part in. 4 of them were excluded from the analysis as they had low percentage of gaze samples found (below 80%), suggesting the lack of usable gaze data which were correctly identified. Overall, data from 27 participants were analyzed. Of those, 17 were male and 10 were female. Their mean age was around 20. Participants were first year undergraduate students with beginner-level English proficiency (i.e. A1 according to CEFR). They had normal or corrected-to-normal vision. The participants were unaware of the purpose of the study, and took part in the study on a voluntary basis. None of the participants took part in another study administered within the scope of this study.

12.4. Materials

The same filler and experimental sentences (i.e. prime and target sentences) used in the previous online study with monolingual Turkish speakers were also used in this experiment. In brief, there were 24 filler and 24 experimental sentences (i.e. 12 prime and 12 target). Furthermore, half of the experimental sentences included active RCs and the other half included passive RCs. The filler sentences included a variety of structures used to divert the attention of participants from the actual purpose of the study. Unlike the previous online study where each sentence was divided into four regions for the investigation of RTs and pauses at the critical regions, participants saw the whole sentence on the screen each time.

The length of the experimental sentences and the words at the critical regions (i.e. NP1 and NP2 regions) were balanced in order to control for the effect of length on participants RTs. Accordingly, there were always 6 words in each sentence, and the words at the critical regions consisted of 3-5 syllables (mean= 3,5; there was only one 5-syllable word in the list).

12.5. Procedure

Participants were tested individually at the Human-Computer Interaction Lab, located at the Computer Center, in Middle East Technical University. They were welcomed one by one by the researcher. Participants were first asked to fill in the demographic information survey and to sign the informed consent form (see Appendix M). They sat (at an approximate distance of 60 cm in front of the desktop computer. Their eye movements were recorded by Tobii T120 Eye Tracker device, equipped with Tobii Studio software. The default fixation filter was used in the experiment.

The experiment started following a (5-point) calibration and a practice phase. The calibration phase is provided by Tobii. In this phase, the eye gaze is calibrated for each participants by showing a calibration pattern of 5 points. Participants needed to fixate on and follow a red dot which moved to these points located at the different parts of the screen. Only after a successful calibration had been obtained did the practice phase and the experiment start. Before they started the practice phase, participants were given instructions about the experiment. They were told only that this would be a reading comprehension experiment in Turkish. They saw 4 trial sentences, two of which were followed by a comprehension question with two options. Once they were ready, participants started the actual experiment.

In the experiment, participants were required to read the sentences silently and press "Space" key to continue and to see the next sentence or the comprehension question. The experiment started with two filler sentences. Following the fillers, participants saw one prime and one target sentence subsequently. On each screen, they saw and read only one sentence located in the middle of the screen. The sentences were presented in black, Ms Sans Serif font type, and 20 font size, on a white background. Participants were required to answer a comprehension question probing the NP to which the RC needed to be attached, and half of the filler sentences were followed by a comprehension question. The questions had two options; A and B. Participants responded to each question by clicking on A or B option on the screen using the mouse. Figure 8 below illustrates the flow of the eye-tracking experiment.

| Filler 1 (Space) | ⟹ | Filler 1 Question (Mouse Click; A or B) | ⟹ | Fixation Dot (1500 ms.) | ⟹ | Filler 2 (Space) |

| Fixation Dot (1500 ms.) | ⟹ | Prime 1 (Space) | ⟹ | Fixation Dot (1500 ms.) | ⟹ | Target 1 (Space) |

| Target 1 Question (Mouse Click; A or B) | ⟹ | Fixation Dot (1500 ms.) | ⟹ | Filler 3 (Space) | ⟹ | Fixation Dot (1500 ms.) |

| Filler 4 (Space) | ⟹ | Filler 4 Question (Mouse Click; A or B) | ⟹ | Fixation Dot (1500 ms.) | ⟹ | Prime 2 (Space) |
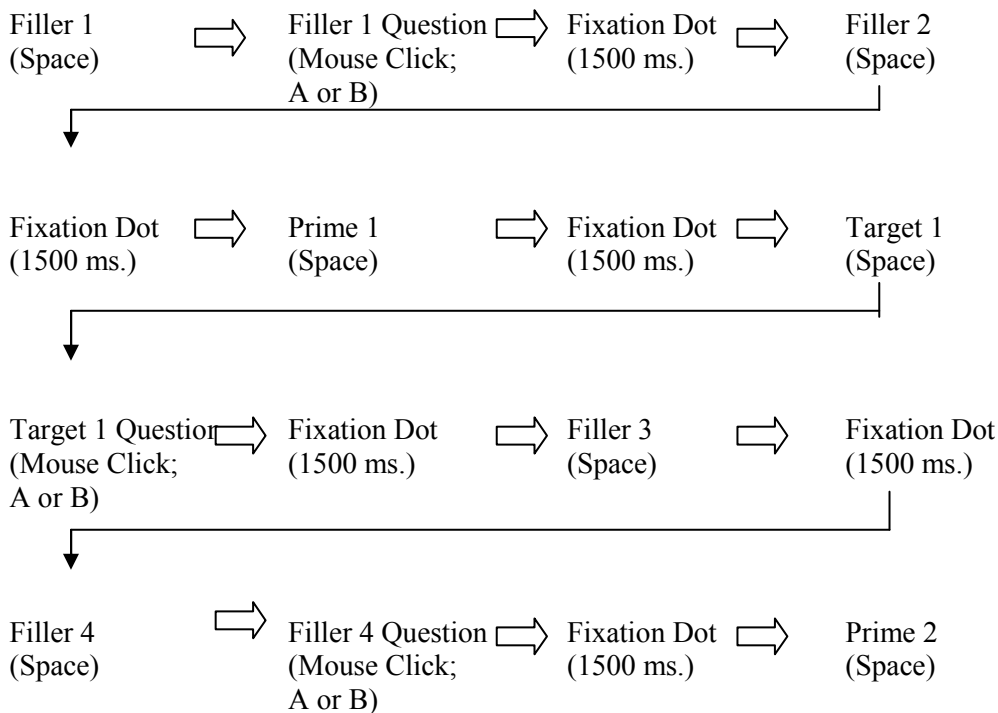
Figure 8. The flow of the eye-tracking experiment

In brief, participants were asked to read the sentences they saw on the screen one by one, silently , at their own pace. They only pressed the space key to continue reading and used the

mouse to respond to the questions. Participants saw a fixation dot for 1500 ms. between the sentences. This fixation dot disappeared automatically after 1500 ms. and the next sentence appeared on the screen. Participants did not receive any feedback on their responses to the questions since the target sentences were ambiguous and both alternative options were actually possible. Similarly, they did not receive any feedback after they responded to the questions on the filler sentences although they had only one correct option so as not to draw participants' attention and not to reveal the main purpose of the study. At the end of the experiment, participants' questions were answered and more detailed information about the study was given. The experiment took approximately 15 minutes for each participant.

12.6. Data Analysis and Results

For the purposes of the study, the date obtained was analysed under two main subtitles; (i) analysis of the priming effect, and (ii) analysis of the critical regions. In the first analysis, the main goal was to find out whether monolingual Turkish speakers had any significant syntactic priming effect in the eye-tracking study unlike the previous online task, and whether the syntactic priming effect was consistent with the findings of the offline tasks. In the second analysis, total fixation durations, first fixation durations, and visit counts at the critical regions were evaluated in order to understand the effect of syntactic priming, particularly the facilitator role of priming, if it is observed, and to reveal how the parser processes the complex sentences under investigation and resolves ambiguity.

12.6.1. Analysis of the Priming Effect

The data obtained was analyzed both descriptively and statistically as in the previous offline and online tasks. Descriptively, participants preferred more NP1 after an NP1 prime and likewise they preferred to attach RCs to more NP2 after an NP2 prime both in the active and in the passive condition. Table 47 below shows the attachment preferences of monolingual Turkish speakers for each category in the eye-tracking study. There were 27 participants, data of whom was analyzed, and thus for each category we obtained 81 responses in total.

Table 47.
Attachment preferences of monolingual Turkish speakers in Experiment 11

Passive RC Construction		
	Target NP1	Target NP2
Prime NP1	51/81 (63 %)	30/81 (37 %)
Prime NP2	34/81 (42 %)	47/81 (58 %)

Active RC Construction		
	Target NP1	Target NP2
Prime NP1	46/81 (57 %)	35/81 (43 %)
Prime NP2	43/81 (53 %)	38/81 (47 %)

In order to reveal whether there was any significant priming effect, a repeated measures ANOVA was run and the two-way and three-way interactions among the prime attachment sites, target attachment preferences, and active/passive condition were also examined. The results showed a significant priming effect, $F (1, 26) = 6,736$ $p < .05$ (p=.015), $\eta_p^2 = ,206$. Accordingly, there were significantly more NP1 preferences in the target sentences (i.e.

ambiguous sentences) following an NP1 prime, and likewise more NP2 after an NP2 prime. Figure 9 below illustrates syntactic priming observed in the eye-tracking study.
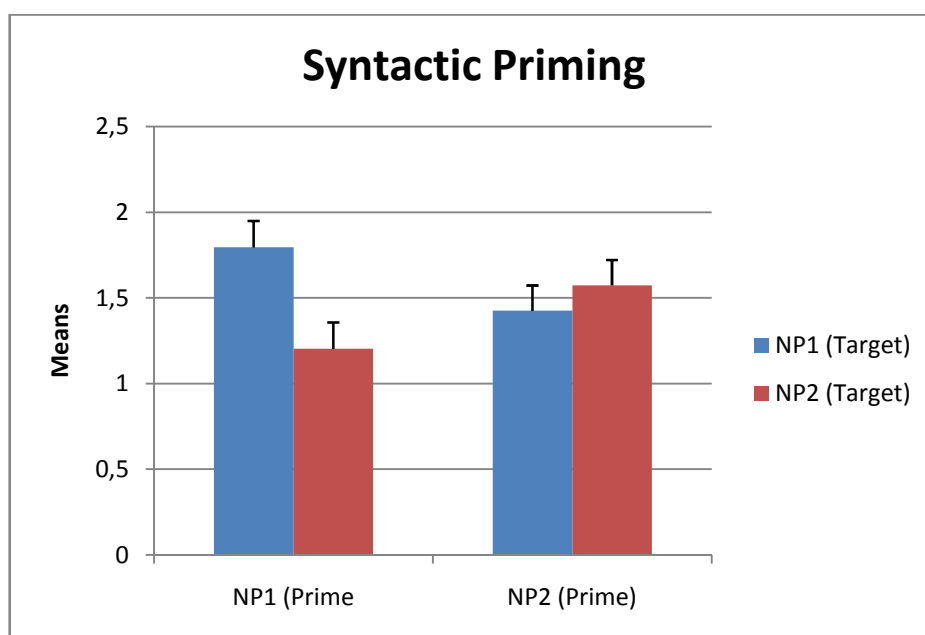
Figure 9. Syntactic priming observed in the eye-tracking study

There was no significant main effect of target attachment site. In other words, there was not any significant overall attachment preference towards either NP1 or NP2. Furthermore, there was not any significant interaction among the prime attachment site, target attachment preferences, and active/passive condition.

In order to see whether the facilitator effect of syntactic priming could be observed in RTs at the critical regions, participants' RTs in the critical regions were compared. Table 48 below shows a comparison of the RTs at the critical regions (i.e. RCs, NP1, and NP2 regions) of the prime and the target.

The hypothesis was that participants would have, for instance, an NP1 bias after reading an NP1 attachment forced prime, and likewise they would have an NP2 bias after reading an NP2 attachment forced prime. This effect was expected to be observed in their RTs, as well. More precisely, it was expected to see longer RTs in NP2 region after reading an NP1 attachment forced prime, and longer RTs in NP1 region after reading an NP2 attachment forced prime considering the fact that there was not an overall attachment preference towards either NP1 or NP2, and there was a significant priming effect.

Table 48. The mean of total fixation durations in the critical regions of the prime and the target according to the attachment forced conditions in the prime

		RC	NP2	NP1
ACTIVE	NP2 ATTACHMENT FORCED CONDITION			
	Prime	0,72	0,593333	0,473333
	Target	0,866667	0,746667	0,613333
ACTIVE	NP1 ATTACHMENT FORCED CONDITION			
	Prime	1,026667	0,626667	0,726667
	Target	0,986667	0,786667	0,61
PASSIVE	NP2 ATTACHMENT FORCED CONDITION			
	Prime	1,253333	0,673333	0,543333
	Target	0983333	0,583333	0,58
PASSIVE	NP1 ATTACHMENT FORCED CONDITION			
	Prime	1,2166667	0,663333	0,496667
	Target	1,06	0,7	0,596667

However, the results did not show a significant interaction between the prime attachment site and the RTs at the critical regions (i.e. NP1 and NP2 regions) of the target sentences, but a significant interaction between the active / passive RC condition and the RTs at the critical regions (i.e. NP1 and NP2 regions), $F (1, 104) = 4,702$, $p < .05$ ($p = .032$), $\eta_p^2 =,043$. More precisely, participants spent longer time at NP2 region in the active RC condition. The reason why we could not observe the syntactic priming effect in the RTs, although we found a significant priming effect with the analysis of participants' responses to the questions following the target sentences, could be explained with the underlying interaction of the active/passive RC condition in reading.

12.6.2. Analysis of the Critical Regions

The analysis of the critical regions both in the prime and in the target sentences (i.e. RC, NP1 and NP2 regions) is based on the total fixation durations, visit counts, and first fixation

durations. The analysis was divided into two subheadings; (i) analysis of the RC region, and (ii) analysis of the NP1 and NP2 regions.

12.6.2.1. Analysis of the RC region

First of all, the total fixation durations at RC region and backtrackings to this region were examined so as to understand the role of this part in resolving the ambiguity, and whether there was any significant difference in RTs depending on the attachment site forced in the prime and active/passive RC conditions. The analysis of the total fixation durations at the RC region in the prime sentences revealed a significant effect of active/passive condition, F (1, 26) = 28,847 p < .001, η_p^2 =, 526. Accordingly, monolinguals spent more time at the RC region in the prime sentences when there was a passive RC. Figure 10 shows the effect of the active/passive RC condition on the total fixation durations in the RC region.
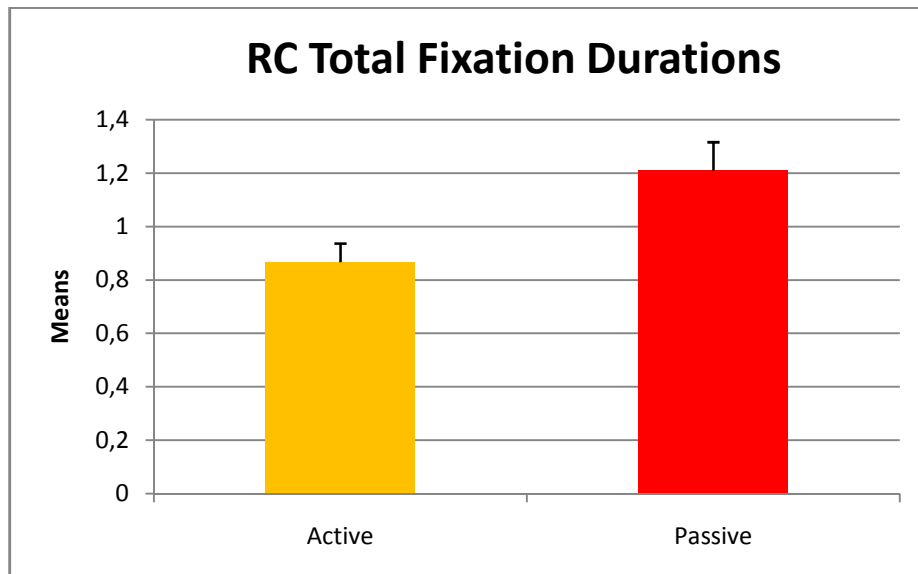
Figure 10. Active / passive RC conditions and total fixation duration in the RC region

Furthermore, there was a substantial interaction between the prime attachment site condition and the active/passive condition, F (1, 26) = 3,894 p < .05 (p = .059), η_p^2 =,130. In order to the see the interaction more clearly, paired samples t-test was run. Accordingly, the results showed that the participants spent more time at the RC region when the sentence was NP1 attachment forced and from the active RC condition, as compared to NP2 forced and active condition, (M = .29383,   SE = .09089), t (26) = 3.233, p <.05 (p = .003) , and when the sentence was NP2 attachment forced and from the passive RC condition, as compared to NP2 forced and active condition, (M = -.51383, SE = .12304), t (26) = -4.176 p < .001.

In the target sentences, however, there was no significant difference or interaction at the RC region in terms of total fixation durations. The lack of any significant difference at the critical region in the target sentences might mean that participants evaluated both possible NPs as to be attached to RCs in the ambiguous sentences while processing these sentences

even though the previous analysis based on participants' responses to the comprehension questions showed that there was significant syntactic priming effect.

In addition to the total fixation durations at the RC region, visit counts were also examined. In the prime sentences, there was not any significant effect of the active/passive condition, but there was a significant interaction between the prime attachment site and the active / passive condition, F (1, 26) = 5.737 p < .05 (p = .024), η_p^2 =,181. Accordingly, participants had slightly more backtrackings to the RC region when the prime was NP1 attachment forced and from the active RC condition, as compared to NP2 forced and from the active condition, and they had significantly more backtrackings to the RC region when the prime was NP2 attachment forced and from the passive condition, as compared to NP2 attachment forced and from the active condition, (M = -1.148, SE = .433), t (26) = -2.654 p < .025 (p = .013), which is in line with the results of the total fixation durations spent at the RC region as reported above.

Unlike the results of the total fixation durations at the RC region in the target sentences, however, there was a significant effect of the active/passive condition in the target sentences when the visit counts were calculated, F (1, 26) = 6.305, p < .05 (p = .019), η_p^2 =,195. Accordingly, there were more backtrackings to the RC regions in the case of the passive RC condition. Furthermore, there was a significant interaction between the prime attachment site and the active /passive condition, F (1, 26) = 6.953, p < .05 (p = .014), η_p^2 =,211. In line with the results found with the prime sentences, there was significantly more backtrackings to the RC region in the target sentences when the prime was NP2 attachment forced and from the passive condition, as compared to NP2 forced and the active RC condition, (M = -1.481, SE= .317), t(26) = -4.667 p < .001. However, there was not any significant difference between the conditions where the prime was NP1 forced and from the active and where the prime was NP2 and from the active condition, even though there was slightly more backtrackings to the RC region when NP1 attachment was forced in the active RC condition, as previously seen in the analysis of the visit counts in the prime sentences. The difference observed in the passive RC condition in the target sentences, which is consistent with the analysis of the RC region in the prime sentences, might be explained with the stronger syntactic priming effect present in the passive condition, considering the fact that priming is stronger with less common structures whereas they might have attempted to evaluate both NPs in the active RC condition with less stronger effect.

12.6.2.2. Analysis of the NP1 and NP2 regions

Following the analysis of the RC region, the total fixation durations, the visit counts, and the first fixation durations in the critical regions where the host NPs (i.e. NP1 and NP2) were located in Turkish were analyzed so as to reveal how monolingual Turkish speakers resolved the ambiguity and decided on either one of these alternative NPs.

Total fixation duration or total reading time is the sum of all the fixations made in a particular region including those fixations made while re-reading that region. The effect observed for total fixation duration or total reading time in a region is generally regarded as an indication of a relatively late effect on processing (Liversedge et al., 1998). The analysis of the total fixation durations in the critical regions (i.e. NP1 and NP2 regions) in the prime sentences showed a significant effect of the regions, F (1, 26) = 18.990 p < .001, η_p^2 =,422. Overall, there were longer fixations at the region of NP2. Furthermore, there were significant

two-way interactions between the prime attachment site and the active / passive condition, F (1, 26) = 6.735 p < .05 (p = .015) , η_p^2 =, 206, the prime attachment site and the regions, F (1, 26) = 6.697 p < .05 (p = .016), η_p^2 =,205, and the active / passive condition and the regions, F (1, 26) = 21.429 p < .001 , η_p^2 =, 452. There were also a significant three-way interaction among all these three conditions, the prime attachment site, the active/passive condition, and the regions, F (1, 26) = 10.319 p < .05 (p = .003) , η_p^2 =,284. Accordingly, when the prime was NP1 attachment forced and from the active RC condition, there was longer fixation at the NP1 region, and when it was from the passive RC condition, there was longer fixation at the NP2 region. However, when the prime was NP2 attachment forced, regardless of the active/passive condition, there was always longer fixation at the NP2 region. Table 49 below shows the three-way interaction between the prime attachment site, the active / passive condition, and the critical regions.

Table 49.
Interaction between prime attachment site, active/passive construction, and critical regions

					95% Confidence interval	
Prime attachment site	Active / passive	Regions	Mean	Std. Error	Lower Bound	Upper Bound
1	1	1	.719	.061	.594	.843
		2	.629	.069	.486	.771
	2	1	.475	.040	.392	.557
		2	.647	.056	.532	.761
2	1	1	.468	.036	.394	.542
		2	.587	.053	.478	.697
	2	1	.518	.042	.433	.604
		2	.664	.063	.534	.793

In order to understand the interaction between these, paired samples t-test was also run. Accordingly, as stated above, when the prime was NP1 attachment forced and from the active RC condition, there was significantly longer fixation at the NP1 region, (M = .08988, SE = .02862), t (26) = 3.141 p = .004, and when it was from the passive RC condition, there was significantly longer fixation at the NP2 region, (M = -.18901, SE = .05481), t (26) = -3.449 p = .002.

With regard to the condition when the prime was NP2 attachment forced, there was significantly longer fixation at the NP2 region both in the active RC condition (M = -.11938, SE= .03799) t (26) = -3.143 p = .004, and in the passive RC condition (M = -.14531, SE = .04005) t (26) = -3.628 p = .001. Figure 11 illustrates the interaction below.

NP1 forced prime → Active → Longer fixation at **NP1 region**
Mutfağı düzenleyen <u>ressamın</u> **hizmetçisi** para buldu.

| NP2 | NP1 |

Passive → Longer fixation at **NP2 region**
Okula   kaydedilen   **müdürün**   <u>yeğeni</u>   bahçede
oynuyordu.

| NP2 | NP1 |

NP2 forced prime → Active → Longer fixation at **NP2 region**
Beşikte uyuyan **bebeğin** <u>annesi</u> temizlik yapıyordu.

| NP2 | NP1 |

Passive → Longer fixation at **NP2 region**
Galeride bıçaklanan **adamın** <u>avukatı</u> davayı kazandı.

| NP2 | NP1 |

Figure 11. Interaction between prime attachment sites, active/passive constructions, and critical regions

The analysis of the total fixation durations in the target sentences also showed a significant effect of the regions (i.e. NP1 and NP2), $F (1, 26) = 13.979$ $p = .001$, $\eta_p^2 = ,350$. As in the prime sentences, there was an overall longer fixation at the NP2 region. Unlike the prime sentences, however, there was also a significant effect of the active/passive condition in the target sentences, $F (1, 26) = 4.799$ $p < .05$ ($p = .038$) , $\eta_p^2 = ,156$. Accordingly, monolingual Turkish speakers spent longer time at the critical regions (i.e. NP1 and NP2 region) in the target sentences when the sentence consisted of an active RC rather than a passive. This could be explained with that participants might not have focused on the alternative NPs in the ambiguous sentences when it was from the active RC condition, which is structurally less complex as compared to the passive RC condition. Even though there was no three-way significant interaction, there was a significant two-way interaction between the active/passive condition and the regions, $F (1, 26) = 6.488$ $p < .05$ ($p = .017$), $\eta_p^2 = ,200$. Participants had longer fixations at the NP2 region especially in the active RC condition. Figure 12 shows the interaction between the active/passive RC conditions and the critical regions in the target sentences.
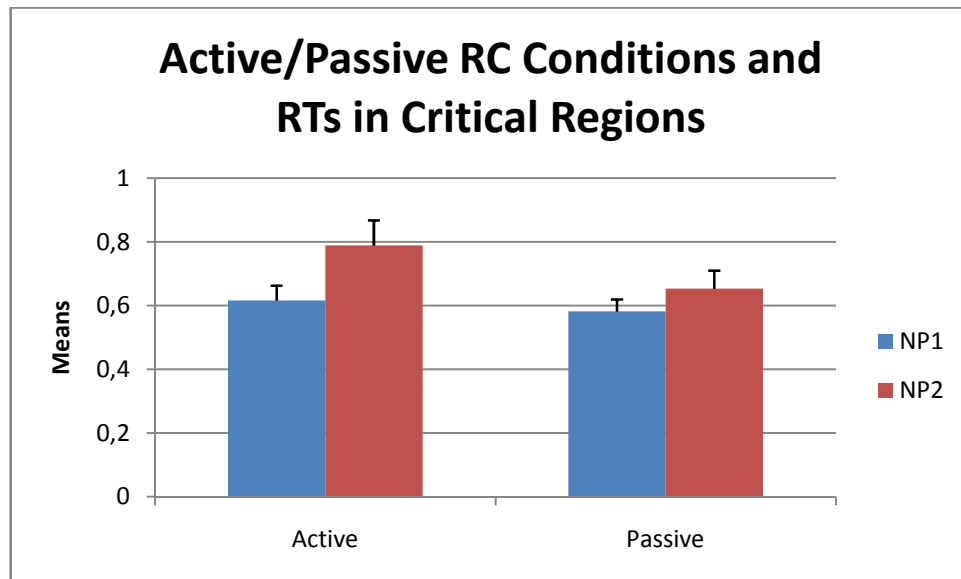
Figure 12. Interaction between the active/passive conditions and the critical regions

The analysis of the backtrackings to the critical regions (i.e. NP1 and NP2) in the prime sentences had consistent results. There was a significant effect of the regions, $F (1, 26) = 31.161$, $p < .001$, $\eta_p^2 = ,545$. Overall, there were more backtrackings to the NP2 region in the prime sentences. Furthermore, there was a significant two-way interaction between the active/passive condition and the regions, $F (1, 26) = 16.138$, $p < .001$, $\eta_p^2 = ,383$, and a significant three-way interaction among the prime attachment site, the active/passive condition, and the regions, $F (1, 26) = 5.333$, $p < .05$ ($p = .029$), $\eta_p^2 = ,170$. The paired samples t-test also confirmed that there were significantly more backtrackings to the NP2 region when the prime was NP2, both in the active (M= -1.11111, SE =.26865), $t(26) = -4.136$, $p < .001$ and in the passive condition (M = -1.44444, SE = .37490), $t (26) = -3.853$, $p = .001$, and when the prime was NP1 forced, only in the passive condition, (M = -1.74074, SE = .31393), $t(26) = -5.545$, $p < .001$. There was not any significant difference when the prime was NP1 attachment forced, in the active condition, in terms of visit counts.

As for the analysis of the backtrackings in the target sentences, the results were somewhat consistent with those of the total fixation durations at the critical regions (i.e. NP1 and NP2). There was a significant effect of the regions, $F (1, 26) = 32.767$ $p < .001$, $\eta_p^2 = ,558$ and of the active/passive condition, $F (1, 26) = 4.450$ $p < .05$ ($p = .045$), $\eta_p^2 = ,146$. Accordingly, there were significantly more backtrackings to the NP2 region, and likewise there were more backtrackings to the critical regions (i.e. NP1 and NP2) in the active RC condition. Furthermore, there was a significant effect of the prime attachment site, $F (1, 26) = 5.970$, $p < .05$ ($p = .022$), $\eta_p^2 = ,187$. Accordingly, when the prime attachment site was NP1 forced, there were more backtrackings to the critical regions in the target sentences. Unlike the results of the total fixation durations at the critical regions in the target sentences, there was not any significant two-way or three-way interaction in the analysis of the visit counts.

In order to understand the initial attachment preferences of monolingual Turkish speakers, and to reveal whether the parser follows a serial or parallel processing while resolving the ambiguity, first fixation durations in the critical regions (i.e. NP1 and NP2) both in the prime and in the target sentences were also examined. The first fixation duration in a particular region could be simply defined as the time readers spend initially fixating the region. This measure is taken as the very earliest point which shows an effect of processing difficulty arising from the experimental manipulation (Liversedge et al., 1998).

The analysis of the first fixation durations at the critical regions in the prime sentences showed that there was only a significant effect of the critical regions, F (1, 26) = 19.009, $p < .001$, $\eta_p^2 =,422$. Accordingly, there were longer fixations at the NP1 region in the prime sentences during the initial reading. The analysis of the first fixation durations in the target sentences had consistency in this sense. In other words, there was also a significant effect of the critical regions in the target sentences, F (1, 26) = 64.588, $p < .001$, $\eta_p^2 = ,713$. Participants had longer first fixation durations at the NP1 region. However, there was also a significant effect of the prime attachment site, F (1, 26) = 5.890, $p < .05$ ($p = .022$), $\eta_p^2 =,185$. Accordingly, when the prime was NP2 attachment forced, there was longer first fixation durations at the critical regions (i.e. NP1 and NP2) in the initial reading of the target sentences. The results suggest that monolingual Turkish speakers follow serial processing during the initial reading, and pause at the NP1 region where they face another alternative NP which could be attached to the RC. This is an expected result as the region of NP1 is the point where readers actually face an ambiguity they need to resolve. However, this was a case which was seen even though some sentences in the prime were semantically disambiguated towards NP2 attachment. Therefore, the results suggest that monolingual Turkish speakers do not rely on semantic information during the initial processing. Given that they are influenced by the effect of syntactic priming, the prime sentences which are forced to NP2 attachment might have led to this result in the analysis of the target sentences. Participants might have evaluated the possibility of an NP2 attachment first as having just processed an NP2 attachment sentence.

Furthermore, there was also a significant interaction between the prime attachment site and the active / passive condition, F (1, 26) = 8.257, $p < .05$ ($p = .008$), $\eta_p^2 = ,241$. Accordingly, there were longer first fixation durations especially in the active RC condition when the prime was NP2 attachment forced. This could be explained again with the idea that structurally less complex active RC condition might have allowed further opportunity to consider alternative NP attachments while reading ambiguous sentences as compared to the passive condition, which is harder to process.

12.7. Discussion

In order to understand the RC attachment preferences across languages and to test the theories of parsing, several eye-tracking studies have been conducted over the past two decades. To illustrate, Brysbaert and Mitchell (1996) found an NP1 attachment bias in an offline study and conducted an eye-tracking study so as to investigate the attachment preferences during the initial analysis. Accordingly, Brysbaert and Mitchell (1996) hypothesized that if there is an NP1 attachment bias during the initial analysis, RCs should be attached to NP1, and when there is an NP2 attachment forced sentence, there will be a reanalysis and the parser will switch the RC attachment to NP2 from NP1. However, if the sentence already forces an NP1 attachment, then there will no need for reanalysis. Therefore,

the latency for the disambiguating segment of an NP2 attachment forced sentence should be longer than that of an NP1 attachment forced sentence, thereby suggesting an NP1 attachment bias during the early phase of the analysis. The analysis of the first passing obtained from the eye-tracking study confirmed the NP1 attachment bias obtained. The sentences forcing NP2 attachment took longer to read than those forcing NP1 attachment. However, the results showed that the presence of NP1 attachment in online tasks was also dependent on the presentation mode (i.e. full sentence or phrase-by-phrase). The NP1 attachment bias was not significant in the phrase-by-phrase mode, where the potential NPs were presented in different displays. This seems to be compatible with our findings. Even though there was not a significant attachment preference or any syntactic priming effect in the previous online self-paced study we conducted, there was a significant syntactic priming effect in the eye-tracking study. The absence of significant attachment bias or any syntactic priming effect highlights the significance of the methodological issues. This suggests that it might not be safe to draw immediate conclusions about variations in attachment preferences where segmentation, and presentation mode is a confounding factor.

Carreiras and Clifton (1999) also administered an eye-tracking study so as to reveal parsing strategies in English and Spanish. The ultimate goal was to replicate and extend the previous results showing an NP1 attachment preference in Spanish because the previous studies used self-paced reading methodology which was restricted to the particular type of segmentation as mentioned above. Furthermore, they aimed to provide a comparison of data obtained from Spanish native speakers with English native speakers. In the eye-tracking study, participants saw the full sentence on the screen. Both first-pass time and total time at the critical region were measured. The critical region was considered as the first content word which disambiguated the RC towards either masculine or feminine host. Only the total reading times showed a significant difference. The first-pass times showed the same tendency, however, the difference was not significant. The results indicated that participants read the critical region faster when sentences were disambiguated towards NP1 attachment, thereby suggesting that NP1 attachment preference in Spanish was real, not only a consequence of segmentation. Carreiras and Clifton (1999) repeated their experiment disambiguating all the sentences morphologically so as to test whether they could identify any early (first-pass) bias in favor of NP1 attachment. However, the first-pass reading times did not show a significant difference while total reading times showed that participants read the critical region in NP1 attachment forced sentences faster again. In their third experiment, Carreiras and Clifton (1999) aimed to determine the attachment preference in English. The first-pass reading times showed that participants read the critical region in NP2 attachment forced sentences faster. Similarly, the total reading times also showed that participants read the critical region in NP2 attachment forced sentences faster. Thus, the third experiment established an overall NP2 attachment preference in English. However, Carreiras and Clifton (1999) reported that NP2 attachment bias in English was not always found in the previous self-paced reading studies such as Carreiras and Clifton (1993) and Traxler et al. (1998) (as cited in Carreiras and Clifton, 1999), and there might be a need for further research and a powerful experimental design to capture the factors affecting the attachment preference.

Unlike English, the first- pass reading time showed an NP1 attachment preference in French. Zagar et al. (1997) explored precise indications of RC attachment preferences in French through an eye-tracking study. Participants read an equal number of NP1 and NP2 attachment forced sentences presented in an NP1 or NP2 attachment forcing context. The results showed that there was longer fixations in the disambiguating region in the first-pass

reading was longer when the attachment was forced to NP2. This indicates that readers favoured one interpretation from the very beginning, and that that interpretation was NP1 attachment (Frazier & Rayner, 1982; Zagar et al., 1997).

In Turkish, Kaya (2010) conducted an eye-tracking study, and investigate how Turkish speakers processed genitive NPs modified by RCs. He used the same set of sentences in Dinçtopal (2007) and replicated the pattern. The NP regions (i.e. the second and the third region) as reported in the present study were the critical regions. Accordingly, Kaya expected participants to show longer RTs in the second region (i.e. where NP2 is located) while they were reading NP1 attachment forced sentences if they favoured NP2 attachment. Participants were expected to show longer RTs in the third region (i.e. where NP1 is located) while they were reading NP2 attachment forced sentences if they favoured NP1 attachment. Kaya reported the analysis of the total fixation times and first-pass reading times in the critical regions. The analysis of the total fixation times showed similar results to Dinçtopal's (2007). Accordingly, the total fixation times were longer in the inanimacy forced condition than in the animacy forced condition, and the longest total fixation times were observed in NP1 attachment forced condition, which is followed by NP2 attachment forced condition and ambiguous condition respectively. The analysis of the first-pass reading time showed that the first-pass reading time was longer in the inanimacy forced condition than the animacy forced condition. The result of the first-pass reading time, which is regarded as an indicator of the type of information the human parser uses in sentence processing, seems to confirm the assumption that the semantic information was used even during the initial analysis considering the fact the first-pass reading time was longer in the inanimacy forced condition. However, there was not a significant effect of the attachment preference. Furthermore, Kaya did not clarify the critical region where the total fixation times and the first-pass reading times were longer in his analysis. For instance, he reported that the total fixation times and the first-pass reading times were longer in the inanimacy forced condition, but we do not know whether he meant the times in both of the critical regions together or whether he assumed an attachment bias and focused on only one of the regions. Similarly, we know that the total fixation times were longer in NP1 attachment forced condition, suggesting that Turkish speakers had more difficulty in processing NP1 attachment forced sentences as compared to NP2 attachment forced sentences and ambiguous sentences, but we do not know whether they had longer total fixation times in the second or in the third region. This clarification is important so as to understand the attachment preferences in Turkish. Apart from that, Kaya (2010) used the same set of sentences used in Dinçtopal (2007). The ambiguous sentences in the set seemed to be semantically biased for monolingual Turkish speakers as seen in the previous studies we conducted in order to validate the stimulus set. Thus, a comparison of the present study with Kaya's (2010) may not be very accurate.

To sum up, there was a significant syntactic priming effect in the eye-tracking study we conducted with monolingual Turkish speakers unlike the previous online study. Even though there is not any research investigating the syntactic priming of RC attachment preferences through an eye-tracking study as far as we know, the results we obtained here seems to be consistent with at least Brysbaert and Mitchell (2996) who observed that presentation mode (i.e. full sentence or phrase-by-phrase) affected the attachment preference. Furthermore, the presence of syntactic priming effect, in all the conditions (i.e. attachment site and active/passive condition) confirms that monolingual Turkish speakers reach and distinguish the tree hierarchical configuration of the alternative interpretations while reading.

The total fixation durations in the critical regions of the prime and the target sentences showed that monolingual Turkish speakers had significantly longer fixations in the region of NP2 as compared to that of NP1. The effect of the attachment site forced is important to decide whether monolingual Turkish speakers show a tendency towards NP1 attachment looking into this finding. The analysis of the prime sentences revealed that both the attachment site and active/passive condition influenced the total fixation durations in the critical regions. Accordingly, there were longer fixations at the region of NP1 if the prime sentence was forced to NP1 and from the active condition although overall there were longer fixations at the region of NP2 in the other conditions. This could be explained with the active being structurally less complex and the attachment site forced in the prime as the two-way and three-way significant interactions suggested. Given that the first fixation durations were significantly longer at the region of NP1, where they had processing difficulty, regardless of the attachment site forced in the sentence, readers might have shown a tendency to focus on the NP1, which is already forced in the sentence, and not to evaluate the NP2 as an alternative as seriously as they did in the other conditions. The visit counts also confirmed this assumption as there were more visits to the NP1 region as compared to their visits to the NP2 region. However, this is not the situation when the prime contained a passive RC even though it was also NP1 attachment forced. This could be explained with the fact that passive is structurally more complex than active, and this might have forced participants to evaluate both alternatives in order to identify the potential NP modified by the RC. The fact that in the passive RC condition, participants had more visits to the RC region could support this assumption. The longer total fixation durations at the region of NP1 when the sentence was from the active condition and NP1 attachment forced could be explained with the Late Closure hypothesis, as well. The parser might be choosing the closest potential NP in the case of active in particular, however, this assumption does not explain why the total fixation duration was longer at the region of NP2 when the sentence was NP2 attachment forced, which could have strengthened the possibility of attaching the RC to the NP2 although the sentence was still from the active condition.

The second assumption is that the syntactic functions of the host NPs might play a role in RC attachment preferences, thereby resulting in an NP1 bias in the passive RC condition, and an NP2 bias in the active RC condition. The sentence (49a) exemplifies one of the sentences which is an NP1 attachment forced sentence, and includes an active RC (i.e. a condition where NP2 attachment bias is clearly observed) whereas the sentence (49b) exemplified one of the sentences which is an NP2 attachment forced sentence, and includes a passive RC (i.e. a condition where NP1 attachment bias is clearly observed). The literature has suggested that the possessor in the specifier position could be conceived of as the subject of the genitive possessive construction (Szabolcsi, 1994). Likewise, the second argument, the possessed in the head position could be regarded as carrying an objective interpretation. The interpretation of the arguments seem to depend on their syntactic functions which they could have in a clause (Horváth, 2010). In the present study, the host NPs in the genitive possessive constructions such as *mankenin koruması* always have two animate NPs with either kinship or occupational relationship. For instance, the reading in *mankenin koruması* is that the model has a bodyguard, where NP2, *manken* has a subject-like function whereas NP1, *koruma,* has an object-like function. Given that an active Subject RC looks for a subject, and a passive RC looks for an object for attachment (Gennari, 2012), this could explain why there was an overall bias towards NP2 in the active RC condition whereas there was a bias towards NP1 in the passive condition.

(49) a. NP1 attachment forced - Active RC condition

Mutfağı düzenleyen [NP2 ressamın] [NP1 hizmetçisi] para buldu.
'*the servant of the painter who tidied the kitchen found some money*'

b. NP2 attachment forced - Passive RC condition

Kalabalıktan kurtarılan [NP2 mankenin] [NP1 koruması] oldukça kuvvetliydi.
'*the bodyguard of the model who was saved from the crowd was very strong*'

The effect of active / passive condition on RC attachment preferences has not been investigated before as far as we know, at least not in Turkish. Therefore, further investigation might be needed to provide a better understanding. Moreover, the fact that the attachment site forced in the sentence did not influence the first fixation durations suggest that monolingual Turkish speakers do not show any initial attachment preference once the sentences are carefully controlled for the confounding factors although there seems to be a tendency towards NP1 attachment looking into the results of the total fixation durations in and visits to the region of NP2, which contradicts with the findings of the previous research in different languages and the one in Turkish (Brysbaert & Mitchell, 1996; Zagar et al., 1997; Carreiras and Clifton, 1999; Kaya, 2010), but the results are somewhat consistent with Carreiras and Clifton's (1999) finding that Spanish did not show any significant attachment preference according to the first-pass time as mentioned above.

CHAPTER 13

13. DISCUSSION

13.1. Introduction

The ultimate goal of this dissertation was to investigate the syntactic priming of RC attachments in monolingual Turkish learners and Turkish learners of English. However, although the literature has shown variations in RC attachment preferences across many languages, it was not clear whether monolingual Turkish speakers had a particular tendency to attach RCs to either one of the host NPs. Therefore, it also aimed to reveal the attachment preference in Turkish if there was such a thing, and to understand the processing strategies in the resolution of ambiguity while reading the sentences under investigation. Furthermore, a comparison of monolingual Turkish speakers with Turkish learners of English in different levels (i.e. intermediate, upper-intermediate, and advanced) was aimed so as to reveal whether the languages (i.e. first and second language which are typologically different) shared the processing strategies and how learners' access to the syntactic information in the second language developed as the level of proficiency increased. In order to fulfil these goals, a number of studies have been conducted within the scope of this dissertation. The experimental sentences were validated to make sure that they were truly ambiguous. The effect of animacy / inanimacy information carried by the host NPs on RC attachment preferences was investigated through comprehension to comprehension and comprehension to production syntactic priming studies. In the following studies, the effect of animacy / inanimacy was eliminated by using only animate NPs in all the experimental sentences, and a comparison of the syntactic structures was made. In this regard, the effect of active/passive was investigated in the following offline, online, and eye-tracking studies. The findings of these studies were presented in the previous chapters. The experimental sentences validated through multiple studies and the findings of all the experiments are summarized and discussed in relation to the findings and the theories posited in the literature in this chapter.

13.1.1. Experimental Sentences

Even though there have been a great number of studies investigating RC attachment preferences across many languages, there have been very few attempts to understand the issue in Turkish. As mentioned above, the initial goal was to investigate the syntactic priming effect of RC attachment preferences in Turkish with a comparison of monolingual Turkish speakers and Turkish learners of English, thereby revealing the processing strategies in both languages during the ambiguity resolution. However, the studies in Turkish did not provide consistent results. In an offline study, Kırkıcı (2004) found that Turkish native speakers did not have any particular attachment tendency when an ambiguous RC contained two animate NPs (e.g. *Şoför, şehir merkezinde oturan **profesörün sekreterini** gördü.*) whereas they had an NP2 attachment tendency when an ambiguous RC contained to inanimate NPs (e.g.. *Yazar, parklarıyla ünlenen **ülkenin başkentini** ayrıntısıyla anlattı.*). Unfortunately, none of the present accounts could explain the different attachment preferences dependent on animacy / inanimacy condition. A possible explanation could be

sought within the framework of the Tuning theory which claims that language users' past experiences might affect their choices in the case of ambiguity.

Dinçtopal-Deniz (2007; 2010) conducted an offline and an online experiment with monolingual Turkish speakers, English native speakers, and highly proficient Turkish learners of English. The results of the offline and the online studies showed that monolingual Turkish speakers showed an NP2 attachment preference. However, she also observed a significant interaction between the lexical information of the host NPs (i.e. whether they were animate or inanimate) and the syntactic information (i.e. attachment site). In the online study, the reading times showed an overall NP2 attachment preference, which was slightly stronger in the inanimacy forced condition, (e.g. *maviye boyanan **geminin kaptanı***) rather the animacy forced condition (e.g. *konuşma yapan **dekanın fakültesi***). However, the results of the comprehension questions following the ambiguous sentences were not in parallel with these results as they showed an overall NP1 attachment preferences in their responses, which was even stronger in the animacy forced NPs condition. Dinçtopal (2007) explained that this might have an effect of the time pressure in the online self-paced reading study. Furthermore, in line with the results of the online study, monolingual Turkish speakers showed an overall NP2 attachment preference, which was slightly stronger in the inanimacy forced condition as compared to the animacy forced condition. The same pattern was also seen for English native speakers. The interaction between the animacy / inanimacy information and the attachment site was not a consequence reported in the literature before. Furthermore, the responses to the questions following the ambiguous sentences showed an NP2 attachment preference both in the animacy forced condition and the inanimacy forced condition. In the offline study, English native speakers showed an overall NP2 attachment in both animacy / inanimacy forced conditions. Turkish learners of English, showed a different pattern in their second language from monolingual Turkish speakers and monolingual English speakers. In the online study, even though they showed a similar pattern to monolingual speakers showing an NP2 attachment preference in the inanimacy forced condition, they showed an NP1 attachment preference in the animacy forced condition, which contradicts with the results of both groups of native speakers. Furthermore, their responses to the comprehension questions following the ambiguous sentences showed an overall NP1 attachment preference in both animacy / inanimacy forced conditions. They also showed an overall NP1 attachment preference in both condition in the offline study.

In Turkish, there have been also two studies on RC attachment preference by professor Kırkıcı (2004), and Dinçtopal-Deniz (2007;2010). Even though in monolinguals there seems to be a tendency towards NP2 attachment, in the offline tasks they conducted, there was still a difference observed in the animate condition, furthermore, interestingly learners of English in Dinçtopal-Deniz's study showed NP1 attachment preference both in offline and online tasks except one condition although neither their L1 nor their L2 shows NP1 attachment preference. Therefore, we wanted to build on these previous studies and reveal some factors influencing monolinguals and learners of English' attachment preference.

For these purposes, the same set of sentences used in Dinçtopal-Deniz (2007; 2010) has been used. However, there were a few sentences which repeated multiple times in the set. Word overlaps might have an effect on attachment preferences such as lexical boost effect (Rowland et al., 2012). In order to avoid it, the sentences were controlled. Furthermore, the length of the sentences were made equal as much as possible. Even though Dinçtopal-Deniz (2007; 2010) reported that the length of the sentences and the words appeared at the critical

regions were balanced so as to control for the length effect on the reading times. The difference between the minimum syllable (i.e. 2) and the maximum syllable (i.e. 6) could be still smaller. Furthermore, the length of the RC and the full sentence was not mentioned. Therefore, the length of these regions were also balanced as much as possible. Following these adaptation process, the ambiguous sentences in the stimulus set were tested to make sure that they were truly ambiguous for monolingual Turkish speakers.

Before moving to the actual experiment, four pilot studies were administered in order to gather sufficient number of truly ambiguous sentences for both the animacy condition (i.e. where there are two animate NPs) and the inanimacy condition (i.e. where there was two inanimate NPs). The process of validating the stimulus set revealed that some sentences might be semantically biased toward either NP1 or NP2 attachment for monolingual Turkish speakers. Thus, the studies suggested that not only the syntactic but also non-syntactic factors should be taken into consideration. More precisely, the results showed that the semantic relations (e.g. part-whole relations) between the noun phrases of the genitive-possessive construction and the semantic associations with the proximal as well as the distal predicate played a key role in the attachment preferences.

Most studies investigating RC attachment preferences have utilized either number (e.g. Felser et al., 2003; Fernández, 2002 or gender agreement (e.g. Dussias, 2003; Papadopoulou & Clahsen, 2003; Scheepers, 2003; Desmet & Declerq, 2006) as disambiguating cues. The agreement paradigm in Turkish does not allow to utilize these in RC attachment preferences. As previously pointed out, Turkish does not show gender agreement and the marking of plurality on the verb is relatively optional. Thus, Dinçtopal-Deniz (2007-2010) used animacy information as a disambiguating cue, and considered those sentences consisting of either two animate NPs or two inanimate NPs as ambiguous sentences. In the studies to validate the stimulus set, none of the disambiguating elements pointed above was used. The sentences that were assumed to be ambiguous were only tested. The sentences were also meticulously controlled for other confounding factors (i.e. length and word overlap). Much more balanced, and truly ambiguous sentences were obtained only after they were also controlled for two semantic factors mentioned above. The first one was the semantic relations (i.e. part-whole relation) between the two competing NPs of the complex genitive possessive construction. More precisely, the semantic dependency of the head NP (i.e. the part, NP1) upon the modifier (i.e. the whole, NP2) might result in the modifier to be more likely attached to the RC. The second one was the semantic association of the competing NPs with the proximal and the distal predicate in the sentence. The detailed analysis of the sentences revealed that if the main predicate strongly highlights one of the NPs in terms of their characteristics or certain associations they usually have for the speakers of that language, language users are more likely to favour that NP. If the distal predicate is neutral or it does not strongly highlight an NP, yet if the proximal predicate could be associated more likely to one of the NPs, then language users favour that NP instead of its competitor.

Many scholars have attempted to explain cross-linguistic variations in RC attachment preferences. However, the explanations for why languages differ in the attachment preferences do not have sufficient evidence yet. Furthermore, there are a number of inconsistent findings in the literature, many arising from methodological issues. The most relevant hypothesis which might explain the effect of the semantic factors mentioned above is the Construal hypothesis (Gilboy et al., 1995; Frazier & Gibson, 1996).

According to the Construal hypothesis, the human parser distinguishes two classes of relations for its processing decisions; namely primary and non-primary relations. Primary phrases uses only syntactic information and follow principles such as late closure and minimal attachment (Frazier & Fodor, 1978), and thus primary relations are represented in a phrase structure tree in a determinate fashion (Gilboy et al., 1995). However, non-primary relations such as relative clauses, adjunct predicates, and phrases related by conjunction follows a construal principle during the analysis. The principle is described as follows:

> Construal principle: associate a phrase XP (which cannot be analyzed as instantiating a primary relation) into the current thematic processing domain: interpret XP within that domain using structural (grammatical) and nonstructural (extragrammatical) interpretive principles.
>
> *Current thematic processing domain:* the extended maximal projection of the last theta-assigner.
>
> <div align="right">(Gilboy et al., 1995, p.134)</div>

According to the principle, non-primary relations are initially represented in a non-determinate fashion with the domain of the current theta-assigner. The preferred interpretation is found using a range of information during the analysis of a sentence. Gilboy et al. (1995) drew attention to the importance of semantic factors, by indicating "Specifying what mechanism or module is responsible for accomplishing the task of interpreting non-primary phrases must await a theory of sentence processing which includes a serious treatment of semantic processing" (p. 134). Gilboy et al. (1995) drew attention to six relations between the host NPs ; (i) kinship, (ii) functional / occupational, (iii) possessives: inanimate- inanimate, (iv) inherent possession, (v) representational, and (vi) possessives: inanimate-animate. Unfortunately, Gilboy et al. (1995) only presented their assumptions on the two types of these relations; representational and possessives: inanimate-animate. The justification is that if the preposition "*of*" assigns an independent thematic role such as "possessor" to NP2 as in the relation "possessives: inanimate-animate" (e.g. *the book of the student*), then NP2 attachment should be favoured because the RC is attached to a thematic domain containing only one potential host. If not, then both NPs fall within the same theta-domain, and both should be available as host NPs to the RC on condition that both NPs are referential. Thus, they assumed that there would be no clear preference, but the factors such as recency and discourse prominence might influence readers to favour one over another.

Besides, the notion of partitive construction could also explain the effect of semantic relations observed in the present study. As Stefanowitsch (1998) pointed out, there is a hierarchical relationship between the part-whole relation and the partitive construction including the examples of the subpart-whole relation. and that the part-whole relation could be also conceptualized as a special case of the partitive construction. The meaning of the head noun phrase seems to be, as in the partitive constructions, highly dependent on that of the modifier as it is this part which constitutes the whole entity (Göksel & Kerslake, 2005). Hence, this semantic dependency of the head NP upon the modifier might also result in the modifier (i.e. NP2) to be more likely attached to RCs in this type of ambiguous sentences.

In line with these assumptions, thus, we propose that the semantic relations between the host NPs is an important determinant in the attachment preferences, and the results explain why

Dinçtopal-Deniz (2007; 2010) previously observed an overall NP2 attachment preference in the inanimate condition. However, the previous research did not provide further evidence for these assumptions, and the present study did not aim to reveal the semantic relations of the host NPs. Therefore, further research is needed to understand the semantic factors.

Apart from the semantic relations between the NPs, the semantic associations made with the NPs in the sentences might also influence the attachment preferences. In this regard, Gilboy et al. (1995), for instance, tested the effect of plausibility and placing focus on one of the potential NPs on the likelihood of attaching the RC to NP1 or NP2. The results did not reveal a significant effect, but there was a modest increase in RC attachment preference depending on the associations. Gilboy et al. (1995) did not look into the semantic association of the genitive NPs with the proximal and the distal predicate. However, as they suggested and the present study showed, strong semantic association with one of the host NPs might enhance the likelihood of choosing that NP over the other. More sensitive research focusing on the semantic association of the genitive NPs with the predicates might provide further evidence.

The stimulus set obtained through multiple studies in Validating the Stimulus Set 1 was used only in Experiment 1 and 2. Given that the stimulus set used in the first two experiments consisted of only passive RCs, we wanted to have a variety of structures in RCs for a better comparison, and understanding of any possible impact of particular structures in RCs. Thus, we conducted two more pilot studies reviewing the sentences and writing new sentences. The results of these studies showed that the participants had a tendency towards attaching RCs to NP1 and doing so more often especially in the inanimate condition. Furthermore, we could not obtain any ambiguous sentence in the inanimate condition (except the first group resulting in only one globally ambiguous sentence from the inanimate condition). In the animate condition, however, we obtained 6 sentences, all of which were globally ambiguous both to the participants in the first group and to those in the second group. (See Appendix E2). 3 of these sentences had active RCs and the other 3 had passives RCs.

The results require further investigation in order to explain why we could not obtain any ambiguous sentences in the inanimate condition even though we controlled all confounding factors which were considered in the previous studies (e.g. semantic relations between the noun phrases and the semantic associations between the predicates). There are three assumptions that we have. First, NP1 attachment preference, especially a higher tendency towards NP1 attachment preference in the inanimate condition could be regarded understandable considering the fact that previously we also observed that monolingual Turkish speakers have a tendency to attach RCs to NP1 more often when they encountered such ambiguous sentences with two inanimate NPs. However, we achieved to obtain fine sentences in the inanimate condition before, so this alone may not explain the results.

As for the second assumption regarding why we could not find any balanced- ambiguous sentences in the inanimate condition even though we achieved this previously, this seems to be due to the fact that we used the similar structures (i.e. past continuous; '-yor-du') in the matrix predicates (e.g. parl-ı-yor-du, düş-ü-yor-du, and yuvarlan-ı-yor-du) unlike the previous set of stimulus obtained. Previously we had a variety of structures in the matrix predicates including verbal predicates in different tenses as well as nominal or adjectival predicates. This might be one of the most important factors explaining why we had a different result this time. The participants might have developed a pattern or an answering strategy for the sentences tested due to this repetition.

Lastly, it is important that both NPs to which an RC could be attached have independently equal roles or functions for ambiguity. NPs should be conceptually similar such that an RC can refer to either one of these competing NPs (Gennari et al., 2012). This seems relatively easier to achieve with animate NPs. Furthermore, the results of Experiment 1 and 2 which used the first set of stimulus showed a complex interaction between the animacy / inanimacy condition in the prime and the animacy / inanimacy information in the target. Thus, revising NPs in the inanimate condition and their relationship with one another, or rethinking the presence of inanimate NPs in the stimuli as well as considering the repetition of the same structure in the matrix predicate as a confounding factor might be convenient so as to obtain a list of stimulus set.

Considering all these factors, a new set of stimulus was needed for Experiment 3 and the afterwards. Therefore, we decided on preparing a new set of sentences only involving animate NPs. The goal was to include a variety of structures (i.e. both active and passive constructions, unlike the initial stimulus set involving only passives) in RCs for better understanding the role of these structures on sentence processing. Unlike the previous studies, the prime sentences also contained two animate NPs, and they were semantically disambiguated towards either NP1 or NP2 attachment. Therefore, they were also tested to make sure that monolingual Turkish participants favoured a certain attachment site in these prime sentences as opposed to the target sentences where we aimed to see an ambiguity. The analysis of the data revealed a good number of balanced- ambiguous sentences to be used as the target sentences. Most of the prime sentences whose RCs were either semantically forced to attach to NP1 or NP2 came out as expected. However, only those which received the highest attachments were chosen as the experimental sentences.

13.1.2. Offline Studies with Monolinguals: Animacy / Inanimacy Information

In spite of several confounding factors, balanced ambiguous sentences were obtained as a consequence of multiple studies conducted to validate the stimulus set. These sentences were divided into two categories; (i) those containing two animate NPs, and (ii) those containing two inanimate NPs, and they were used as target sentences in the syntactic priming experiments, Experiment 1 and 2.

Syntactic priming could be defined as the facilitation of processing which occurs when a sentence has the same syntactic form as a preceding one. Numerous studies have provided evidence for the effect of syntactic priming. It is a promising tool to investigate the mechanisms of comprehension and production, and the mental representation of syntactic knowledge (Branigan et al., 2005). Syntactic priming of RC attachment has also been studied by several researchers. One of the seminal studies was conducted by Scheepers (2003). Scheepers (2003) tested the German equivalent of the English construction [NP2+of+NP1+RC]. Gender agreement was used as a disambiguating cue in the prime sentences. Scheepers (2003) reported three sentence completion experiments. In first two experiments, ambiguous target sentences containing RCs were preceded by the prime sentences which were disambiguated either towards NP1 or NP2 attachment. In the third experiment, the prime sentences were structurally incongruent with the targets. More precisely, anaphoric adverbial clauses were encouraged instead of RCs in the prime sentence. In the first two experiments, a significant priming effect was obtained whereas the third did not exhibit any significant priming, thereby suggesting that syntactic priming in RC attachment is dependent on syntactic overlap between prime and target sentences.

Desmet and Declerq (2006) tested the Dutch replication of Scheepers (2003). They translated the items into Dutch from German, and used the same methodology. Desmet and Declerq (2006) also used gender agreement in order to force RC attachment in the prime sentences. The results replicated Scheepers (2003). They found a significant priming in the presence of syntactic overlap between the prime and the target, thereby suggesting that participants had access to tree hierarchical configuration in the alternative readings of RC attachments. However, Scheepers (2003) and Desmet and Declerq (2006) both investigated the syntactic priming of RC attachments in production. Gertken (2013) explored the effect of syntactic priming in comprehension. Gertken conducted a self-paced reading study in French. The prime sentences were disambiguated using number agreement. In addition to disambiguated prime and ambiguous target sentences containing RCs, the researcher also included sentences preserving anaphoric binding and focus structure of RC sentences but differed in structures following Scheepers (2003) and Desmet and Declerq (2006). The results provided evidence for the priming of RC attachment in comprehension, which has been previously found in production. Similarly, there was no priming effect in French L1 speakers when the prime and target sentences differed in syntactic structure but shared discourse information such as focus structure and anaphoric binding, thereby suggesting that priming occurs at the level of abstract hierarchical configuration.

There have been also a few studies on RC attachments as reported above. However, considering the cross-linguistic variations in the attachment preferences across languages, research in syntactic priming of RC attachment is quite limited. Furthermore, the effect of animacy / inanimacy information on the syntactic priming of RC attachments was not investigated before. Syntactic priming was the primal means of investigating the resolution of ambiguity in RC attachments, and the confounding factors influencing the attachment preferences of monolingual Turkish speakers (as well as Turkish learners of English but not in Experiment 1 and 2) in this dissertation. Therefore, Experiment 1 and 2 aimed to understand the effect of syntactic priming on RC attachment preferences in Turkish.

Most studies investigating RC attachment ambiguity resolution have utilized either number (e.g. Desmet & Declerq, 2006; Felser et al., 2003; Fernández, 2002) or gender agreement (e.g. Dussias, 2003; Papadopoulou & Clahsen, 2003; Scheepers, 2003). However, the agreement paradigm in Turkish does not allow to utilize them while choosing the possible host NP to be attached to RCs. Turkish does not show gender agreement and the marking of plurality on the verb is relatively optional. Therefore, Dinçtopal-Deniz (2007;2010) manipulated the syntactic positions of the NPs and the lexical information they carried (i.e. animate or inanimate) and used animacy information as a disambiguating cue. There have not been any research investigating the syntactic priming of RC attachments in Turkish as far as we know. In the present study, the prime sentences used animacy information as a disambiguating cue to force RC attachment to either NP1 or NP2 following Dinçtopal-Deniz (2007; 2010), and thus appeared in four possible conditions; (i) NP1 Attachment in Animacy Forced Condition, (ii) NP2 Attachment in Animacy Forced Condition, (iii) NP1 Attachment in Inanimacy Forced Condition, and (iv) NP2 Attachment in Inanimacy Forced Condition. The target sentences consisted of the balanced-ambiguous sentences obtained in the multiple studies conducted to validate the stimulus set, and they were either from Animate (containing two animate NPs) or from Inanimate (containing two inanimate NPs) condition.

Experiment 1 investigated the syntactic priming of RC attachments in comprehension. It was an offline, pen-and-paper study. The experimental sentences included only passive RCs. The effect of active / passive construction on RC attachments was investigated later in Experiment 3 and afterwards. The results showed that participants favoured an overall NP1 attachment especially when the target sentences were from the inanimate condition. In these sentences, NP1 attachment preferences were higher after an NP1 prime. Nonetheless, there was not any significant syntactic priming effect in Experiment 1. The overall NP1 attachment tendency in the inanimate condition could be explained with the semantic effect of animacy information embedded in the experimental sentences. However, the semantic relations between the host NPs do not explain this tendency. The target sentences were balanced, ambiguous sentences. In spite of that, we observed that there would be more NP2 attachment in the two inanimate NPs condition as compared to the two animate NP2 condition as shown in the pilot studies. One assumption could be the effect of the prime attachment site considering the fact that NP1 attachment preferences were higher after an NP1 prime. However, this was independent of the animacy condition in the prime. In both animacy forced and inanimacy forced conditions, there were more NP1 attachment. The reason why there were more NP1 attachment preferences in the inanimate condition could be explained with the idea that inanimate NPs had higher processing costs as compared to animate NPs in RC attachment (Jackson & Roberts, 2010). Furthermore, the results observed here are somewhat inconsistent with Dinçtopal-Deniz (2007, 2010) where she found stronger NP2 attachment preferences especially in the inanimate condition in the offline judgment task conducted with monolingual Turkish speakers. This could be explained with the effect of experimental sentences, and several factors (e.g. semantic factors) guiding RC attachment preferences. Furthermore, the experiments administered by Dinçtopal-Deniz were not priming studies but tasks measuring participants' overall judgments. The effect of the passive RCs might be interacting with the semantic effects of animacy conditions in the prime and the target. There seems to be multiple interactions between the factors, however, the analysis of the data does not provide further explanations. Besides, the reason why we could not observe any significant priming effect might be related to that we worked with very small numbers of responses in Experiment 1. We had 8 conditions when the animacy and the attachment site conditions in the prime and the target were considered, and each participant saw only two pairs of them, and we evaluated their responses over 2, where 0 (zero) means no matching in the prime and the target attachment site, 1(one) means by chance, and 2 means matching in both examples appeared for that particular condition. This resulted in very small differences between the conditions, and that might explain why we did not obtain any significant priming effect even though some effects were observed.

Unlike Experiment 1, Experiment 2 investigated the syntactic priming of RC attachments in production. Experiment 2 was also an offline study. Given that Turkish does not have a relative pronoun, it is challenging to prepare a task which will force participants to form RCs to complete the sentences. In Experiment 2, the same number of experimental and filler sentences in Experiment 1 was used. The target sentences and the filler sentences were totally the same, but the prime sentences were revised according to the goals of this study. The prime sentences were given in alternative ways of attaching RC to a particular NP in Turkish. For this, we included these two types; (i) unambiguous RC attachment (NP2+RC+NP1), and (ii) ambiguous RC attachment (RC+NP2+NP1). In this way, we expected to see whether participants would show a tendency to use a particular way of RC attachment (e.g. an unambiguous one) when they were allowed to do so as the Avoid

Ambiguity Strategy would predict, and to see the effect of syntactic priming in resolving complex sentence structures.

Furthermore, since Experiment 2 is a production study, the participants were expected to write RC segment in the target sentence themselves, complete the genitive possessive construction with the given noun phrase, and attach RCs to the most appropriate NP in the end. In this regard, RC segment in the target sentences and NP2 (i.e. the modifier, the local NP) were omitted from the original target sentences. Then the noun phrase and RCs (as simple sentences) were given in parenthesis. The simple sentence completion question followed the target sentence as in Experiment 1 so as to understand which one of the two NPs in the genitive possessive construction the participants attached RCs to. RCs were given as simple sentences in parenthesis in order not to imply that we expected the participants to use them to complete the sentences by using a particular structure (i.e. RC) and in order to avoid the risk of revealing the purpose of the study, which might have misguided the results.

The results revealed that monolingual Turkish participants they favoured NP2 attachment regardless of the attachment site forced in the prime, and that they preferred to use the ambiguous RC attachment (RC+NP2+NP1) in production, and Furthermore, there was not any significant difference in NP1 attachment preferences between the alternative ways of construction. Based on the Avoid Ambiguity Strategy, as Turkish has an alternative way of attaching RCs to NP1 unambiguously, the expectation was that monolingual Turkish speakers would favour the unambiguous RC attachment if they wanted to attach RCs to NP1 in particular. However, the results showed an overall preference for the ambiguous RC attachment structure. The lack of syntactic priming effect and an overall preference for the ambiguous RC attachment structure as well as NP2 attachment preference could be explained with the nature of full genitive possessive constructions in Turkish and the design of the material. The two noun phrases in genitive possessive constructions were provided with their suffixes. The head NP was already given to the participants with possessive marker -(s)I, probably forcing the participants to complete this relation first, and then to write RC and attach it to either one of the NPs, where they might have resulted in attaching it to the latest or closest NP (i.e. NP2), in parallel with the assumptions of Late Closure Hypothesis (Frazier & Fodor, 1978).

Experiment 2 consisted of two groups; Group A and Group B. In Group A, half of the prime sentences involved RC alternative 1 and the other half involved RC alternative 2. As mentioned above, RC alternative 1 already enforced NP1 attachment. For a better comparison between these two alternative structures, we tried to make sure that the other half of the prime sentences involving RC alternative 2 also enforced NP1 attachment. Therefore, all of the prime sentences in Experiment 2 were NP1 attachment forced, so we could compare the strength and the effect of two alternative ways on the target sentence production in terms of RC alternative preference as well as NP1 attachment preference. In Group B, half of the prime sentences were again RC alternative 1 (NP2+RC+NP1) but the other half this time included the prime sentences enforcing NP2 attachment, those of which cannot be expressed with RC alternative 1 but only with RC alternative 2. Group A showed a significant main effect of prime animacy. Accordingly, the participants showed a tendency to attach RC to NP1 more often when the prime was from the inanimacy forced condition. However, Group B had only significant difference between the target attachment sites. The reason why we could not see the effect of prime animacy in Group B could be related to the fact that Group B distinctively focused on the differences between the target attachment sites

(i.e. including RC alternative 1 enforcing NP1 attachment, and RC alternative 2 enforcing NP2 attachment) as opposed to Group A.

In brief, the nature of full genitive possessive constructions in Turkish and the design of the task forced participants to complete the genitive possessive construction first since the head NP was already provided in the region of NP1 with the possessive marker, and then to form the RC using the clues given in parenthesis. This resulted in a preference for the ambiguous RC attachment structure and an NP2 attachment preference in parallel with the assumptions of Late Closure hypothesis. Further research might investigate the syntactic priming of RC attachments in Turkish through a different design. The head NPs might be given without any markers. The NP2 can be marked with a genitive suffix (-in) instead (in order to avoid the risk of using the NP2 as a modifier such as "oyuncu abla"; the sister who is an actress). Furthermore, RCs might be provided with a participle suffix, e.g. -(y)An.

The results of both Experiment 1 and 2 showed that there was not a significant syntactic priming effect as opposed to the findings of the previous research in different languages (e.g. Scheepers, 2003; Desmet & Declerq, 2006; Gertken, 2013). The design of the task in Experiment 2 might have an effect on it, but both Experiment 1 and 2 consistently showed that there was an overall NP1 attachment preference, especially in the inanimacy condition. This might be explained with the idea that inanimate NPs had higher processing cost in RC attachment. However, there must be corpus data to prove this assumption for the Turkish language, as well. Furthermore, there seems to be a complex interaction between the prime attachment site (forced either to NP1 or NP2 attachment using animacy/ inanimacy information) and the animacy condition in the target sentences. The prime sentences consisted of one inanimate and one animate NPs in the genitive possessive construction, and the attachment site was forced by using the animacy information. The target sentences, on the other hand, had either two inanimate NPs or two animate NPs. In order to avoid this complex interaction, Experiment 3 and the afterwards used the last set of stimulus containing only animate NPs both in the prime and the target sentences. Furthermore, these experiments also investigated the effect of active / passive RC condition on RC attachment preferences in monolingual Turkish speakers as well as Turkish learners of English.

13.1.3. Offline Studies with Monolinguals: Active /Passive RC Condition

Experiment 3 and 4 investigated the syntactic priming of RC attachments in comprehension as mentioned above. Monolingual Turkish speakers took part in them. The last set of stimulus containing only animate NPs both in the prime and in the target was used. The set also allowed us to investigate the effect of active / passive RC condition on RC attachment preferences. The only difference between Experiment 3 and 4 was related to the design of the task. Experiment 3 evaluated the correctness of the prime completion (i.e. whether the prime was interpreted by experimental manipulation or not) following the study conducted by Scheepers (2003). Each sentence fragment was printed in a single line, followed by a line that marked the area where a hand-written sentence completion needed to be provided. Participants had to complete the sentences according to the most recent sentence (both the prime and the target sentences) they had read using only one word.

Unlike Experiment 1 and 2, the results showed a significant syntactic priming effect. Accordingly, there were more NP1 after NP1 primes and likewise more NP2 after NP2 primes. Furthermore, there was a significant interaction between the active / passive

construction and the target attachment preferences. Participants preferred even more NP2 attachment in the active RC condition whereas they preferred even more NP1 attachment in the passive RC condition. This could also explain why we obtained an overall NP1 attachment preference in our previous experiment, Experiment 1 where we had used only passive RCs. The Late Closure Hypothesis (Frazier & Fodor, 1978), claiming a universal parsing strategy might explain stronger NP2 attachment preference especially when there was an active RC in a sentence. However, it does not explain why monolingual Turkish speakers tended to show a stronger NP1 attachment tendency when there was a passive RC. One explanation could be that speakers might tend to pause at the subject-verb boundary before attaching RCs to either one of the NPs if they encounter a syntactically complex structure as in the passive RC condition, which will lead them to consider the distant NP, i.e. NP1, as a possible attachment site (Ferreira, 1991; Townsend & Bever, 2001). Given the complexity of passive RCs and the complex genitive NPs, thus, participants might have showed a stronger tendency to attach RCs to NP1, the NP which is the closest and the most topic-related (as the subject) to the main predicate. Unlike the assumptions of Recency and Predicate Proximity Principle posited by Gibson et al. (1996), the strength of the main predicate might be determined by the complexity of the structures embedded in the sentence rather than the distance - which has not yet been clearly explained in the Construal hypothesis- of the head NP to the main predicate. The second assumption is that the syntactic functions of the host NPs, as the subject and the object of the genitive possessive construction might have a role in RC attachment preference. In the present study, the host NPs in the genitive possessive constructions such as *mankenin koruması* always had two animate NPs with either kinship or occupational relationship, thereby resulting in a reading that the model has a bodyguard. Thus, participants might have considered the possessor in the specifier position (i.e. NP2) as more like a subject and favoured in the active RC condition, whereas the possessed in the head position (i.e. NP1) as more like an object and favoured in the passive RC condition. Considering the fact that an active Subject RC searches for a subject whereas a passive RC searches for an object (Gennari, 2012). Given that the semantic relations between the host NPs in the set are all alike, the assumption seems to provide a relevant explanation for the difference in the active and passive conditions.

Experiment 4 did not require participants to evaluate the prime attachment site in order to understand whether the priming effect in Experiment 3 was only a consequence of participants' directed assessment of the attachment site in the prime. The results showed that there was no significant syntactic priming effect, yet there was a significant interaction between the prime attachment site, target attachment preferences and the active / passive construction in RCs. This means that the effect of syntactic priming differed between active and passive RC constructions. Accordingly, if there was an active RC, participants preferentially attached RCs to NP1 after NP1 primes and to NP2 after NP2 more often. However, if there was a passive RC, they attached RCs to NP2 after NP1 primes and to NP1 after NP2, thereby showing a somewhat reversed effect. Even though there was a difference between active/passive conditions in terms of the interaction between the prime attachment site and the target attachment preferences. The results of the paired samples t-tests did not show any significant priming effect in the active RC condition or any significant reversed priming in the passive RC condition. In the literature, as far as we know, there is not another study that compared RC attachment preferences in the active and passive RC condition. The reason why we obtained these results here, in Experiment 4, could be explained in comparison with the previous research we conducted (Experiment 3). From the previous research, we know that both in the active and in the passive RC condition, participants

showed a significant syntactic priming effect. However, in Experiment 4 participants were not required to evaluate the attachment site in the prime sentences explicitly. This might explain why we did not have a strong syntactic priming effect in Experiment 4. In the passive RC condition, as both Experiment 1 (that we conducted only with passive RCs) and Experiment 3 (comparing actives and passives) showed, participants used different parsing strategies in ambiguity resolution of RC attachments, and they showed a stronger NP1 attachment preference with passive RCs. In Experiment 4, participants were not explicitly forced towards either NP1 or NP2 in the prime, which might have resulted in inhibition of the response initially triggered by the prime, and facilitated selecting the response alternative, thereby resulting in a somewhat reversed effect.

13.1.4. Offline Studies with Turkish Learners of English: A Comparison of L2 Levels

In addition to RC attachment preferences in L1, there have been several studies investigating RC attachment preferences in L2, as well. The interest in L2 processing of RC attachments has been driven by the question of whether syntax is shared or separate in L2 learners. Many researchers have explored the issue across languages (Fernández, 2002; Dussias, 2003; Papadopoulou & Clahsen, 2003; Miyao & Omaki, 2006; Han, 2012; Taheri et al., 2015; Bidaoui, 2016). Even though some suggested that L2 learners exhibited an attachment preference displayed by monolingual speakers of their dominant language (Fernández, 2002; Han, 2012; Taheri et al., 2015; Bidaoui, 2016) whereas L2 speakers did not show either any clear attachment preferences or similar patterns to either their L1 or L2 (Dussias, 2003; Papadopoulou & Clahsen, 2003; Miyao & Omaki, 2006; Dinçtopal-Deniz, 2007).

The researchers have been also interested in the effect of proficiency on RC attachment preferences in L2. Several studies failed to show a significant relation between the proficiency and the development of L2 parsing strategies (Felser et al., 2003; Han, 2012). In this regard, Felser et al. (2003) claimed that advanced L2 learners relied on lexical-semantic information in L2 processing and that their level of proficiency did not influence their processing strategies. Han (2012) explained the lack of the relation between L2 proficiency and RC attachment preferences with the lack of L2 experience. Given that L2 learners' experience was restricted to classroom learning, Han assumed that their lack of experience on resolving RC attachment ambiguity in L2 resulted in more L1-like and less L2-like parsing. However, Miyao and Omaki (2006) claimed that the developmental stages in L2 could influence RC attachment preferences, the relative weight of L1 transfer, and L2 influence. Accordingly, the assumption put forth is that there might be three phases; L1 transfer phase, intermediate phase, and target-like phase respectively. In the L1 transfer phase, L2 learners transfer L1 parsing strategies. In the intermediate phase, L2 learners develop their L2 grammar and parsing strategies, however the parser is still incomplete and not efficient in the sense that it is still influenced by L1 grammar and parsing strategies. Therefore, the parser prefers to minimize the cognitive demand in online processing. In the target-like phase, L2 learners achieve a target-like grammar and develop their L2 parsing strategies, and thus L2 learners start to show target-like attachment preferences. Miyao and Omaki suggested that the results of the studies conducted by Frenck-Mestre (1997, 2002) with Spanish L1 - French L2 group who had low proficiency and high proficiency in their L2 and their own study with this Korean L1- Japanese L2 group who had intermediate to advanced level of Japanese confirmed this assumption, however further research would be essential to understand the relation between L2 proficiency and the attachment preferences .

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Even though there have been several attempts to understand RC attachment preferences in L2, the syntactic priming of RC attachments in L2 has been investigated in very few studies. To illustrate, Desmet and Declerq (2006) conducted two experiments with Dutch L1 - English L2 speakers in addition to another experiment with Dutch L1 speakers only. They investigated the syntactic priming of RC attachments in production. In their first experiment with L2 speakers, the researchers sought to understand whether syntactic information is shared between two languages or represented separately. For this purpose, the same prime sentences used a previous experiment in Dutch L1 replicating Scheepers (2003) were used, but the target sentences were translated into English. The results showed that the syntactic information related to the hierarchical tree configuration is shared between two languages. More precisely, the researchers reported that participants who just completed an NP1 attachment forced prime in Dutch were more likely to attach RC to NP1 in the English target sentence, as well than they did so after completing an NP2 attachment forced prime in Dutch. The third experiment was defined as a control experiment. Desmet and Declerq (2006) replaced the prime sentences in the second experiment with adverbial clauses, and expected not to find any significant syntactic priming effect if the effect they observed in the second experiment was truly a consequence of the syntactic overlap between the prime in Dutch and the target in English. The results of the third experiment were consistent with Scheepers (2003). The researchers did not find any priming effect in the absence of syntactic overlap between the prime and target sentence. Gertken (2013) also investigated the syntactic priming of RC attachments in L2 comprehension in addition to that in L1, and administered a self-paced reading study in French as a second language. Unlike French L1 speakers and the findings of Desmet and Declerq (2006), the results showed a syntactic priming effect in French L2 learners even if the sentences differed in syntactic structure but shared discourse information. Thus, Gertken (2013) suggested that priming in L2 might be also linked to discourse information, and that non-syntactic representation persisted between the prime and target sentences.

All in all, there was a lack of research on syntactic priming of RC attachments in L2, and those that were previously conducted revealed inconsistent results. Furthermore, research both on RC attachment preferences in L2 and syntactic priming of RC attachments in L2 has suggested a difference in L1 and L2 processing, and there was a need for further research for understanding the relation between L2 proficiency and the development of L2 parsing strategies.. Therefore, a series of offline studies were also administered with Turkish learners of English who had intermediate and upper-intermediate levels of proficiency. A summary of the results of these offline studies is presented in Table 50 below.

Table 50. A summary of the results obtained from the offline studies with L2 learners

	Intermediate	Upper-Intermediate
Implicit Processing of the Prime Attachment Site	* NP1 attachment preference * No syntactic priming	* NP1 attachment preference * Syntactic priming
Directed Assessment of the Prime Attachment Site	* NP1 attachment preference (Marginally significant) * Syntactic priming in NP1 attachment preference * More NP1 in the passive RC condition	* No attachment tendency * Significant priming

In all of the experiments conducted with Turkish learners of English, the translations of the sentences used in Experiment 3 and 4 were used. The translations were reviewed by two native English speakers. Experiment 5 and 7 had the same design. Both required participants' implicit processing of the prime sentences. However, participants' levels of proficiency in English were different in Experiment 5 and 7. In Experiment 5, L2 learners had intermediate level of proficiency in English. The results showed an overall NP1 attachment preference in the target sentences regardless of the prime attachment site, and there was no significant syntactic priming effect. In Experiment 7, L2 learners had upper-intermediate level of proficiency in English. The results also showed an overall NP1 attachment preference in the target sentences regardless of the prime attachment site. There was not a significant decrease in NP1 attachment preference as the level of proficiency increased. Furthermore, as opposed to the results of Experiment 5, there was a significant syntactic priming effect, thereby suggesting that L2 proficiency might have an effect on syntactic priming of RC attachment preferences. This means that Turkish learners of English distinguish the tree hierarchical configurations of the ambiguous RC attachments in their L2 as their level of proficiency increases, even in a design of a task which requires the implicit processing of the prime attachment site. The previous research failed to show a significant relation between L2 proficiency and the development of L2 processing strategies (Felser et al., 2003; Han, 2012) and suggested that syntactic processing would be primed without being affected by L2 proficiency (Kim & McDonough, 2008; Fujita, 2016). On the contrary to that, the present study demonstrated that L2 learners could benefit syntactic clues when their abstract linguistic representations developed at later stages of acquisition following decreasing reliance on lexical items, as Juffs and Harrington (1995) put forth. However, there was not a significant difference in the effect of syntactic priming effect between the intermediate and upper-intermediate levels of proficiency in English.

The design of Experiment 6 and 8 was different from Experiment 5 and 6. Experiment 6 and 8 required directed assessment of the prime attachment site. In other words, participants were asked to evaluate the prime attachment site explicitly. Participants' levels of proficiency in English were different in Experiment 6 and 8. In Experiment 6, L2 learners had intermediate level of proficiency in English. The results showed a marginally significant NP1 attachment preference. However, NP1 attachment preference did not significantly decreased as the level of proficiency increased. In Experiment 6, there was also a significant syntactic priming

effect. However, this effect was only significant in NP1 attachment preference in the target after an NP1 prime. Furthermore, there was a significant interaction between the active / passive condition and the target attachment preferences. This means that participants preferred to attach RCs to NP1 more often in the passive RC condition. This could be explained with the complexity of the processing passive RCs as pointed out before. The assumption is that speakers might tend to pause at the subject-verb boundary before attaching RCs to either one of the NPs if they encounter a syntactically complex structure as in the passive RC condition, which will lead them to consider the distant NP, i.e. NP1, as a possible attachment site (Ferreira, 1991; Townsend & Bever, 2001). Given the complexity of passive RCs and the complex genitive NPs, thus, participants might have showed a stronger tendency to attach RCs to NP1, the NP which is the closest and the most topic-related (as the subject) to the main predicate.

In Experiment 8, L2 learners had upper-intermediate level of proficiency in English. The results also showed a significant syntactic priming effect. Therefore, the results, as in Experiment 6, confirmed that L2 learners benefitted from syntactic clues as their abstract linguistic representations develop. All in all, the results of the experiments (except Experiment 8) showed an overall NP1 attachment preference in L2 learners. However, the analysis revealed that NP1 attachment preference did not significantly decreased as the level of proficiency in English increased. Thus, it is not likely to claim that L2 learners began to show more target-like parsing strategies (more NP2 attachment as native English speakers did) as their level of proficiency increased (Cuetos & Mitchell, 1988; Dinçtopal-Deniz, 2007). Furthermore, it is not clear why L2 learners showed an overall NP1 attachment preference in the first place considering the fact that this is not the pattern observed in their L1. Thus, one assumption is that higher NP1 attachment preference could be related to the processing difficulty. As Miyao and Omaki (2006) suggested, this might be a strategy to minimize the cognitive demand favoured by L2 learners who did not reach target-like levels yet. However, this assumption seems to contradict with the results of Dinçtopal-Deniz's study (2010) in which highly proficiency L2 learners also showed an overall NP1 attachment preference as opposed to the patterns observed in the native speakers of their L1 (Turkish) and L2 (English). In line with the findings that both monolingual Turkish speakers and upper-intermediate L2 learners showed an NP1 attachment preference especially in the passive RC condition, which is syntactically more complex, L2 learners might have exhibited an overall NP1 attachment preference while fulfilling a task in their L2, which is cognitively more demanding. Besides, the results of the experiments in L2 (except Experiment 5) showed that the syntactic priming was not only effective and observed in L1 but also in L2 (Kim & McDonough, 2008). However, as in Experiment 5 and 7, there was not a significant difference in the effect of syntactic priming between the intermediate and upper-intermediate levels. This could be because the difference between the levels was not great. Furthermore, the comparison of levels is based on participants' self-assessment, which might not reflect their true levels of proficiency in English. Thus, further research on L2 learners with intermediate and target-like levels might provide a better comparison. Furthermore, it is important to note here that the measurement of language proficiency varies across studies. Some studies use language measures as categorical variables whereas others use them as continuous variables. Many prefer categorical variables as they can be interpreted easily (Gee et al., 2010). However, these measures might be unreliable and inadequately represent the levels of language proficiency. Thus, some studies prefer to use measures as continuous variables. We relied on participants' self-report, and their levels of

proficiency already established by the exams conducted at their university. However, one can use language measures as continuous variables for a more detailed inspection.

13.1.5. Online Studies with Monolinguals and Turkish Learners of English

Before gathering the relevant data through an eye-tracking study, we conducted an online self-paced study with monolingual Turkish speakers and Turkish learners of English. In the online study with monolingual Turkish speakers, we used the last set of stimulus in Turkish. The results did not show any significant priming effect. There was not an overall attachment preference. However, there was a significant three-way interaction among the prime attachment site, active/passive condition, and the target attachment preferences. The analysis revealed that there was a significant priming effect in the passive RC condition. In other words, the recency of reading an NP1 or NP2 attachment forced prime influenced the attachment preference in the passive RC condition. The reason why monolingual Turkish speakers had syntactic priming effect in the passive RC condition, but not in the active could be explained with the fact that syntactic priming occurs more often with marked syntactic forms (Hartsuiker & Westenberg, 2000; Pickering & Ferreira, 2008).

The critical regions in the prime sentences, where the attachment site was forced to NP1 or NP2 attachment, were also evaluated in terms of RTs to investigate whether monolingual Turkish speakers had an initial attachment preference. The analysis showed a marginally significant interaction between the prime attachment site and the critical regions. More precisely, monolingual Turkish speakers had slightly longer RTs in the NP2 region when the prime was forced to NP1 attachment, thereby suggesting an initial preference to attach RCs to NP2. However, this interaction was not significant, and needs further research to validate. The reason why we could not find any significant difference between the critical regions in the prime sentences might also mean that monolingual Turkish speakers did not have any strong initial attachment preference. This contradicts with Dinçtopal-Deniz's (2007; 2010) finding that monolingual Turkish speakers exhibited longer RTs in the NP1 attachment forced condition, thereby suggesting an NP2 attachment preference.

The analysis of the RTs, however, did not exhibit any significant difference between the critical regions in the target sentences. The presentation mode could explain the absence of any significant difference. The sentences were presented in a phrase-by-phrase mode. Participants needed to press the space key to complete reading a sentence. Thus, participants might have spent an equal amount of time since they were not aware of how a sentence would continue, and whether a comprehension question would appear or not.

In order to reveal whether it takes shorter for monolingual Turkish speakers to process ambiguous sentences as compared to the attachment forced sentences as the models of serial processing and the Unrestricted Race model would predict, and Dinçtopal-Deniz (2007;2010) previously showed, or longer as parallel processing would predict, a comparison of the RTs in the critical regions between the prime and target sentences was made. However, the results did not show a significant difference. The reason could not be related to the presentation mode, since Dinçtopal-Deniz (2007; 2010) also used the same method. The sentences used in the present study were different from those used Dinçtopal- Deniz (2007; 2010). This could be one reason. However, the absence of any difference, either shorter or longer, could be related to the priming effect in the present study, as well. Therefore, the attachment forced and ambiguous sentences could be presented separately to a group of

monolingual Turkish participants, and then the difference in RTs could be evaluated for a better understanding of sentence processing. Furthermore, as previously pointed out, presentation mode (i.e. full sentence or phrase-by-phrase) seems to be a confounding factor in RC attachment preferences (Brysbaert and Mitchell, 1996). Therefore, the potential effects of methodological issues could be taken into consideration during the investigation.

In the online study with Turkish learners of English, we used the English translation used in the previous offline studies with L2 learners. L2 learners in the online self-paced reading study had advanced level of proficiency in English. There was a marginally significant NP1 attachment preference as in the offline studies. However, there was no significant syntactic priming effect or an effect of active/passive condition.

The critical region in the target sentences did not show a significant difference as in monolingual Turkish speakers. Considering the fact that there was no priming effect, this was an expected result. Furthermore, the critical region in the prime sentences did not exhibit any significant difference in RTs, thereby suggesting that Turkish learners of English had no initial attachment preference. However, there was an effect of active / passive condition on RTs both in the target and in the prime sentences. More precisely, Turkish learners of English had longer RTs in the passive RC condition. In the previous study, Dinçtopal-Deniz (2007; 2010) observed that Turkish learners of English (with advanced level of proficiency) had almost the same RTs in the NP1 attachment forced, NP2 attachment forced, and ambiguous sentence condition. However, she also reported that L2 learners had an NP1 attachment preference in the animate condition, and NP2 attachment preference in the inanimate NP2 condition, and suggested that L2 learners relied on lexical information in parsing RC attachments. In the present study, the role of animacy information was not investigated. Therefore, we cannot say much about this interaction. However, the analysis of the RTs suggested that L2 learners did not have an initial attachment preference. The results showed only difficulty in processing passive RCs both in the prime and in the target sentences. On the other hand, according to their responses to the questions following the target sentences, Turkish learners of English favoured NP1 attachment (though marginally significant). The results are in parallel with those of the previous offline studies we administered, apart from Experiment 8 (which required directed assessment of the prime attachment site and was conducted with upper-intermediate group of L2 learners). Furthermore, the results are consistent with the other offline studies conducted with a group of L2 learners who had a head-final L1 language such as Korean (Han, 2012). In brief, Turkish learners of English seem to have an overall NP1 attachment preference both in the offline and in the online tasks. Han (2012) explained that NP1 attachment preference in English by Korean learners of English could be due to their past experiences of resolving RC attachment ambiguity in Korean, which was towards NP1. However, for Turkish learners of English, this explanation does not seem to appropriate considering the fact that monolingual Turkish speakers did not exhibit a clear attachment preference. For this possibility, however, corpus data might be investigated in further research. For now, as previously pointed out, NP1 attachment preference could be attributed to processing difficulty. Given that both monolingual Turkish speakers and also Turkish learners of English showed significantly more NP1 attachment preference in the passive RC condition, which is syntactically more complex, L2 learners might have an overall NP2 attachment preference while fulfilling a task in their L2, which is cognitively demanding (Felser et al., 2003; Han, 2012).

13.1.6. Eye-Tracking Study

The previous offline and online studies we conducted shed light on quite a few points regarding the RC attachment preferences of monolingual Turkish speakers -and Turkish learners of English, but they failed to show how the initial analysis of RC attachments is carried out. An eye-tracking study allows to test whether the human parser follows serial or parallel processing, whether it relies on only the syntactic information during the initial processing or utilizes the lexical-semantic information, as well. Besides, there was a lack of research on the initial processing of RC attachments, and those previously conducted revealed inconsistent or inaccurate findings. Therefore, we conducted a final study with monolingual Turkish speakers in order to understand their parsing strategies better.

In the previous online study, we found that monolingual Turkish speakers showed a priming effect only in the passive RC condition. The analysis of the data obtained through the eye-tracking study revealed a significant syntactic priming of RC attachments both in active and in the passive RC condition. This difference could be explained with the difference in the presentation mode and confirms the assumptions of the previous research. As Brysbaert and Mitchell (1996) pointed out, RC attachment preferences are dependent on the presentation mode (i.e. full sentence or phrase-by-phrase).

The analysis of the RTs in the critical regions also provided significant results. First of all, the results showed that monolingual Turkish speakers had difficulty processing the sentences in the passive RC condition. There were longer total fixations in the RC region and also more visits to the RC region in the passive RC condition. Furthermore, this effect was stronger in NP2 attachment forced sentences. This means that there is an NP1 attachment preference in the passive RC condition, which is in line with the results of the previous offline studies such as Experiment 1 and 3.

A comparison of NP1 and NP2 regions showed that there was longer total fixations and more visits to the region of NP2 in general, thereby suggesting an NP1 attachment preference. The total fixation durations were longer at the NP1 region only in the active RC condition when NP1 attachment was forced, suggesting an NP2 attachment preference. This result is consistent with the finding obtained in Experiment 3 which shows that NP2 attachment preference was higher in the active RC condition. However, it does not explain why this was not the case in the active RC condition when NP2 attachment was forced. One assumption is that as opposed to the passive RC condition, monolingual Turkish speakers might have more opportunity to evaluate the alternative NP (i.e. NP2) in the active RC condition. The analysis of the visit counts at the NP1 and NP2 regions confirmed these assumptions. The analysis showed that there were more visits to the NP2 region, and these visits to the critical regions were higher in the NP1 attachment forced condition and in the active RC condition.

Table 51. A summary of the syntactic priming from comprehension to comprehension studies conducted with monolingual Turkish speakers

OFFLINE (PEN-AND-PAPER)	**ANIMACY INFORMATION (PASSIVE RC)**	• No syntactic priming • more NP1 in the inanimate target condition
	DIRECTED ASSESSMENT OF THE PRIME ATTACHMENT SITE	• Syntactic priming • In the target sentences (independent of the prime attachment site); - active RC - more NP2 - passive RC - more NP1
	IMPLICIT PROFESSIN OF THE ATTACHMENT SITE	• No syntactic priming • No clear attachment preference
ONLINE (SELF-PACED READING)	**PHRASE-BY-PHRASE**	• Syntactic priming in the passive RC condition
ONLINE (EYE-TRACKING)	**FULL SENTENCE**	• Syntactic priming

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The analysis of the first fixation durations in the NP1 and NP2 regions provided further evidence for the initial processing of RC attachments. More precisely, there were longer first fixations at the NP1 region both in the prime (regardless of the attachment site forced) and in the target sentences. This explains why participants favoured NP1 attachment in the passive RC condition and lower span readers simply pick NP1 attachment more often as it will be also discussed in the next subheading. They probably do not evaluate the other alternatives, but rely on their initial attachment. Furthermore there was a relation between the prime attachment site and active / passive condition. This could be explained with the interpretation of the host NPs in the genitive possessive construction. The possessor in the specifier position, (i.e. NP2) could be conceived as the subject and favoured over NP1 in the active RC condition whereas the possessed in the head position, (i.e. NP1) could be conceived as the object and favoured over NP2 in the passive RC condition. Even though there have been assumption showing that the possessor could be regarded as the subject (i.e. Szabolsci, 1994), there seems to be a need for further research for investigating this assumption.

13.1.7. Working Memory and RC Attachment Preferences

The extent to which and how exactly working memory capacity plays a role in RC attachment preferences both in L1 and L2 have been also of great interest to scholars. The literature has shown that working memory capacity and RC attachment preferences interact with each other. In this regard, as reported before, Just and Carpenter (1992) posited a capacity theory. The theory predicts that working memory capacity would constrain sentence comprehension. More precisely, the authors suggested that processing and storage are mediated by activation available in working memory, and that individual differences in working memory could account for differences observed in language comprehension. With respect to the resolution of syntactic ambiguity, Just and Carpenter indicated that the larger working memory capacity will enable individuals to maintain multiple interpretations. In order to understand this relation, there have been several offline and online studies. The most of the studies showed that low span readers favoured NP1 attachment whereas high span readers either showed an NP2 attachment preference or no clear attachment preference (Mendelson & Pearlmutter, 1999; Omaki, 2005; Swets et al., 2007; Kim & Christianson, 2013). However, there were some inconsistent results, as well. To illustrate, Traxler (2007) found that high span readers showed an NP1 attachment preference in English L1. In an previous study, Mendelson and Pearlmutter (1999) observed no clear attachment preference in high span readers both in an offline and in an online task. On the other hand, Omaki (2005) and Kim and Christianson (2013) observed an NP2 attachment preference in high span readers both in an offline and in an online task. For high span readers who showed either NP2 attachment preference or no clear attachment preference in English, the researchers have suggested that they might be considering the alternative Saxon genitive in parallel, thereby resulting in more NP2 attachment preferences as a consequence of Avoid Ambiguity strategy they employed. Besides, Kim and Christianson (2013) could not find a clear interaction between working memory capacity and RC attachment preferences in Korean L1. Similarly, Omaki (2005) could not find a clear interaction in Japanese L1, either. Kim and Christianson (2013) suggested that the difference between English and Korean could be due to the effects of head-directionality. Therefore, the assumption was that working memory based accounts could provide a better explanation for cross-linguistic variations in RC attachment preferences.

In Turkish L1, Kaya (2010) investigated the interaction between working memory and relative clause attachment preferences through an eye-tracking study following Dinçtopal (2007). The analysis of the data related to the interaction between working memory scores and RC attachment preferences showed that high-span readers had significantly higher percentage of NP2 attachment preference, which is in line with the findings of the previous research in different languages, but not consistent with the findings of Traxler (2007) who found an NP1 attachment preference with high span readers through an eye-tracking study as well as the findings of Omaki (2005) and Kim and Christianson (2013). With regard to more NP2 attachment preference, Kaya asserted that high span readers might be evaluating the alternative form in Turkish [NP2-RC-NP1], which unambiguously forces NP1 attachment.

Given that there was an inconsistency in the findings of previous research, and that there were a number of individuals who exhibited an overall NP1 or NP2 attachment preference even in the balanced-ambiguous sentences, we also looked into the relation between working memory capacity and RC attachment preferences of monolingual Turkish speakers in an offline study. The results showed that there was a significant interaction between the working memory capacity and the RC attachment preferences. Accordingly, low span readers preferred to attach RCs to NP1 whereas high span readers preferred to attach RCs to NP2 in the ambiguous sentences. The findings obtained for monolingual Turkish speakers in this study also replicated the previous research on native speakers of various languages (Omaki, 2005; Kim & Christianson, 2013; Swets et al. 2007). The results of the present study also seem to be consistent with Kaya's (2010) finding that significantly less NP1 attachments were observed with high span readers. Low span readers might be using a chunking strategy while interpreting RC attachments as Hopp (2014) asserted.

In an online task, we also investigated the interaction between working memory capacity and syntactic priming of RC attachments both in monolingual Turkish speakers and Turkish speakers of English. The results did not show a significant interaction between them in monolingual Turkish speakers. However, low span readers showed slightly more NP1 attachment preference whereas high span readers showed more NP2 attachment preference. The analysis of the data obtained from Turkish learners of English showed a significant interaction between working memory capacity and RC attachment preferences in the syntactic priming study. More precisely, low span readers favoured NP1 attachment whereas high span readers favoured NP2. Therefore, the results confirm the findings of the previous research suggesting that L2 learners seem to employ the same strategies used by L1 speakers (Hopp, 2014). However, L2 learners had advanced level of English proficiency. L2 learners with lower levels of proficiency could behave like low-span native speakers of English due to greater processing difficulties (Omaki, 2005) or could show no clear interaction due to the lack of lexical automaticity in L2 and L2 processing being more costly (Hopp, 2014).

CHAPTER 14

14. CONCLUSIONS

This dissertation investigated syntactic priming of RC attachments in monolingual Turkish speakers and Turkish learners of English through a series of studies. The literature has shown cross-linguistic variations in RC attachment preferences. This implies that parsing strategies might not be guided by universal principles but language-specific parameters. Several models of sentence processing have been proposed in order to explain the parsing strategies employed in the resolution of syntactic ambiguity in RC attachments. The models differed in their assumptions about the universality of the parser and the underlying mechanisms working in the initial analysis, and the sources of information used in sentence processing. However, there is not one single model, the predictions of which could account for all the contradictory findings obtained in a myriad of studies using different materials and tasks in different languages. Nevertheless, the results have been motivating for further research.

First of all, multiple studies were conducted to validate the stimulus sets. Monolingual Turkish speakers took part in these studies. The results provided us with both the experimental sentences and enabled us to understand some factors affecting RC attachment preferences such as (i.e. the semantic relations between the host NPs and the semantic associations of the host NPs with the proximal and the distal predicate). Furthermore, the relation between working memory capacity and RC attachment preferences was investigated through one of these studies. The first set was used in Experiment 1 and 2, and the second set was used in Experiment 3 and afterwards. The second set was also translated into English and two native English speakers reviewed the sentences in the set. The English set was used in the experiments conducted with Turkish learners of English.

Six studies were conducted using the sets of stimulus mentioned above with monolingual Turkish speakers. Experiment 1 and 2 were offline, pen-and-paper studies. They gave important results about the role of animacy / inanimacy information embedded in the host NPs on the syntactic priming of RC attachments. Experiment 3 and 4 were also offline pen-and-paper studies. They enabled us to understand the effect of active / passive condition and the importance of task requirements in the effect of syntactic priming. More precisely, Experiment 3 required participants' directed assessment of the prime attachment site whereas Experiment 4 required implicit processing. Unlike the previous experiments, Experiment 9 was an online self-paced reading study. This study showed that syntactic priming was more powerful in the passive RC condition and that the presentation mode (i.e. full sentence or phrase-by-phrase) influenced the syntactic priming of RC attachments. Experiment 11 was an eye-tracking study, and it was the last study conducted with monolingual Turkish speakers. The study was administered for a better understanding of the patterns observed in the previous experiments. First of all, the results confirmed that the presentation mode influenced the syntactic priming of RC attachments. Furthermore, the analysis of the data revealed important findings about the initial analysis of monolingual Turkish speakers.

Five studies were conducted using the set of stimulus translated into English with Turkish learners of English. L2 learners with intermediate level of proficiency took part in

Experiment 5 and 6. Experiment 5 required implicit processing whereas Experiment 6 required directed assessment of the prime attachment sites. L2 learners with upper-intermediate level of proficiency took part in Experiment 7 and 8. Similarly, Experiment 7 required implicit processing whereas Experiment 8 required directed assessment of the prime attachment sites. They all were offline, pen-and-paper studies. The results provided a comparison of levels as well as task requirements. Lastly, Experiment 10 was an online self paced study. It showed a marginally significant NP1 attachment preference, in consistency with the findings of the offline studies, and longer RTs in the passive RC condition.

The findings of all these studies were discussed in the previous chapter. They will be summarized in two subheadings below; (i) processing RC attachments in monolingual Turkish speakers and (ii) processing RC attachments in Turkish learners of English. Lastly, the limitations of the dissertation and the ideas for further research will be presented.

14.1. Processing RC Attachments in Monolingual Turkish Speakers

The present dissertation showed that monolingual Turkish speakers had no clear attachment preferences on condition that several confounding factors were controlled. More precisely, RC attachment preferences varied depending on the semantic factors (e.g. semantic associations of the host NP with the proximal and the distal predicate), task requirements (e.g. implicit or directed), and techniques (e.g. offline or online) employed in the studies. Nonetheless, the effect of syntactic priming showed that monolingual Turkish learners distinguished the tree hierarchical configuration of the alternative attachment interpretations. On the other hand, monolingual Turkish speakers' attachment preferences varied depending on the active / passive RC condition. More precisely, there were more NP2 attachment preferences in the active whereas there were more NP1 in the passive RC condition.

The reason why we observe such differences in active / passive RC conditions might be explained with the assumption that semantic interference and competition should exist to varying degrees in different conditions (Fukumura et al., 2011; Gennari et al., 2012), thereby resulting in varying degrees of ambiguity and difficulty in RC attachment preferences. To illustrate, the relation between animacy and structural choices has been a great interest to researchers studying language comprehension and production (McDonald et al., 1993; Van Dyke & McElree, 2006; Fukumura et al., 2011; Gennari et al., 2012). Gennari et al. (2012) asserted the role of animacy as follows:

> ... the conceptual salience of animate entities is thought to govern syntactic choices such as passives vs. actives, because animacy determines the order in which lemmas are retrieved and their functions are assigned. (p.146)

However, we do not know much about the role of animacy and active / passive conditions in processing complex sentences and ambiguity resolution as in RC attachment preferences or syntactic priming of RC attachments. Therefore, there is a need for further research. In English, for instance, passives are rare in main clauses, however, in RCs, utterances tend to be passive when the head is an animate NP (Gennari et al., 2012). Therefore, corpus data might enable us to anticipate and explain RC attachment preferences in Turkish. Unfortunately we know of no corpus analyses of RC attachments in Turkish for the time being. Future research might contribute to this gap in the field.

Furthermore, the syntactic functions of the host NPs in the genitive possessive construction could explain this difference in the active RC and the passive RC condition. The literature has suggested that the possessor in the specifier position could be conceived of as the subject of the genitive possessive construction (Szabolcsi, 1994). Likewise, the second argument, the possessed in the head position could be regarded as carrying an objective interpretation. However, the interpretation of the arguments seem to depend on their syntactic functions which they could have in a clause (Horváth, 2010). Therefore, the relation between the host NPs could result in varying interpretations. In the present study, the host NPs in the genitive possessive constructions had similar readings as in *mankenin koruması* and always had two animate NPs with either kinship or occupational relationship. For instance, the reading in *mankenin koruması* is that the model has a bodyguard, where NP2, *manken* has a subject-like function whereas NP1, *koruma,* has an object-like function. Given that an active Subject RC looks for a subject, and a passive RC looks for an object for attachment (Gennari, 2012), this could explain why there was an NP2 bias in the active RC condition, and an NP1 bias in the passive. Further research might provide detailed investigation of this assumption.

14.2. Processing RC Attachments in Turkish Learners of English

The present dissertation showed that Turkish learners of English had an overall NP1 attachment preference and longer RTs in the passive RC condition. Therefore, the present dissertation suggested that NP1 attachment preference could be associated with processing difficulty. In other words, NP1 attachment could be explained with L2 processing being cognitively more demanding and passive being syntactically more complex to process. Furthermore, the effect of syntactic priming observed in L2 learners with upper-intermediate level of proficiency suggested that L2 learners developed their parsing strategies in their L2 as their level of proficiency increased. Nonetheless, there was not a significant difference in the effect of syntactic priming or NP1 attachment preference between the intermediate and upper-intermediate levels of proficiency in English. On the other hand, there was an effect of the task requirement. Accordingly, there was less NP1 attachment preference when participants' directed assessment of the prime attachment site was required, thereby suggesting that participants' directed attention influenced their preferences.

14.3. Limitations and Ideas for Further Research

This dissertation collected the data from a reasonably large sample of participants and investigated RC attachment preferences both in monolingual Turkish speakers and Turkish learners of English through offline (pen-and-paper), online (self-paced reading), and eye-tracking studies in order to find answers to its research questions. The role of several confounding factors on RC attachment preferences was identified. To start with, the present dissertation drew attention to the role of (i) animacy / inanimacy information embedded in the host NPs, (ii) semantic relations between the host NPs, (iii) the semantic associations of the host NPs with the proximal and the distal predicate, and (iv) the active / passive RC condition. Furthermore, the relation between working memory capacity and RC attachment preferences was analysed. Besides, the effects of the methodological issues, such as the presentation mode (i.e. full sentence or phrase-by-phrase), techniques (i.e. offline, online, or eye-tracking), and task requirements (i.e. implicit processing or directed assessment of the syntactic structure in the prime and comprehension or production) were discussed.

However, the present dissertation had some limitations. There are still several things to do for a better understanding of RC attachment preferences in monolingual Turkish speakers and Turkish learners of English. Therefore, the present dissertation offers some ideas for further research as touched upon briefly in the previous chapter,. The limitations and the ideas for further research are presented below:

1. To start with the relation between the semantic relations of the host NPs with one another and the semantic associations of the host NPs with the proximal and the distal predicate in sentences needs further investigation so as to clarify the role semantic factors in RC attachment preferences. The semantic factors could explain why there are variations in RC attachment preferences across languages. The previous research has often designed the tasks ignoring their effects. Understanding how these factors interact with RC attachment preferences could provide further explanation. The present dissertation did not focus on revealing how RC attachment preferences varied depending on different semantic relations between the host NPs in detail or it did not provide a sophisticated understanding of the semantic associations of the host NPs between the proximal and the distal predicate. The main purpose of the present dissertation was to obtain a set of balanced - ambiguous sentences. This was done through adaptations on the previous set used in Turkish by Dinçtopal-Deniz (2007; 2010). However, researchers might investigate these semantic factors in more sensitive experimental designs.

2. The experiments in the present dissertation investigated the syntactic priming of RC attachments in comprehension. Only Experiment2 was designed to understand the syntactic priming of RC attachments in production. Furthermore, Experiment 2 aimed to compare the ambiguous (RC+NP2+NP1) and unambiguous (NP2+RC+NP1) RC attachment alternatives in Turkish in order to see whether monolingual Turkish speakers would prefer the unambiguous alternative if they wanted to attach RCs to NP1 as the Avoid Ambiguity strategy would predict. However, it was difficult to design a task which will force participants to form RCs and a complex genitive possessive construction considering the fact that Turkish does not have a relative pronoun and genitive or possessive marker should be provided to imply that a genitive possessive construction must be formed. In Experiment 2, NP1 with the possessive marker was already given in the sentence, which might have forced participants to form the genitive structure first, and then form the RC to complete the sentence. Therefore, further research might investigate the syntactic priming of RC attachments in Turkish through a different design. For instance, the head NPs, NP1, might be given without a possessive marker. NP2 can be marked with a genitive suffix (-in) instead (in order to avoid the risk of using the NP2 as a modifier such as "oyuncu abla"; *the sister who is an actress*). Furthermore, RCs might be provided with a participle suffix, e.g. -(y)An. They might be provided in a box and participants might be required to order them to complete a sentence.

3. The literature has showed inconsistent and unexpected results regarding RC attachment preferences and the effect of syntactic priming in L2. Therefore, a comparison of L2 levels (i.e. intermediate and upper-intermediate) was provided in Experiment 5, 6, 7, and 8. Experiment 5 and 7 required implicit processing of the prime attachment site whereas Experiment 6 and 8 required directed assessment of the prime attachment site. The participants' levels of proficiency were compared in

both groups. The results showed some differences between the two levels of proficiency. However, the relation between the levels of proficiency and RC attachment preferences as we as the effect of syntactic priming was not significant. The reason could be explained with that the difference between the two levels were not so great. The lower level was intermediate whereas the higher level was upper-intermediate. Furthermore, the comparison of levels is based on participants' self-assessment, which might not reflect their true levels of proficiency n English. Therefore, further research providing a comparison of L2 learners with intermediate and target-like levels might provide a better understanding of this relation.

4. Corpus data might enable us to explain RC attachment preferences of monolingual Turkish speakers and Turkish learners of English. The present dissertation showed that Turkish learners of English had an overall NP1 attachment preference, and that monolingual Turkish speakers showed an NP1 attachment preference in the passive RC condition. The findings suggested that NP1 attachment preference could be attributed to processing difficulty. In other words, NP1 attachment could be explained with L2 processing being cognitively more demanding and passive being syntactically more complex to process. However, this does not explain why there was an NP1 attachment preference in the passive RC condition, especially in the inanimate condition, and why there was an NP2 attachment preference in the active RC condition only when the prime was NP1 attachment forced but not when it was NP2 attachment forced, even though there are some evidence in other languages suggesting that an inanimate NP has higher processing cost as compared to an animate NP in RC attachment. These results could be related to monolingual Turkish speakers' past experiences of RC attachments. Corpus data might provide better evidence regarding that.

5. Based on the analysis of the data obtained by a number of studies within the scope of this dissertation, NP1 attachment preference seems to be related to processing difficulty. Participants had more NP1 attachment preferences when they encountered passive RCs, and inanimate NPs, when they had low reading spans, and when the task was presented in their L2. This NP1 attachment preference could be explained with the chunking strategy as put forth by the Implicit Prosody Hypothesis. Even though there is no strong evidence yet for the assumption that sentence processing is guided by prosodic factors, even in silent reading, the hypothesis seems to explain the similar effect in different conditions. Therefore, further research should be conducted in order to provide a sophisticated understanding of the effect of prosodic factors on sentence processing during silent reading.

6. The effect of auditory and visual modalities in RC attachment preferences would be different considering the fact that auditory materials provide a better way of controlling prosodic factors which we cannot in written materials. One can also provide contextual information to control chunking strategies employed by L1 and L2 readers in future research. Besides, articulation of speech is accompanied by head movements and facial expressions. This visual aspect of speech also provides additional information (Graf et al., 2002). Thus, future research might also investigate the effect of visual prosody on RC attachment in various languages.

7. Lastly, the syntactic functions of the host NPs in the genitive possessive construction carrying a variety of relational readings should be further investigated. These syntactic functions of the specifier and the head can provide a clear understanding of the difference observed in the active RC and the passive RC condition.

In brief, the present dissertation sought to find answers to several questions. However, there are still at least five ideas which future research might focus on in order to provide a better understanding of the effects of semantic factors on RC attachment preferences, the differences between comprehension and production, the relation between L2 proficiency and parsing strategies, and the effect of past experiences as well as the syntactic functions of the host NPs in the genitive possessive constructions on processing complex sentences.

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APPENDIX A: GENERAL MATERIALS

A1. Demographic Information Form (Turkish)

Demografik Bilgi Toplama Formu

Uygulama Tarihi   :   .... / .... / ....

Kişisel Bilgiler:

Adı ve Soyadı   :

Cinsiyetiniz   :   Kadın ☐   Erkek ☐

Yaşınız   :

Mesleğiniz   :   _____

     Çalışmıyorum ☐

Eğitim Durumu ve Alanı   :

Örnek: *Lisans :*   *İngilizce Öğretmenliği 2. Sınıf, 1. Dönem*

1.   Lisans   :

_____

2.   Yüksek Lisans   :

_____

3.   Doktora   :

_____

Bildiğiniz Diller:

Ana Diliniz   :   Türkçe ☐   Diğer ☐

Bildiğiniz bir ya da birden fazla yabancı dil var mı? Varsa hangi dil ya da diller olduğunu seviyenizle birlikte lütfen burada belirtiniz.

Bu anketle birlikte size verilen Dil Seviyeleri - Öz Değerlendirme Çizelgesine göre seviyenizi belirtiniz. Daha önce elde ettiğiniz her hangi bir sertifika ya da dil puanınız varsa (YDS, TOEFL ya da okulunuzda yapılan İngilizce muafiyet / seviye belirleme sınavı sonuçları gibi) lütfen yazınız.

	Yabancı Diller	Seviye	Dil Sınavı Puanı / Sertifika (Varsa)
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

Ağırlıklı olarak hangi elinizi kullanırsınız?　　Sağ ☐　　Sol ☐

Sağlık Durumunuza İlişkin Bilgiler:

Görme bozukluğunuz var mı?　　Var ☐　　Yok ☐

　Varsa düzeltilmiş mi, gözlük ya da kontakt lens kullanıyor musunuz? Lütfen açıklayınız:

_____

–

Renk körlüğünüz var mı?　　Var ☐　　Yok ☐

Geçirdiğiniz önemli bir rahatsızlık (özellikle nörolojik, psikiyatrik ya da psikolojik) var mı?

　　Var ☐　　Yok ☐

　Varsa lütfen açıklayınız:

_____

Sürekli kullandığınız bir ilaç var mı?　　Var ☐　　Yok ☐

　Varsa ilacın ya da ilaçların adlarını lütfen yazınız:

_____

Uzun süre kullanıp bıraktığınız bir ilaç var mı?   Var ☐   Yok ☐

Varsa ilacın ya da ilaçların adlarını lütfen yazınız:

_____

Varsa ilaç ya da ilaçları kullanım sürenizi lütfen yazınız:

_____

Herhangi bir konuşma ya da dil ile ilgili başka (anlama ya da yazma ile ilgili) bir probleminiz var mı?

    Var ☐   Yok ☐

Varsa lütfen açıklayınız:

_____

Daha önce buna benzer bir çalışmaya katıldınız mı?   Evet ☐   Hayır ☐

Katıldıysanız nasıl bir çalışma olduğunu ve ne zaman katıldığınızı lütfen kısaca belirtiniz:

_____
_____

ÇALIŞMAMIZA KATILDIĞINIZ İÇİN ÇOK TEŞEKKÜR EDERİZ! :)

A2. Demographic Information Form (English)

Demographic Information

Date   :   .... / .... / ....

Personal Information:

Name, Surname   :   _____

Gender   :   Female ☐   Male ☐

Age   :   _____

Occupation   :   _____

                      I do not work. ☐

Education   :   Please write your educational background as in the example given below.

Example: BA *:*   English language teaching, Year 2, Semester 1

1.   BA   :

     _____

2.   MA / MSc   :

     _____

3.   PhD   :

     _____

Languages:

Native Language   :   Turkish ☐   ☐

If you know other languages, please indicate them below with your proficiency level.

Please use the self-assessment grid given to you with this survey. If you have any language certificate or have taken any language exam (e.g. TOEFL) before, please indicate them as in the example below.

	Languages	Levels	Language Exam Scores / Certificates
Example:	**English**	**B1**	**80 (TOEFL-IBT)**
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

A3. Post-study Survey

<div align="center">

Araştırma Sonrası Anket

(Araştırma sonunda doldurulacaktır.)

</div>

Çalışma boyunca cümleleri anlamak ve sorulara cevap verebilmek için özel bir yöntem kullandım (Bazı kelimelere dikkat etmek, cümledeki bazı öğelere özellikle dikkat etmek, cümleyi öğelerine bölmek, ifadeler arasında anlam ilişkisi kurmak vb. gibi). Lütfen birini işaretleyiniz.

Evet ☐   Hayır ☐

Cümleleri anlamak ve sorulara cevap verebilmek için herhangi bir yöntem kullandıysanız, lütfen detaylı bir şekilde açıklayınız.

_____
_____
_____
_____
_____
_____
_____

Çalışma boyunca, cümleleri anlamak ve sorulara cevap verebilmek için bu yöntem ya da yöntemleri ne sıklıkta kullandınız. Lütfen birini işaretleyiniz.

☐   Herhangi bir yöntem kullanmadım.

☐   Nadiren bu yöntem ya da yöntemleri kullandım.

☐   Bazen bu yöntem ya da yöntemleri kullandım.

☐   Çoğu zaman bu yöntem ya da yöntemleri kullandım.

☐   Her zaman bu yöntem ya da yöntemleri kullandım.

B1. Pilot Study 1

01.   Kafede oturan kadının arkadaşı konuşkan birisi.
        Kafede oturan kimdir?
        a. arkadaşı   b. kadın
02.   Bankaya giden müdürün karısı güzel giyinmiş.
        Bankaya giden kimdir?
        a. karısı   b. müdür
03.   Maviye boyanan bardağın kulpu çok beğenildi.
        Maviye boyanan hangisidir?
        a. bardak   b. kulp
04   Yurtdışına giden mühendisin ağabeyi iyi insandır.
        Yurtdışına giden kimdir?
        a. ağabey   b. mühendis
05.   İki ay önce kapanan okulun yemekhanesi kötüydü.
        İki ay önce kapanan hangisidir?
        a. yemekhane   b. okul
06.   Restore edilen sarayın salonu çok görkemliydi.
        Restore edilen hangisidir?
        a. saray   b. salon
07.   Fransa'da yaşayan tasarımcının kızı uzun boylu.
        Fransa'da yaşayan kimdir?
        a. tasarımcı   b. kızı
08.   Konservatuara giden şarkıcının gitaristi büyüleyici.
        Konservatuara giden kimdir?
        a. gitarist   b. şarkıcı
09.   Yolda bozulan arabanın direksiyonu çok hassastı.
        Yolda bozulan hangisidir?
        a. direksiyon   b. araba
10.   Bu sabah temizlenen eczanenin camı kırıldı.
        Bu sabah temizlenen hangisidir?
        a. eczane   b. cam
11.   Karakola gelen hırsızın kardeşi şüpheli davranıyordu.
        Karakola gelen kimdir?
        a. kardeş   b. hırsız
12.   Çok iyi çalınan senfoninin giriş müziği ödül kazandı.
        Çok iyi çalınan hangisidir?
        a. senfoni   b. giriş müziği
13.   Hafta sonu saldırıya uğrayan postacının oğlu dava açtı.
        Hafta sonu saldırıya uğrayan kimdir?
        a. oğlu   b. postacı
14.   Yazıyı yeniden yazan yazarın editörü epey sinirliydi.
        Yazıyı yeniden yazan kimdir?
        a. editör   b. yazar

15. Özenle hazırlanan resimlerin sergisi görücüye çıktı.
    Özenle hazırlanan hangisidir?
    a. resimler   b. sergi
16. Dün yapılan konferansın gala yemeği çok sıkıcıydı.
    Dün yapılan hangisidir?
    a. gala yemeği   b. konferans
17. Mahkeme salonunda bekleyen katilin avukatı gergin.
    Mahkeme salonunda bekleyen kimdir?
    a. katil   b. avukat
18. Londra'da büyüyen muhasebecinin çalışanı çok hırslı.
    Londra'da büyüyen kimdir?
    a. muhasebeci   b. çalışan
19. İstifa eden büyükelçinin yardımcısı bir sorunla karşılaştı.
    İstifa eden kimdir?
    a. yardımcı   b. büyükelçi
20. Rus bir yazar tarafından yazılan kitabın önsözü etkileyici.
    Rus bir yazar tarafından yazılan hangisidir?
    a. kitap   b. önsöz
21. Yeni yıkanan arabanın paspası turuncu renkliydi.
    Yeni yıkanan hangisidir?
    a. paspas   b. araba
22. Modern tarzda tasarlanan evin mobilyaları hoş gibi.
    Modern tarzda tasarlanan hangisidir?
    a. ev   b. mobilyalar
23. Bugün kazada yaralanan çiftçinin damadı çok zengin.
    Bugün kazada yaralanan kimdir?
    a. çiftçi   b. damat
24. Hastalarla ilgilenen doktorun asistanı yeni mezun.
    Hastalarla ilgilenen kimdir?
    a. asistan   b. doktor
25. Daha yeni tamir edilen ayakkabının topuğu vuruyor.
    Daha yeni tamir edilen hangisidir?
    a. ayakkabı   b. topuğu
26. Ufak yüzgeçleri olan balığın yavrusu hızla büyüyor.
    Ufak yüzgeçleri olan hangisidir?
    a. yavru   b. balık
27. Almanya'dan dönen gencin babası herkesi sevindirdi.
    Almanya'dan gelen hangisidir?
    a. genç   b. baba
28. Geçen yıl yapılan üniversitenin kütüphanesi çok güzel.
    Geçen yıl yapılan hangisidir?
    a. kütüphane   b. üniversite
29. Geçmişi 15. yüzyıla dayanan şehrin kilisesi büyüleyici.
    Geçmişi 15. yüzyıla dayanan hangisidir?
    a. şehir   b. kilise
30. Hollanda'dan ithal edilen lalelerin tohumları kayboldu.
    Hollanda'dan ithal edilen hangisidir?
    a. laleler   b. tohumlar

B2. Pilot Study 2

01. Geçtiğimiz gün satın alınan masanın örtüsü geri gönderildi.
Geçtiğimiz gün satın alınan hangisi?
a. masa   b. örtüsü
02. Yıllar evvel kaybolan dolabın anahtarı daha yeni bulundu.
Yıllar evvel kaybolan hangisi?
a. anahtarı   b. dolap
03. Almanya'da yetiştirilen mühendisin oğlu meraklı bir insan.
Almanya'da yetiştirilen kim?
a. oğlu   b. mühendis
04. Maviye boyanan kavanozun kapağı sandalyenin arkasında.
Maviye boyanan hangisi?
a. kavanoz   b. kapağı
05. Konservatuara kabul edilen şarkıcının gitaristi otelde çalıştı.
Konservatuara kabul edilen kim?
a. gitaristi   b. şarkıcı
06. Ameliyata çağrılan doktorun asistanı öğle yemeği yiyordu.
Ameliyata çağrılan kim?
a. doktor   b. asistanı
07. Geçen yıl genişletilen odanın penceresi sokağa bakıyormuş.
Geçen yıl genişletilen hangisi?
a. penceresi   b. oda
08. Belçika'da kaçırılan öğretmenin babası elçiliği uyarmıştı.
Belçika'da kaçırılan kim?
a. öğretmen   b. babası
09. Geçenlerde okulda unutulan gözlüğün kutusu siyah renkliydi.
Geçenlerde okulda unutulan hangisi?
a. kutusu   b. gözlük
10. Bir kaç ay evvel seçilen evin mobilyaları modern tarzdaydı.
Bir kaç ay evvel seçilen hangisi?
a. ev   b. mobilyaları
11. Bir çok soru yöneltilen bakanın danışmanı epey terlemişti.
Bir çok soru yöneltilen kim?
a. danışmanı   b. bakan
12. Pazartesi işe alınan muhasebecinin karısı İngilizce biliyordu.
Pazartesi işe alınan kim?
a. karısı   b. muhasebeci
13. Akşam üzeri kazara kırılan kapının tokmağı el oymasıydı.
Akşam üzeri kazara kırılan hangisi?
a. kapı   b. tokmağı
14. Yarım saattir konuşulan kadının arkadaşı yorulmuş olmalı.
Yarım saattir konuşulan kim?
a. arkadaşı   b. kadın
15. Sabah hastanede dövülen postacının amcası şikayetçi oldu.
Sabah hastanede dövülen kim?
a. postacı   b. amcası

16. Her gün temizlenen apartmanın bahçesi gerçekten büyük.
    Her gün temizlenen hangisi?
    a. bahçesi   b. apartman
17. Bugün kundaklanan dükkanın aracı hafif zararla kurtuldu.
    Bugün kundaklanan hangisi?
    a. dükkan   b. aracı
18. Telefonda dolandırılan oyuncunun ablası medyaya konuştu.
    Telefonda dolandırılan kim?
    a. oyuncu   b. ablası
19. Zorla denize sokulan çocuğun kardeşi heyecandan bağırdı.
    Zorla denize sokulan kim?
    a. kardeşi   b. çocuk
20. Az önce çantaya konulan tabletin kablosu farklı tasarlanmıştı.
    Az önce çantaya konulan hangisi?
    a. tablet   b. kablosu
21. Hediye olarak verilen kitabın ayracı beyaz zambak kokuluydu.
    Hediye olarak verilen hangisi?
    a. ayracı   b. kitap
22. Aylardır özenle hazırlanan derginin sitesi görücüye çıkmış.
    Aylardır özenle hazırlanan hangisi?
    a. dergi   b. sitesi
23. Çalışanlarla tanıştırılan müdürün sekreteri ayakta bekledi.
    Çalışanlarla tanıştırılan kim?
    a. müdür   b. sekreteri
24. Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
    Dün ödüllendirilen kim?
    a. kameramanı   b. gazeteci
25. Düzenli bakımı yapılan bahçenin yolu senelerdir kullanılıyor.
    Düzenli bakımı yapılan hangisi?
    a. yolu   b. bahçe
26. Bütün parası çalınan hemşirenin ninesi çaresiz söyleniyor.
    Bütün parası çalınan kim?
    a. hemşire   b. ninesi
27. Ayakta tedavi edilen gelinin annesi memlekete geri döndü.
    Ayakta tedavi edilen kim?
    a. annesi   b. gelin
28. Çöp tenekesine atılan oyuncağın ambalajı kullanılabilirdi.
    Çöp tenekesine atılan hangisi?
    a. ambalajı   b. oyuncak
29. Arabaya bırakılan bilgisayarın çantası oldukça eskimişti.
    Arabaya bırakılan hangisi?
    a. çantası   b. bilgisayar
30. Şirketten kovulan patronun avukatı zor durumda kaldı.
    Şirketten kovulan kim?
    a. patron   b. avukatı

B3. Pilot Study 3

01. Geçtiğimiz gün satın alınan masanın örtüsü çok beğenildi.
    Geçtiğimiz gün satın alınan hangisi?
    a. masa   b. örtüsü
02. Yıllar evvel kaybedilen koyunun kuzusu sarı beneklere sahip.
    Yıllar evvel kaybedilen hangisi?
    a. kuzusu   b. koyun
03. Suriye'de kaçırılan mühendisin oğlu Türk vatandaşı değildi.
    Suriye'de kaçırılan kim?
    a. oğlu   b. mühendis
04. Partiye davet edilen şarkıcının gitaristi otelde çalışıyordu.
    Partiye davet edilen kim?
    a. gitaristi   b. şarkıcı
05. Uzay İstasyonu'na gönderilen astronotun ikizi inceleniyor.
    Uzay İstasyonu'na gönderilen hangisi?
    a. ikizi   b. astronot
06. Geçen yıl öldürülen öğretmenin babası tanınmış bir insandı.
    Geçen yıl öldürülen kim?
    a. öğretmen   b. babası
07. Bir kaç ay evvel değiştirilen evin mobilyaları çok bakımsızdı.
    Bir kaç ay evvel değiştirilen hangisi?
    a. ev   b. mobilyaları
08. Bir çok soru yöneltilen bakanın danışmanı sigara içiyordu.
    Bir çok soru yöneltilen kim?
    a. danışmanı   b. bakan
09. Cuma günü kazara kırılan kapının anahtarı yeniden yapıldı.
    Cuma günü kazara kırılan hangisi?
    a. kapı   b. anahtarı
10. Yarım saattir konuşulan kadının arkadaşı sabırla bekliyor.
    Yarım saattir konuşulan kim?
    a. arkadaşı   b. kadın
11. Sabah işyerinde dövülen postacının amcası şikayetçi oldu.
    Sabah işyerinde dövülen kim?
    a. postacı   b. amcası
12. Hafta sonları temizlenen apartmanın bahçesi epey büyük.
    Hafta sonları temizlenen hangisi?
    a. bahçesi   b. apartman
13. Telefonda dolandırılan oyuncunun ablası polise ifade verdi.
    Telefonda dolandırılan kim?
    a. oyuncu   b. ablası
14. Zorla denize sokulan çocuğun kardeşi sevimli bir kız bebek.
    Zorla denize sokulan kim?
    a. kardeşi   b. çocuk
15. Az önce odaya bırakılan tabletin kablosu farklı tasarlanmıştı.
    Az önce odaya bırakılan hangisi?
    a. tablet   b. kablosu

16. Hediye olarak verilen kremin şampuanı çay ağacı kokuluydu.
    Hediye olarak verilen hangisi?
    a. şampuanı   b. krem
17. Çalışanlarla tanıştırılan memurun sekreteri deneyimli biri.
    Çalışanlarla tanıştırılan kim?
    a. memur   b. sekreteri
18. Bütün parası çalınan hemşirenin kocası hırsızların peşinde.
    Bütün parası çalınan kim?
    a. hemşire   b. kocası
19. Ayakta tedavi edilen adamın gelini hastaneye teşekkür etti.
    Ayakta tedavi edilen kim?
    a. gelini   b. adam
20. Şirketten kovulan avukatın yardımcısı zor durumda kaldı.
    Şirketten kovulan kim?
    a. avukat   b. yardımcısı

B4. Pilot Study 4

01. Geçtiğimiz gün satın alınan koltuğun kılıfı masanın üstünde.
    Geçtiğimiz gün satın alınan hangisi?
    a. koltuk   b. kılıfı
02. Suriye'de kaçırılan mühendisin oğlu bordo bereli bir asker.
    Suriye'de kaçırılan kim?
    a. oğlu   b. mühendis
03. Geçen yıl öldürülen öğrencinin öğretmeni tanınmış biriymiş.
    Geçen yıl öldürülen kim?
    a. öğretmeni   b. öğrenci
04. Çalışanlarla tanıştırılan memurun sekreteri tatlı ikram etti.
    Çalışanlarla tanıştırılan kim?
    a. memur   b. sekreteri
05. Her gün temizlenen apartmanın avlusu dikkat çekiyordu.
    Her gün temizlenen hangisi?
    a. avlusu   b. apartman
06. Hafta başında seçilen evin mobilyaları ahşaptan yapılmıştı.
    Hafta başında seçilen hangisi?
    a. mobilyaları   b. ev
07. Zorla denize sokulan çocuğun kardeşi heyecandan çıldırdı.
    Zorla denize sokulan kim?
    a. çocuk   b. kardeşi
08. Birkaç ay evvel tamir edilen kapının tokmağı el oymasıydı.
    Birkaç ay evvel tamir edilen hangisi?
    a. kapı   b. tokmağı
09. Şirketten kovulan avukatın kocası patronla görüşmek istedi.
    Şirketten kovulan kim?
    a. kocası   b. avukat

10. Nazikçe sehpaya koyulan kitabın ayracı hemen fark edildi.
    Nazikçe sehpaya koyulan hangisi?
    a. ayracı   b. kitap
11. Önceki gün değiştirilen bilgisayarın çantası sorun çıkartıyor.
    Önceki gün değiştirilen hangisi?
    a. bilgisayar   b. çantası
12. Vestiyere yerleştirilen ayakkabının boyası uygun fiyata geldi.
    Vestiyere yerleştirilen hangisi?
    a. boyası   b. ayakkabı
13. Günler önce terziye gönderilen elbisenin ceketi onarılmış.
    Günler önce terziye gönderilen hangisi?
    a. elbise   b. ceketi

B5. Target Sentences (i.e. Globally Ambiguous Sentences)

Animate Condition

01. Partiye davet edilen şarkıcının gitaristi otelde çalışıyordu.
02. Sabah işyerinde dövülen postacının amcası şikayetçi oldu.
03. Telefonda dolandırılan oyuncunun ablası polise ifade verdi.
04. Ayakta tedavi edilen adamın gelini hastaneye teşekkür etti.
05. Ameliyata çağrılan doktorun asistanı öğle yemeği yiyordu.
06. Pazartesi işe alınan muhasebecinin karısı İngilizce biliyordu.
07. Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
08. Zorla denize sokulan çocuğun kardeşi heyecandan çıldırdı.

Inanimate Condition

01. Az önce odaya bırakılan tabletin kablosu farklı tasarlanmıştı.
02. Maviye boyanan kavanozun kapağı sandalyenin arkasında.
03. Geçenlerde okulda unutulan gözlüğün kutusu siyah renkliydi.
04. Bugün kundaklanan dükkanın aracı hafif zararla kurtuldu.
05. Aylardır özenle hazırlanan derginin sitesi görücüye çıkmış.
06. Geçtiğimiz gün satın alınan koltuğun kılıfı masanın üstünde.
07. Hafta başında seçilen evin mobilyaları ahşaptan yapılmıştı.
08. Günler önce terziye gönderilen elbisenin ceketi onarılmış.

Aşağıda verilen cümleleri sırayla okuyunuz. Takip eden boşluklu cümleler bir üst satırda verilen ilgili cümlelere göre en uygun şekilde ve yalnızca tek bir kelime kullanılarak (lütfen zamir kullanmayın) doldurulacaktır. Lütfen bir cümleyi tamamladıktan sonra tekrar o cümleye geri dönmeyiniz. Başlamadan önce örnek cümleyi incelemeyi unutmayınız.

Örnek: Karadeniz'de batırılan balıkçının teknesi kıyıya sürüklendi.
                    Tekne Karadeniz'de batırıldı.

                    Kitabı yazdığında annesine öğretmen sevinçle sarıldı.
                    Öğretmen önce kitabı *yazdı*.

Sonuçlara bakarken hemşire hastaya şüphelerini sıralıyordu.
Hemşire önce sonuçlara _____ .

Bütünüyle dolduğunda baraj köylülere gerçekten faydalı oldu.
Baraj _____ doldu.

Fakültenin sahtecilikle suçlanan dekanı görevden ayrılıyordu.
_____ sahtecilikle suçlandı.

Partiye davet edilen şarkıcının gitaristi bir otelde çalışıyordu.
_____ partiye davet edildi.

Savcıyı sertçe eleştirdiğinde avukat stajyere fena sinirlendi.
Avukat, savcıyı _____ eleştirdi.

Sunumu ayrıntılı incelerken projeyi kurul oldukça beğendi.
Kurul, projeyi _____ beğendi.

Tersanede restore edilen kralın gemisi limana sessizce yaklaştı.
_____ tersanede restore edildi.

Telefonda dolandırılan oyuncunun ablası polise ifade verdi.
_____ telefonda dolandırıldı.

Korucuyu gördüklerinde avcılar geyiği çoktan yakalamıştı.
Avcılar önce korucuyu _____ .

Deneyleri yaptığında araştırmacı bulguları günlerce değerlendirdi.
Araştırmacı önce deneyleri _____ .

Yönetmenin sınırlı bütçeyle çekilen filmi Oscar'a aday oldu.
_____ sınırlı bütçeyle çekildi.

Zorla denize sokulan çocuğun kardeşi heyecandan çıldırdı.
_____ zorla denize sokuldu.

Her şeyi anlattığında hakim davalıyı hapis cezasına mahkum etti.
Davalı, hakime her şeyi _____ .

Dünyayı aydınlatırken izleyenleri meteorlar etkisi altına almıştı.
Meteorlar, dünyayı _____ .

Bahçede güldürülen restoranın aşçısı yıllarca İtalya'dan geldi.
_____ bahçede güldürüldü .

Sabah işyerinde dövülen postacının amcası şikayetçi oldu.
_____ sabah işyerinde dövüldü.

Damarlarda ilerlerken cihaz tümörü çabucak tespit ediyordu.
Cihaz, tümörü _____ tespit ediyordu.

Süt ile karıştırıldığında tarçın kurabiyeyi daha da lezzetlendirdi.
Tarçın önce süt ile _____.

Kafenin saldırıda kötü yaralanan garsonu dava açtı.
_____ saldırıda kötü yaralandı.

Bugün kundaklanan dükkanın aracı hafif zararla kurtuldu.
_____ bugün kundaklandı.

Toplantıda ortaya çıkarıldığında muhbiri mektup kolayca ele verdi.
Mektup, muhbiri _____ ele verdi.

Anayasayı değiştirirken uzmanlar hükümete destek veriyordu.
Hükümet, anayasayı _____ .

Bayram tatilinde kirletilen bebeğin kıyafeti güç bela değiştirilmişti.
_____ bayram tatilinde kirletildi.

Az önce odaya bırakılan tabletin kablosu oldukça farklı tasarlanmıştı.
_____ az önce odaya bırakıldı.

_____

Sonunda jüriyi ikna ederken profesör kanıta elbette ihtiyaç duydu.
Profesör, jüriyi _____ ikna etti.

Mahalleye vardığında hizmetçi muhtara rahatlıkla ulaşabildi.
Hizmetçi önce mahalleye _____ .

Öğrencinin uzun zamandır kullanılan defteri yanlışlıkla yırtıldı.
_____ uzun zaman kullanıldı.

Maviye boyanan kavanozun kapağı sandalyenin arkasında.
_____ maviye boyandı.

Bahsi kazandığında sihirbaz kumarbazı içtenlikle tebrik etti.
Sihirbaz, kumarbazı _____ tebrik etti.

Karşı tarafa geçerken malları satıcı güvenilir birine emanet etti.
Satıcı karşı tarafa _____ .

Polis tarafından şehirde aranan kazanın suçlusu gözaltına alınmış.
_____ polis tarafından şehirde arandı.

Günler önce terziye gönderilen elbisenin ceketi onarılmış.
_____ günler önce terziye gönderildi.

Fiyat teklif ederken müteahhit mühendisi haince kandırmak istedi.
Müteahhit, mühendisi _____ kandırmak istedi.

Seçmelere katıldığında manken tasarımcıyı bayağı öfkelendirdi.
Manken, tasarımcıyı _____ öfkelendirdi.

Bankanın düğünde sarhoş edilen temsilcisi ansızın havuza atıldı.
_____ düğünde sarhoş edildi.

Ayakta tedavi edilen adamın gelini hastaneye teşekkür etti.
_____ ayakta tedavi edildi.

_____

Bomba ihbarı aldığında müşterileri yetkililer hemen dışarı çıkardı.
Yetkililer önce bomba ihbarı _____ .

İstanbul'da havalimanına inerken leylekleri uçak sorunsuz geçti.
Uçak, leylekleri _____ geçti.

Kömürlükte saklanan komşunun bisikleti birden ortadan kayboldu.
_____ kömürlükte saklandı.

Dün ödüllendirilen muhabirin kameramanı yurtdışına gitti.
_____ dün ödüllendirildi.

Uçurumun kenarından geçerken tren yolcuları epey korkuttu.
Tren, yolcuları _____ korkuttu.

Aşırı derecede farklılaştığında iklim hayvanları göç etmeye zorladı.
İklim önce aşırı derecede _____.

Dedenin balkonda kurutulan gömleği dolapta duruyordu.
_____ balkonda kurutuldu.

Ameliyata çağrılan doktorun asistanı öğle yemeği yiyordu.
_____ ameliyata çağrıldı.

Aynayı parlattığında teyzeyi temizlikçi gerçekten sevindirdi.
Temizlikçi önce aynayı _____.

Üniversiteyi kurarken mekana iş adamı ciddi önem gösterdi .
İş adamı, mekana _____ önem gösterdi.

Sebepsiz işten kovulan büronun çaycısı mutsuz görünüyordu.
_____ sebepsiz işten kovuldu.

Pazartesi işe alınan muhasebecinin karısı İngilizce biliyordu.
_____ Pazartesi işe alındı.

_____

Kimlik tespiti yaparken komiser insanları detaylıca sorguladı.
Komiser, insanları _____ sorguladı.

Güverteye geçtiğinde kaptan tayfaya teker teker görevlerini dağıttı.
Kaptan önce güverteye _____ .

Otobüsün patlamada sağ kurtarılan şoförü uzun boyluydu.
_____ patlamada sağ kurtarıldı.

Geçenlerde okulda unutulan gözlüğün kutusu siyah renkliydi.
_____ geçenlerde okulda unutuldu.

Kazıyı tamamladığında fosilleri arkeolog müzeye teslim etti.
Arkeolog önce kazıyı _____.

Baklavayı çıtır çıtır kızartırken mutfağı fırın harika kokuttu.
Fırın, mutfağı _____ kokuttu.

Hızlıca emniyete alınan katilin tabancası neyse ki tutukluk yapmış.
_____ hızlıca emniyete alındı.

Aylardır özenle hazırlanan derginin sitesi görücüye çıkmış.
_____ aylardır özenle hazırlandı.

Belediyeye uğrarken veznedar amire dürüstçe açıklama yaptı.
_____ belediyeye uğradı.

Köye geri döndüğünde kaymakam köprüyü ulaşıma açmıştı.
Kaymakam önce köye geri _____ .

Bestecinin akşam sergilenen müzikali dakikalarca alkışlanmıştı.
_____ akşam sergilendi.

Hafta başında seçilen evin mobilyaları ahşaptan yapılmıştı.
_____ hafta başında seçildi.

_____

Kuruma atandığında soruşturma müfettişi fazlasıyla meşgul etti.
Soruşturma, müfettişi _____ meşgul etti.

Koğuşları yeniden dolaşırken mahkumu gardiyan yanına çağırdı.
Gardiyan, koğuşları _____ dolaştı.

 Hediyelere boğulan sarayın mimarı şuanda Almanya'da.
_____ hediyelere boğuldu.

Geçtiğimiz gün satın alınan koltuğun kılıfı masanın üstünde.
_____ geçtiğimiz gün satın alındı.

APPENDIX D: SAMPLE BOOKLET FOR EXPERIMENT 2

AÇIKLAMALARI LÜTFEN DİKKATLE OKUYUNUZ!

Bu çalışmada size verilen cümleleri **sırayla** okumanız ve tamamlamanız gerekecektir.

Takip eden boşluklu **basit cümleler** bir üst satırda verilen **(ya da sizin tamamladığınız)** ilgili cümlelere göre **en uygun şekilde** ve **yalnızca tek bir kelime kullanılarak (lütfen zamir kullanmayın)** doldurulacaktır.

Bazı cümleleri sizin öncelikle tamamlamanız gerekecektir. Cümleleri tamamlarken kullanacağız tüm gerekli bilgiler (ana cümle ve yan cümlenizin öznesi olarak kullanmayı tercih edebileceğiniz iki isim ve tamamlayıcı olarak kullanabileceğiz cümleniz) kapalı parantez içinde aşağıdaki örnekte olduğu gibi size verilmiştir. Herhangi bir kelime eklemenize gerek yoktur. Hatta verilen iki isimden biri çoktan eksik cümlenizde yazılmış olacaktır. Sizden beklenen diğer ismi uygun şekilde cümlenizi tamamlarken kullanmanızdır.

Cümleleri **tek bir cümle** olacak şekilde, **noktalama işaretine (virgül, nokta, noktalı virgül gibi) gerek kalmadan**, **Türkçe gramer kurallarına uygun ve anlamlı** bir şekilde tamamlamanız beklenmektedir. Bunlar dışında kullanacağınız yapı ve kelime sıralaması konusunda sınırlama yoktur.

Son olarak **lütfen bir cümleyi tamamladıktan sonra tekrar o cümleye geri dönmeyiniz**! Başlamadan önce verilen bilgiler kullanılarak tamamlanan aşağıdaki örnek cümleyi incelemeyi unutmayınız.

Örnek: [balıkçı, tekne
                          Karadeniz'de batırıldı.]
                          Karadeniz'de batırılan balıkçının teknesi kıyıya sürüklendi.
                          Tekne Karadeniz'de batırıldı.

Sonuçlara bakarken hemşire hastaya şüphelerini sıralıyordu.
_____ sonuçlara bakıyordu.

[baraj, köylüler
Bütünüyle doldu.]
_____ köylülere gerçekten faydalı oldu.
_____ bütünüyle doldu.

Fakültenin sahtecilikle suçlanan dekanı görevden uzaklaştırıldı.
_____ sahtecilikle suçlandı.

[şarkıcı, gitarist
Partiye davet edildi.]
_____ gitaristi bir otelde çalıştırıldı.
_____ partiye davet edildi.

Savcıyı sertçe eleştirdiğinde avukat stajyere fena sinirlendi.
_____ savcıyı sertçe eleştirdi.

Sunumu detaylı incelerken projeyi kurul büyük ölçüde beğendi.
_____ sunumu detaylı inceledi.

Erken tahttan indirilen kralın gemisi limana sessizce demirlendi.
_____ erken tahttan indirildi.

[oyuncu, abla
Telefonda dolandırıldı.]
_____ ablası karakolda ifadeye alındı.
_____ telefonda dolandırıldı.

Geyikleri yakalarken avcılar korucuları beraberlerinde getirdi.
_____ geyikleri yakaladı.

[araştırmacı, bulgular
Deneyleri yaptı.]
_____ bulguları günlerce değerlendirdi.
_____ deneyleri yaptı.

Yönetmenin sınırlı bütçeyle çekilen filmi Oscar'a aday gösterildi.
_____ sınırlı bütçeyle çekildi.

[çocuk, kardeş
Zorla denize sokuldu.]
_____ kardeşi çılgınca heyecanlandırıldı.
_____ zorla denize sokuldu.

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Her şeyi itiraf ettiğinde hakim davalıyı hapis cezasına mahkum etti.
_____ her şeyi itiraf etti.

Dünyayı aydınlatırken izleyenleri meteorlar etkisi altına almıştı.
_____ dünyayı aydınlattı.

Ormana inşa edilen restoranın aşçısı yıllarca İtalya'da eğitildi.
_____ ormana inşa edildi.

[postacı, amca
Sabah işyerinde dövüldü.]
_____amcası   kısmen   sakinleştirildi.

_____ sabah işyerinde dövüldü.

Damarlarda ilerlerken cihaz tümörü çabucak tespit ediyordu.
_____ damarlarda ilerliyordu.

[tarçın, kurabiye
Süt ile karıştırıldı.]
_____ kurabiyeyi daha da lezzetlendirdi.
_____ süt ile karıştırıldı.

Kafenin saldırıda kötü yaralanan garsonu hastanede ziyaret edildi.
_____ saldırıda kötü yaralandı.

[dükkan, araç
Ağrı'da bugün kundaklandı.]
_____ aracı hafif zararla kurtarıldı.

_____ Ağrı'da bugün kundaklandı.

Toplantıda ortaya çıkarıldığında muhbiri mektup kolayca ele verdi.
_____ toplantıda ortaya çıkarıldı.

Anayasayı değiştirirken uzmanlar hükümete destek veriyordu.
_____ anayasayı değiştirdi.

 Nihayet beşikte uyutulan bebeğin kıyafeti güç bela değiştirildi.
_____ nihayet beşikte uyutuldu.

[tablet, kablo
Demin odaya bırakıldı.]
_____ kablosu oldukça farklı tasarlandı.
_____ demin odaya bırakıldı.

Sonunda jüriyi ikna ederken profesör kanıta tabi ki ihtiyaç duydu.
_____ sonunda jüriyi ikna etti.

[hizmetçi, muhtar
Mahalleye vardı.]
_____ muhtara rahatlıkla ulaşabildi.
_____ mahalleye vardı.

Öğrencinin uzun zamandır kullanılan defteri yanlışlıkla yırtıldı.
_____ uzun zaman kullanıldı.

[kavanoz, kapak
Kırmızı renge boyandı.]
_____kapağı sehpada güzelce süslendi.
_____ kırmızı renge boyandı.

Bahsi kazandığında sihirbaz kumarbazı içtenlikle tebrik etti.
_____ bahsi kazandı.

Karşı tarafa geçerken malları satıcı güvenilir birine emanet etti.
_____ karşı tarafa geçti.

Otoyolda dikkatsizlikle yapılan kazanın suçlusu gözaltına alındı.
_____ otoyolda dikkatsizlikle yapıldı.

[elbise, ceket
Cumartesi terziye gönderildi.]
_____ ceketi çoktan tamir edildi.

_____ cumartesi terziye gönderildi.

Fiyat teklif ederken müteahhit mühendisi haince kandırmak istedi.
_____ fiyat teklif etti.

[manken, tasarımcı
Seçmelere katıldı.]
_____ tasarımcıyı bayağı öfkelendirdi.
_____ seçmelere katıldı.

Bankanın düğünde sarhoş edilen temsilcisi ansızın havuza atıldı.
_____ düğünde sarhoş edildi.

[adam, gelin
Ayakta tedavi edildi.]
_____ gelini muayenehanede iyi karşılandı.
_____ ayakta tedavi edildi.

Bomba ihbarı aldığında müşterileri yetkililer hemen dışarı çıkardı.
_____ bomba ihbarı aldı.

İstanbul'da havalimanına inerken leylekleri uçak sorunsuz geçti.
_____ İstanbul'da havalimanına indi.

Sürekli kızdırılan komşunun bisikleti gizlice paramparça edildi.
_____ sürekli kızdırılan.

[muhabir, kameraman
Gece ödüllendirildi.]
_____ kameramanı yurt
Gece ödüllendirilen muhabirin kameramanı yurtdışına gönderildi.
_____ gece ödüllendirildi.

Uçurumun kenarından geçerken tren yolcuları epey korkuttu.
_____ uçurumun kenarından geçti.

[iklim, hayvanlar
Aşırı derecede farklılaştı.]
_____ hayvanları göç etmeye zorladı.
_____ aşırı derecede farklılaştı.

Dedenin balkonda kurutulan gömleği düzgünce dolaba yerleştirildi.
_____ balkonda kurutuldu.

[doktor, asistan
 Bu ameliyata çağrıldı.]
_____ asistanı öğle yemeğine çıkarıldı.
_____ bu ameliyata çağrıldı.

 Aynayı parlattığında teyzeyi temizlikçi gerçekten sevindirdi.
_____ aynayı parlattı.

Üniversiteyi kurarken mekana iş adamı özel bir önem gösterdi .
_____ üniversiteyi kurdu.

Şehir merkezine açılan büronun çaycısı hırsızlıktan tutuklandı.
_____ şehir merkezine açıldı.

[muhasebeci, arkadaş
Pazartesi işe alındı.]
_____ arkadaşı yarım saat bekletildi.
_____ Pazartesi işe alındı.

Kimlik tespiti yaparken komiser insanlara bazı sorular yöneltti.
_____ kimlik tespiti yaptı.

[kaptan, tayfa
Güverteye geçti.]
_____ tayfaya teker teker görevlerini dağıttı.
_____ güverteye geçti.

Otobüsün patlamada sağ kurtarılan şoförü hızla ambulansa taşındı.
_____ patlamada sağ kurtarıldı.

[gözlük, kutu
Geçen okulda unutuldu.]
_____ kutusu tesadüfen kantinde bulundu.
_____ geçen okulda unutuldu.

Kazıyı tamamladığında fosilleri arkeolog müzeye teslim etti.
_____ kazıyı tamamladı.

Baklavayı çıtır çıtır kızartırken mutfağı fırın misler gibi kokuttu.
_____ baklavayı çıtır çıtır kızarttı.

Çatışmada öldürülen katilin tabancası doğruca emniyete götürüldü.
_____ çatışmada öldürüldü.

[dergi, site
Aylardır titizlikle hazırlandı.]
_____ sitesi görücüye çıkarıldı.
_____ aylardır titizlikle hazırlandı.

Belediyeye uğrarken veznedar amire danışsa çok daha iyi olurdu.
_____ belediyeye uğradı.

Köye geri döndüğünde kaymakam köprüyü ulaşıma açmıştı.
_____ köye geri döndü.

Bestecinin bu akşam sergilenen müzikali dakikalarca alkışlandı.
_____ bu akşam sergilendi.

[ev, mobilya
Hafta başında seçildi.]
_____ mobilyaları tamamen ahşaptan yapıldı.
_____ hafta başında seçildi.

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Kuruma atandığında soruşturma müfettişi fazlasıyla meşgul etti.
_____ kuruma atandı.

[mahkum, gardiyan
Koğuşları yeniden dolaştı.]
_____ mahkumu gardiyan yanına çağırdı.
_____ koğuşları yeniden dolaştı.

 Yeni restore edilen sarayın mimarı Almanya'dan özellikle istendi.
_____ yeni restore edildi.

[koltuk, kılıf
Geçenlerde satın alındı.]
_____ kılıfı makinede tertemiz yıkandı.
_____ geçenlerde satın alındı.

APPENDIX E: MATERIALS FOR VALIDATING THE STIMULUS SET 2

E1. Pilot Study Sentences

01. Çok beğenilen aynanın çerçevesi dükkanda parlıyordu.
Çok beğenilen hangisi?
a. çerçevesi   b. ayna

02. Gazeteciyi bıçaklayan adamın çalışanı meydana koşuyordu.
Gazeteciyi bıçaklayan hangisi?
a. çalışanı   b. adam

03. Dalgınlıkla unutulan telefonun kablosu yere düşüyordu.
Dalgınlıkla unutulan hangisi?
a. kablosu   b. telefon

04. Acilen istenen bornozun havlusu balkonda kuruyordu.
Acilen istenen hangisi?
a. bornoz   b. havlusu

05. Hastayı yumruklayan doktorun asistanı hastaneye giriyordu.
Hastayı yumruklayan hangisi?
a. asistanı   b. doktor

06. Başkana sarılan şarkıcının gitaristi konservatuara gidiyordu.
Başkana sarılan hangisi?
a. gitaristi   b. şarkıcı

07. Yanlışlıkla kırılan sürahinin bardağı mağazaya gönderildi.
Yanlışlıkla kırılan hangisi?
a. sürahi   b. bardağı

08. Senaristi tekmeleyen oyuncunun menajeri koridora çıkıyordu.
Senaristi tekmeleyen hangisi?
a. menajeri   b. oyuncu

09. Futbolcuyu iten muhabirin kameramanı radyoda konuşuyordu.
Futbolcuyu iten hangisi?
a. kameramanı   b. muhabir

10. Gizlice kundaklanan fabrikanın arabası hafif zararla kurtarıldı.
Gizlice kundaklanan hangisi?
a. fabrika   b. arabası

11. Korumaya saldıran bakanın danışmanı meclise geliyordu.
Korumaya saldıran hangisi?
a. danışmanı   b. bakan

12. Pastayı kesen ressamın babası salonda dikiliyordu.
    Pastayı kesen hangisi?
    a. babası   b. ressam

13. Özenle hazırlanan derginin sitesi televizyonda gösterildi.
    Özenle hazırlanan hangisi?
    a. dergi   b. sitesi

14. Balonu patlatan bekçinin komşusu sokakta gülüyordu.
    Balonu patlatan hangisi?
    a. komşusu   b. bekçi

15. Topu yakalayan çocuğun kuzeni yolda zıplıyordu.
    Topu yakalayan hangisi?
    a. kuzeni   b. çocuk

16. Müşteriyi büyüleyen restoranın bahçesi kutlama için süslendi.
    Müşteriyi büyüleyen hangisi?
    a. bahçesi   b. restoran

17. Acımasızca dövülen postacının amcası istasyonda bekliyordu.
    Acımasızca dövülen hangisi?
    a. postacı   b. amcası

18. Haince dolandırılan hemşirenin ablası bankada çalışıyordu.
    Haince dolandırılan hangisi?
    a. ablası   b. hemşire

19. Güzelce boyanan kavanozun kapağı tezgahta yuvarlanıyordu.
    Güzelce boyanan hangisi?
    a. kapağı   b. kavanoz

20. Setçe tokatlanan muhasebecinin kardeşi parkta dolaşıyordu.
    Sertçe tokatlanan hangisi?
    a. muhasebeci   b. kardeşi

21. Kazara vurulan avukatın müvekkili mahkemeye yürüyordu.
    Kazara vurulan hangisi?
    a. müvekkili   b. avukat

22. Tasarımcıyı sinirlendiren elbisenin ceketi makinede çekiyordu.
    Tasarımcıyı sinirlendiren hangisi?
    a. ceketi   b. elbise

23. Güçlükle hatırlanan mühendisin arkadaşı kanepede uyuyordu.
    Güçlükle hatırlanan hangisi?
    a. mühendis   b. arkadaşı

24. Çılgınca sevilen güreşçinin rakibi kafede oturuyordu.
    Çılgınca sevilen hangisi?
    a. güreşçi   b. rakibi

25. Çiftçiyi endişelendiren traktörün pulluğu serviste paslanıyordu.
    Çiftçiyi endişelendiren hangisi?
    a. pulluğu   b. traktör

26. Tesadüfen duyulan kadının kocası bankta dinleniyordu.
    Tesadüfen duyulan hangisi?
    a. kocası   b. kadın

27. Yakından tanınan madencinin oğlu köşede ağlıyordu.
    Yakından tanınan hangisi?
    a. madenci   b. oğlu

28. Sekreteri usandıran bilgisayarın çantası masada duruyordu.
    Sekreteri usandıran hangisi?
    a. çantası   b. bilgisayar

29. Makinisti telaşlandıran trenin rayları tünelde titriyordu.
    Makinisti telaşlandıran hangisi?
    a. rayları   b. tren

E2. Globally Ambiguous Sentences

01. Başkana sarılan şarkıcının gitaristi konservatuara gidiyordu.

02. Pastayı kesen ressamın babası salonda dikiliyordu.

03. Balonu patlatan bekçinin komşusu sokakta gülüyordu.

04. Acımasızca dövülen postacının amcası istasyonda bekliyordu.

05. Haince dolandırılan hemşirenin ablası bankada çalışıyordu.

06. Yakından tanınan madencinin oğlu köşede ağlıyordu.

F1. Pilot Study 1

01.   Beşikte uyuyan bebeğin annesi temizlik yapıyordu.
        Beşikte uyuyan hangisi?
        a. bebek   b. annesi

02.   Almanya'da büyüyen tasarımcının kızı yönetmen oldu.
        Almanya'da büyüyen hangisi?
        a. kızı   b. tasarımcı

03.   Uzaydan dönen astronotun ikizi dikkatle inceleniyor.
        Uzaydan dönem hangisi?
        a. ikizi   b. astronot

04.   Afganistan'da kaçırılan mühendisin oğlu destek istiyor.
        Afganistan'da kaçırılan hangisi?
        a. mühendis   b. oğlu

05.   Geçenlerde öldürülen öğrencinin öğretmeni sevilen biriydi.
        Geçenlerde öldürülen hangisi?
        a. öğrenci   b. öğretmeni

06.   İşyerinde dövülen memurun amiri şikayetçi oldu.
        İşyerinde dövülen hangisi?
        a. amiri   b. memur

07.   Bankaya giden müdürün sevgilisi güzel giyinmişti.
        Bankaya giden hangisi?
        a. sevgilisi   b. müdür

08.   Soruları cevaplayan bakanın danışmanı sigara içiyordu.
        Soruları cevaplayan hangisi?
        a. bakan   b. danışmanı

09.   Makaleyi yazan yazarın editörü düzeltmeleri tamamladı.
        Makaleyi yazan hangisi?
        a. yazar   b. editörü

10.   Telefonda dolandırılan oyuncunun ablası ifade verdi.
        Telefonda dolandırılan hangisi?
        a. ablası   b. oyuncu

11.   Sahtecilikle suçlanan dekanın yeğeni suçlamaları reddetti.
        Sahtecilikle suçlanan hangisi?
        a. yeğeni   b. dekan

12. Partiye katılan şarkıcının gitaristi otelde çalışıyordu.
Partiye katılan hangisi?
a. şarkıcı   b. gitaristi

13. Kasabada aranan katilin teyzesi ihbarda bulundu.
Kasabada aranan hangisi?
a. katil   b. teyzesi

14. Ameliyata çağrılan doktorun asistanı yemek yiyordu.
Ameliyata çağrılan hangisi?
a. asistanı   b. doktor

15. Fenerbahçe'de oynayan futbolcunun dedesi hastaneye kaldırıldı.
Fenerbahçe'de oynayan hangisi?
a. dedesi   b. futbolcu

16. Balonu patlatan bekçinin komşusu sokakta dikiliyordu.
Balonu patlatan hangisi?
a. bekçi   b. komşusu

17. Elçilikte çalışan çiftçinin damadı kaza geçirdi.
Elçilikte çalışan hangisi?
a. çiftçi   b. damadı

18. Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
Dün ödüllendirilen hangisi?
a. kameramanı b. gazeteci

19. Hapishanede bıçaklanan adamın avukatı davayı kazandı.
Hapishanede bıçaklanan hangisi?
a. avukatı   b. adam

20. Dükkanı açan terzinin kalfası çay söyledi.
Dükkanı açan hangisi?
a. terzi   b. kalfası

21. Sabah kızdırılan bakkalın çırağı siparişleri geciktirdi.
Sabah kızdırılan hangisi?
a. bakkal   b. çırağı

22. Denize sokulan çocuğun kardeşi heyecandan çıldırdı.
Denize sokulan hangisi?
a. kardeşi   b. çocuk

23. Korumaya saldıran başkanın yardımcısı gözaltına alındı.
Korumaya saldıran hangisi?
a. yardımcısı   b. başkan

24. Evrakları getiren sekreterin patronu sinirli görünüyordu.
Evrakları getiren hangisi?
a. sekreter   b. patronu

25. Otobüsü çalıştıran şoförün muavini valizleri yerleştirdi.
Otobüsü çalıştıran hangisi?
a. şoför   b. muavini

26. Karakola getirilen hırsızın babası şüpheli davranıyordu.
Karakola getirilen hangisi?
a. babası   b. hırsız

27. Şirketten kovulan mimarın karısı günlerce ağladı.
Şirketten kovulan hangisi?
a. karısı   b. mimar

28. İstanbul'da tutuklanan sanatçının menajeri açıklama yaptı.
İstanbul'da tutuklanan hangisi?
a. sanatçı   b. menajeri

29. Saatlerdir konuşan kadının arkadaşı kafenin sahibiydi.
Saatlerdir konuşan hangisi?
a. kadın   b. arkadaşı

30. Mektupları dağıtan postacının amcası barakada yaşıyor.
Mektupları dağıtan hangisi?
a. amcası   b. postacı

31. Cezaevine gönderilen hemşirenin kocası yardım bekliyor.
Cezaevine gönderilen hangisi?
a. kocası   b. hemşire

32. Mesleği öğrenen aşçının yamağı lokanta açtı.
Mesleği öğrenen hangisi?
a. aşçı   b. yamağı

33. Teklifi reddeden marangozun nişanlısı parkta oturuyordu.
Teklifi reddeden hangisi?
a. nişanlısı   b. marangoz

34. Mahkemeye atanan hakimin kuzeni ziyarete geldi.
Mahkemeye atanan hangisi?
a. kuzeni   b. hakim

35. Törende alkışlanan valinin misafiri kibarca gülümsedi.
Törende alkışlanan hangisi?
a. vali   b. misafiri

36.	Hokkabazlık yaptırılan kralın soytarısı halkı eğlendirdi.
	Hokkabazlık yaptırılan hangisi?
	a. kral		b. soytarısı

37.	Stüdyoya varan sunucunun kuaförü malzemeleri hazırlıyordu.
	Stüdyoya varan hangisi?
	a. kuaförü	b. sunucu

38.	Odayı düzenleyen ressamın hizmetçisi para buldu.
	Odayı düzenleyen hangisi?
	a. hizmetçisi	b. ressam

39.	Metni çeviren çevirmenin müşterisi bürodan ayrıldı.
	Metni çeviren hangisi?
	a. çevirmen	b. müşterisi

40.	Sertçe yumruklanan yayıncının çalışanı polis çağırdı.
	Sertçe yumruklanan hangisi?
	a. yayıncı	b. çalışanı

41.	Sınırda yakalanan milyarderin bahçıvanı soygunu itiraf etti.
	Sınırda yakalan hangisi?
	a. milyarder	b. bahçıvanı

42.	Doping verilen sporcunun antrenörü görevden alındı.
	Doping verilen hangisi?
	a. sporcu		b. antrenörü

F2. Experimental Sentences

PRIME SENTENCES				
No.	**NP2**		**No.**	**NP1**
	Active Sentences			**Active Sentences**
P1	Beşikte uyuyan **bebeğin** annesi temizlik yapıyordu.		**P1**	Muhabire saldıran başkanın yardımcısı gözaltına alındı.
	*The mother of **the baby** who was sleeping in the crib was doing the cleaning.*			*The assistant of the President who attacked the reporter was taken into the custody.*
P2	Fenerbahçe'de oynayan futbolcunun dedesi hastaneye kaldırıldı.		**P2**	Mesleği öğrenen aşçının yamağı lokanta kiraladı.
	The grandfather of the footballer who played for Fenerbahçe was taken to the hospital.			*The helper of the chef who learnt the job rented a diner.*
P3	Metni çeviren tercümanın müşterisi bürodan ayrıldı.		**P3**	Mutfağı düzenleyen ressamın hizmetçisi para buldu.
	The client of the interpreter who translated the text left the bureau.			*The servant of the painter who tidied the kitchen found some money.*
	Passive Sentences			**Passive Sentences**
P1	Kasabada aranan katilin teyzesi ihbarda bulundu.		**P1**	Okula kaydedilen müdürün yeğeni bahçede oynuyordu.
	The aunt of the murderer who was wanted in the village reported him.			*The nephew of the principal who was enrolled in the school was playing in the garden.*
P2	Galeride bıçaklanan adamın avukatı davayı kazandı.		**P2**	Sürekli azarlanan kasabın çırağı istifa etti.
	The lawyer of the man who was stabbed in the gallery won the case.			*The apprentice of the butcher who was always reprimanded resigned.*
P3	Kalabalıktan kurtarılan mankenin koruması oldukça kuvvetliydi.		**P3**	Sezaryene alınan dekanın karısı odada dinleniyordu.
	The bodyguard of the model who was saved from the crowd was very strong.			*The wife of the dean who was taken to cesarean was resting in the room.*

**TARGET SENTENCES**				
No.	**Active Sentences**		**No.**	**Passive Sentences**
T1	Uzaydan dönen astronotun ikizi dikkatle incelendi.		**T1**	Telefonda dolandırılan oyuncunun ablası ifade verdi.
	The twin of the astronaut who returned from the space was meticulously examined.			*The sister of the actress who was defrauded on the phone testified.*
T2	Soruları cevaplayan bakanın danışmanı sigara içiyordu.		**T2**	Ameliyata çağrılan doktorun asistanı yemek yiyordu.
	The consultant of the minister who answered the questions was smoking.			*The assistant of the doctor who was called for the surgery was eating a meal.*
T3	Partiye katılan şarkıcının gitaristi otelde çalışıyordu.		**T3**	Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
	The guitarist of the singer who attended the party was working at a hotel.			*The cameraman of the journalist who was rewarded yesterday went abroad.*
T4	Saatlerdir konuşan kadının arkadaşı kafenin sahibiydi.		**T4**	Törende alkışlanan valinin misafiri kibarca gülümsedi.
	The friend of the woman who talked for hours was the owner of the cafe.			*The guest of the governor who was applauded at the ceremony gently smiled.*
T5	Teklifi reddeden marangozun nişanlısı parkta oturuyordu.		**T5**	Fena yumruklanan yayıncının çalışanı polis çağırdı.
	The fiancée of the carpenter who declined the offer was sitting at the park.			*The employee of the publisher who was badly punched called the police.*
T6	Stüdyoya varan sunucunun kuaförü malzemeleri hazırlıyordu.		**T6**	Karakola getirilen hırsızın babası sorguya alındı.
	The hairdresser of the presenter who arrived at the studio was preparing the equipment.			*The father of the thief who was brought to the station was interrogated.*

Aşağıda verilen cümleleri **sırayla** okuyunuz. Takip eden boşluklu cümleler bir üst satırda verilen ilgili cümlelere göre en uygun şekilde ve **yalnızca tek bir kelime kullanılarak (lütfen zamir kullanmayın!)** doldurulacaktır.

Bir cümleyi tamamladıktan sonra tekrar o cümleye geri dönmeyiniz.

Başlamadan önce örnek cümleleri incelemeyi unutmayınız!

Örnek: Karadeniz'de batırılan balıkçının teknesi kıyıya sürüklendi.
                __Tekne__ Karadeniz'de batırıldı.

Hemşire sonuçlara bakıp hastaya olasılıkları sıraladı.
_____ sonuçlara baktı.
Baraj tümüyle dolduğunda köylüler epey sevindi.
_____ epey sevindi.
Beşikte uyuyan bebeğin annesi temizlik yapıyordu.
_____ beşikte uyuyordu.
Uzaydan dönen astronotun ikizi dikkatle incelendi.
_____ uzaydan döndü.
Savcıyı eleştirdiğinde avukat stajyere çok sinirlendi.
_____ savcıyı eleştirdi.
Araştırmacı deneyleri yaptığında bulguları değerlendirdi.
_____ bulguları değerlendirdi.

Sezaryene alınan dekanın karısı odada dinleniyordu.
_____ sezaryene alındı.
Fena yumruklanan yayıncının çalışanı polis çağırdı.
_____ fena yumruklandı.
Davalı olayı anlattığında hakim cezaya karar verdi.
_____ olayı anlattı.
Göktaşları, dünyayı aydınlatarak izleyenleri büyüledi.
_____ izleyenleri büyüledi.
Metni çeviren tercümanın müşterisi bürodan ayrıldı.
_____ metni çevirdi.

Partiye katılan şarkıcının gitaristi otelde çalışıyordu.
_____ partiye katıldı.
Cihaz, damarlarda ilerleyerek tümörü hızla tespit etti.
_____ damarlarda ilerledi.
Biraz tarçın eklendiğinde kurabiye daha da lezzetlendi.
_____ daha da lezzetlendi.
Okula kaydedilen müdürün yeğeni bahçede oynuyordu.
_____ okula kaydedildi.
Karakola getirilen hırsızın babası sorguya alındı.
_____ karakola getirildi.
Jüriyi ikna etmek için profesör güçlü kanıtlar kullandı.
_____ güçlü kanıtlar kullandı.
Sihirbaz, bahsi kazandığında kumarbazı tebrik etti.
_____ bahsi kazandı.

Galeride bıçaklanan adamın avukatı davayı kazandı.
_____ galeride bıçaklandı.
Ameliyata çağrılan doktorun asistanı yemek yiyordu.
_____ ameliyata çağrıldı.
Satıcı, karşıya geçerken malları esnafa emanet etti.
_____ karşıya geçti.
Müteahhit, fiyat teklif ederken mühendisi kandırmaya çalıştı.
_____ fiyat teklif etti.
Mutfağı düzenleyen ressamın hizmetçisi para buldu.
_____ mutfağı temizledi.
Stüdyoya varan sunucunun kuaförü malzemeleri hazırlıyordu.
_____ stüdyoya vardı.

Yetkililer, bomba ihbarı alınca müşterileri dışarı çıkardı.
_____ bomba ihbarı aldı.
Uçak havalimanına inerken motordan alevler yükseldi.
_____ havalimanına indi.
Kalabalıktan kurtarılan mankenin koruması oldukça kuvvetliydi.
_____ kalabalıktan kurtarıldı.
Telefonda dolandırılan oyuncunun ablası ifade verdi.
_____ telefonda dolandırıldı.
İklim giderek farklılaştığı için hayvanlar göç etmeye başladı.
_____ göç etmeye başladı.
Üniversiteyi kurarken iş adamı mekana büyük önem gösterdi.
_____ üniversiteyi kurdu.

Mesleği öğrenen aşçının yamağı lokanta kiraladı.
_____ mesleği öğrendi.
Teklifi reddeden marangozun nişanlısı parkta oturuyordu.
_____ teklifi reddetti.
Kaptan, güverteye geçtiğinde tayfaya görevleri dağıttı.
_____ güverteye geçti.
Kazıyı tamamladığında arkeolog fosilleri müzeye teslim etti.
_____ kazıyı tamamladı.
Sürekli azarlanan kasabın çırağı istifa etti.
_____ sürekli azarlandı.
Törende alkışlanan valinin misafiri kibarca gülümsedi.
_____ törende alkışlandı.

Hükümet anayasayı değiştirirken uzmanlar destek verdi.
_____ anayasayı değiştirdi.
Kütüphaneci tüm raflar düşmeden önce dergi okuyordu.
_____ dergi okuyordu.
Kasabada aranan katilin teyzesi ihbarda bulundu.
_____ kasabada aranıyordu.
Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
_____ dün ödüllendirildi.
Şehre döndüğünde kaymakam köprüyü ulaşıma açtı.
_____ şehre döndü.
Kurul, sunumu dinleyip projeyi onaylamaya ikna oldu.
_____ sunumu dinledi.

Fenerbahçe'de oynayan futbolcunun dedesi hastaneye kaldırıldı.
_____ Fenerbahçe'de oynuyor.
Soruları cevaplayan bakanın danışmanı sigara içiyordu.
_____ soruları cevapladı.
Gardiyan, koğuşları dolaşırken mahkumu gizlice gözetliyordu.
_____ koğuşları dolaştı.
Mektup ortaya çıktığında muhbir kolayca yakalandı.
_____ kolayca yakalandı.
Muhabire saldıran başkanın yardımcısı gözaltına alındı.
_____ muhabire saldırdı.
Saatlerdir konuşan kadının arkadaşı kafenin sahibiydi.
_____ saatlerdir konuşuyor.

Aşağıda verilen cümleleri **sırayla** okuyunuz. Takip eden boşluklu cümleler bir üst satırda verilen ilgili cümlelere göre en uygun şekilde ve **yalnızca tek bir kelime kullanılarak (lütfen zamir kullanmayın!)** doldurulacaktır.

Bir cümleyi tamamladıktan sonra tekrar o cümleye geri dönmeyiniz.

Başlamadan önce örnek cümleleri incelemeyi unutmayınız!

Örnek: Karadeniz'de batırılan balıkçının teknesi kıyıya sürüklendi.
              Tekne Karadeniz'de batırıldı.

Hemşire sonuçlara bakıp hastaya olasılıkları sıraladı.
Baraj tümüyle dolduğunda köylüler epey sevindi.
_____ sonuçlara baktı.
Beşikte uyuyan bebeğin annesi temizlik yapıyordu.
Uzaydan dönen astronotun ikizi dikkatle incelendi.
_____ uzaydan döndü.
Savcıyı eleştirdiğinde avukat stajyere çok sinirlendi.
Araştırmacı deneyleri yaptığında bulguları değerlendirdi.
_____ bulguları değerlendirdi.

Sezaryene alınan dekanın karısı odada dinleniyordu.
Fena yumruklanan yayıncının çalışanı polis çağırdı.
_____ fena yumruklandı.
Davalı olayı anlattığında hakim cezaya karar verdi.
Göktaşları, dünyayı aydınlatarak izleyenleri büyüledi.
_____ olayı anlattı.
Metni çeviren tercümanın müşterisi bürodan ayrıldı.
Partiye katılan şarkıcının gitaristi otelde çalışıyordu.
_____ partiye katıldı.

Cihaz, damarlarda ilerleyerek tümörü hızla tespit etti.
Biraz tarçın eklendiğinde kurabiye daha da lezzetlendi.
_____ daha da lezzetlendi.
Okula kaydedilen müdürün yeğeni bahçede oynuyordu.
Karakola getirilen hırsızın babası sorguya alındı.
_____ karakola getirildi.
Jüriyi ikna etmek için profesör güçlü kanıtlar kullandı.
Sihirbaz, bahsi kazandığında kumarbazı tebrik etti.

_____ güçlü kanıtlar kullandı.
Galeride bıçaklanan adamın avukatı davayı kazandı.
Ameliyata çağrılan doktorun asistanı yemek yiyordu.
_____ ameliyata çağrıldı.
Satıcı, karşıya geçerken malları esnafa emanet etti.
Müteahhit, fiyat teklif ederken mühendisi kandırmaya çalıştı.
_____ fiyat teklif etti.
Mutfağı düzenleyen ressamın hizmetçisi para buldu.
Stüdyoya varan sunucunun kuaförü malzemeleri hazırlıyordu.
_____ stüdyoya vardı.

Yetkililer, bomba ihbarı alınca müşterileri dışarı çıkardı.
Uçak havalimanına inerken motordan alevler yükseldi.
_____ bomba ihbarı aldı.
Kalabalıktan kurtarılan mankenin koruması oldukça kuvvetliydi.
Telefonda dolandırılan oyuncunun ablası ifade verdi.
_____ telefonda dolandırıldı.
İklim giderek farklılaştığı için hayvanlar göç etmeye başladı.
Üniversiteyi kurarken iş adamı mekana büyük önem gösterdi.
_____ üniversiteyi kurdu.

Mesleği öğrenen aşçının yamağı lokanta kiraladı.
Teklifi reddeden marangozun nişanlısı parkta oturuyordu.
_____ teklifi reddetti.
Kaptan, güverteye geçtiğinde tayfaya görevleri dağıttı.
Kazıyı tamamladığında arkeolog fosilleri müzeye teslim etti.
_____ güverteye geçti.
Sürekli azarlanan kasabın çırağı istifa etti.
Törende alkışlanan valinin misafiri kibarca gülümsedi.
_____ törende alkışlandı.

Hükümet anayasayı değiştirirken uzmanlar destek verdi.
Kütüphaneci tüm raflar düşmeden önce dergi okuyordu.
_____ dergi okuyordu.
Kasabada aranan katilin teyzesi ihbarda bulundu.
Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
_____ dün ödüllendirildi.
Şehre döndüğünde kaymakam köprüyü ulaşıma açtı.
Kurul, sunumu dinleyip projeyi onaylamaya ikna oldu.
_____ şehre döndü.

Fenerbahçe'de oynayan futbolcunun dedesi hastaneye kaldırıldı.
Soruları cevaplayan bakanın danışmanı sigara içiyordu.
_____ soruları cevapladı.
Gardiyan, koğuşları dolaşırken mahkumu gizlice gözetliyordu.
Mektup ortaya çıktığında muhbir kolayca yakalandı.
_____ kolayca yakalandı.
Muhabire saldıran başkanın yardımcısı gözaltına alındı.
Saatlerdir konuşan kadının arkadaşı kafenin sahibiydi.
_____ saatlerdir konuşuyor.

Please read the following sentences **in the given order**. You are supposed to complete the related sentences following them in accordance with the sentences given above them. Please use **only one single word (not compound words, or a pronoun)**. See the example below.

Example: The boat of the fisher who sank in the Black Sea drifted to the coast.
                                    _____ sank in the Black Sea.

The nurse listed the patient her doubts by looking into the results.
The peasants really got happy when the dam got completely filled up.
_____ looked into the results.
The mother of the baby who was sleeping in the crib was doing the cleaning.
The twin of the astronaut who returned from space was meticulously examined.
_____ returned from the space.
The lawyer got very angry at the intern when she criticized the prosecutor.
The researcher evaluated the findings when she conducted the research.
_____ conducted the research.

The wife of the dean who was taken to caesarean was resting in the room.
The employee of the publisher who was badly punched called the police.
_____ was badly punched.
The judge sentenced the defendant when he told the event.
The meteors fascinated the watchers by lighting up the earth.
_____ told the event.
The client of the interpreter who translated the text left the bureau.
The guitarist of the singer who attended the party was working at a hotel.
_____ attended the party.

The device rapidly identified the tumour by going through the veins.
The cookie got more delicious when some cinnamon was added to it.
_____ got more delicious.
The nephew of the principal who was enrolled in the school was playing in the garden.
The father of the thief who was brought to the station was interrogated.
_____ was brought to the station.
The professor used strong evidence in order to convince the jury.
The magician congratulated the gambler when he won the bet.
_____ used strong evidence.

The lawyer of the man who was stabbed in the gallery won the case.
The assistant of the doctor who was called for the surgery was eating a meal.
_____ was called for the surgery.
The goods extremely exhausted the salesman while he was crossing over the road.
The contractor tried to deceive the engineer while he was quoting the price.
_____ was quoting the price.
The servant of the painter who tidies the kitchen found some money.
The hairdresser of the presenter who arrived at the studio was preparing the equipment.
_____ arrived at the studio.

The authorities evacuated the customers when they received the warning.
The plane smoothly passed by the storks while it was landing at the airport.
_____ received the warning.
The bodyguard of the model who was saved from the crowd was very strong.
The sister of the actress who was defrauded on the phone testified.
_____ was defrauded.
The climate deeply forced the animals to immigration as it suddenly changed.
The businessman decided the place himself while he was founding the university.
_____ was founding the university.

The helper of the chef who learnt the job rented a diner.
The fiancée of the carpenter who declined the offer was sitting at the park.
_____ declined the offer.
The crew respectfully greeted the captain when he finally arrived at the deck.
The fossils astonished the archaeologist when she completed the excavation.
_____ finally arrived at the deck.
The apprentice of the butcher who was always reprimanded resigned.
The guest of the governor who was applauded at the ceremony gently smiled.
_____ was applauded at the ceremony.

The experts supported the government while it was working on the constitution.
The librarian was reading a magazine before all the shelves fell down.
_____ was reading a magazine.
The aunt of the murderer who was wanted in the village reported him.
The cameraman of the journalist who was rewarded yesterday went abroad.
_____ was rewarded yesterday.
The governor carefully examined the bridge when it was planned to be built.
The committee approved the project when they listened to the presentation.
_____ examined the bridge.

The grandfather of the footballer who played for Fenerbahçe was taken to the hospital.
The consultant of the minister who answered the questions was smoking.
_____ answered the questions.
The guardian secretly talked to the convict while he was wandering in the yard.
The informant was easily found because the letter had not been destroyed in time.
_____ was easily found.
The deputy of the President who attacked the reporter was taken into custody.
The friend of the woman who talked for hours was the owner of the cafe.
_____ talked for hours.

APPENDIX J: SAMPLE BOOKLET FOR EXPERIMENT 6 AND 8

Please read the following sentences **in the given order**. You are supposed to complete the related sentences following them in accordance with the sentences given above them. Please use **only one single word (not compound words, or a pronoun)**. See the example below.

Example: The boat of the fisher who sank in the Black Sea drifted to the coast.
_____ sank in the Black Sea.

The nurse listed the patient her doubts by looking into the results.
_____ looked into the results.
The peasants really got happy when the dam got completely filled up.
_____ really got happy.
The mother of the baby who was sleeping in the crib was doing the cleaning.
_____ was sleeping in the crib.
The twin of the astronaut who returned from space was meticulously examined.
_____ returned from the space.
The lawyer got very angry at the intern when she criticized the prosecutor.
_____ criticized the prosecutor.
The researcher evaluated the findings when she conducted the research.
_____ conducted the research.

The wife of the dean who was taken to caesarean was resting in the room.
_____ was taken to caesarean.
The employee of the publisher who was badly punched called the police.
_____ was badly punched.
The judge sentenced the defendant when he told the event.
_____ told the event.
The meteors fascinated the watchers by lighting up the earth.
_____ fascinated the watchers.
The client of the interpreter who translated the text left the bureau.
_____ translated the text.
The guitarist of the singer who attended the party was working at a hotel.
_____ attended the party.

The device rapidly identified the tumour by going through the veins.
_____ went through the veins.
The cookie got more delicious when some cinnamon was added to it.
_____ got more delicious.
The nephew of the principal who was enrolled in the school was playing in the garden.
_____ was enrolled in the school.
The father of the thief who was brought to the station was interrogated.
_____ was brought to the station.
The professor used strong evidence in order to convince the jury.
_____ used strong evidence.
The magician congratulated the gambler when he won the bet.
_____ won the bet.

The lawyer of the man who was stabbed in the gallery won the case.
_____ was stabbed in the gallery.
The assistant of the doctor who was called for the surgery was eating a meal.
_____ was called for the surgery.
The goods extremely exhausted the salesman while he was crossing over the road.
_____ was crossing over the road.
The contractor tried to deceive the engineer while he was quoting the price.
_____ was quoting the price.
The servant of the painter who tidied the kitchen found some money.
_____ tidied the kitchen.
The hairdresser of the presenter who arrived at the studio was preparing the equipment.
_____ arrived at the studio.

The authorities evacuated the customers when they received the warning.
_____ received the warning.
The plane smoothly passed by the storks while it was landing at the airport.
_____ was landing at the airport.
The bodyguard of the model who was saved from the crowd was very strong.
_____ was saved from the crowd.
The sister of the actress who was defrauded on the phone testified.
_____ was defrauded on the phone.
The climate deeply forced the animals to immigration as it suddenly changed.
_____ suddenly changed.
The businessman decided the place himself while he was founding the university.
_____ was founding the university.

The helper of the chef who learnt the job rented a diner.
_____ learnt the job.
The fiancée of the carpenter who declined the offer was sitting at the park.
_____ declined the offer.
The crew respectfully greeted the captain when he finally appeared at the deck.
_____ finally appeared at the deck.
The fossils astonished the archaeologist when she completed the excavation.
_____ completed the excavation.
The apprentice of the butcher who was always reprimanded resigned.
_____ was always reprimanded.
The guest of the governor who was applauded at the ceremony gently smiled.
_____ was applauded at the ceremony.

The experts supported the government while it was working on the constitution.
_____ was working on the constitution.
The librarian was reading a magazine before all the shelves fell down.
_____ was reading a magazine.
The aunt of the murderer who was wanted in the village reported him.
_____ was wanted in the village.
The cameraman of the journalist who was rewarded yesterday went abroad.
_____ was rewarded yesterday.
The governor carefully examined the bridge when he came to the town.
_____ came to the town.
The committee approved the project when they listened to the presentation.
_____ listened to the presentation.

The grandfather of the footballer who played for Fenerbahçe was taken to the hospital.
_____ played for Fenerbahçe.
The consultant of the minister who answered the questions was smoking.
_____ answered the questions.
The guardian secretly talked to the convict while he was wandering in the yard.
_____ was wandering in the yard.
The informant was easily found because the letter had not been destroyed in time.
_____ was easily found.
The deputy of the President who attacked the reporter was taken into custody.
_____ attacked the reporter.
The friend of the woman who talked for hours was the owner of the cafe.
_____ talked for hours.

Bu çalışmada ekranda Türkçe cümleler okuyacaksınız.

Cümleleri okumaya devam etmek için "Boşluk" tuşuna basmanız gerekmektedir.

Bazen bir cümleyi takiben o cümle ile ilgili iki seçenekli bir soru gelebilir. Sorulara cevap vermek için klavyede (A) ya da (B) tuşlarına basmalısınız.

Deneye önce bir "Deneme" kısmı ile başlayacaksınız.

Hazır olduğunuzda "Hazırım!" a tıklayarak başlayabilirsiniz.

Practice Session

Karadeniz'de batırılan balıkçının teknesi kıyıya sürüklendi.
Hangisi Karadeniz'de batırıldı?
a) balıkçı   b) tekne

Yağmur bastırdığında çadır kampçılara sığınak oldu.

Güneş batana kadar Merkür ülkemizden gözlemlenebilecek.
Hangisi ülkemizden gözlemlenebilecek?
a) Merkür   b) Güneş

Ankara'da gerçekleşen kazanın suçlusu hala bulunamadı.

Experiment

Hemşire sonuçlara bakıp hastaya olasılıkları sıraladı.
Hangisi sonuçlara baktı?
a) hemşire   b) hasta

Baraj tümüyle dolduğunda köylüler epey sevindi.

Beşikte uyuyan bebeğin annesi temizlik yapıyordu.

Uzaydan dönen astronotun ikizi dikkatle incelendi.
Hangisi uzaydan döndü?
a) astronot   b) ikizi

Savcıyı eleştirdiğinde avukat stajyere çok sinirlendi.

Araştırmacı deneyleri yaptığında bulguları değerlendirdi.
Hangisi deneyleri yaptı?
a) bulgular   b) araştırmacı

Sezaryene alınan dekanın karısı odada dinleniyordu.
Fena yumruklanan yayıncının çalışanı polis çağırdı.
Hangisi fena yumruklandı?
a) çalışan   b) yayıncı

Davalı olayı anlattığında hakim cezaya karar verdi.
Hangisi olayı anlattı?
a) davalı   b) hakim

Göktaşları, dünyayı aydınlatarak izleyenleri büyüledi.

Metni çeviren tercümanın müşterisi bürodan ayrıldı.

Partiye katılan şarkıcının gitaristi otelde çalışıyordu.
Hangisi partiye katıldı?
a) şarkıcı   b) gitarist

Cihaz, damarlarda ilerleyerek tümörü hızla tespit etti.

Biraz tarçın eklendiğinde kurabiye daha da lezzetlendi.
Hangisi daha da lezzetlendi?
a) kurabiye   b) tarçın

Okula kaydedilen müdürün yeğeni bahçede oynuyordu.

Karakola getirilen hırsızın babası sorguya alındı.
Hangisi karakola getirildi?
a) baba   b) hırsız

Jüriyi ikna etmek için profesör güçlü kanıtlar kullandı.

Hangisi güçlü kanıtlar kullandı?
a) jüri   b) profesör

Sihirbaz, bahsi kazandığında kumarbazı tebrik etti.

Galeride bıçaklanan adamın avukatı davayı kazandı.

Ameliyata çağrılan doktorun asistanı yemek yiyordu.
Hangisi ameliyata çağrıldı?
a) doktor   b) asistan

Satıcı, karşıya geçerken malları esnafa emanet etti.

Müteahhit, fiyat teklif ederken mühendisi kandırmaya çalıştı.

Hangisi fiyat teklif etti?
a) mühendis   b) müteahhit

Mutfağı düzenleyen ressamın hizmetçisi para buldu.
Stüdyoya varan sunucunun kuaförü malzemeleri hazırlıyordu.
Hangisi stüdyoya vardı?
a) kuaför   b) sunucu

Yetkililer, bomba ihbarı alınca müşterileri dışarı çıkardı.
Hangisi bomba ihbarı aldı?
a) yetkililer   b) müşteriler

Uçak havalimanına inerken motordan alevler yükseldi.

Kalabalıktan kurtarılan mankenin koruması oldukça kuvvetliydi.

Telefonda dolandırılan oyuncunun ablası ifade verdi.
Hangisi telefonda dolandırıldı?
a) oyuncu   b) ablası

İklim giderek farklılaştığı için hayvanlar göç etmeye başladı.

Üniversiteyi kurarken iş adamı mekana büyük önem gösterdi.
Hangisi üniversiteyi kurdu?
a) mekan   b) iş adamı

Mesleği öğrenen aşçının yamağı lokanta kiraladı.

Teklifi reddeden marangozun nişanlısı parkta oturuyordu.
Hangisi teklifi reddetti?
a) nişanlı   b) marangoz

Kazıyı tamamladığında arkeolog fosilleri müzeye teslim etti.

Kaptan, güverteye geçtiğinde tayfaya görevleri dağıttı.
Hangisi güverteye geçti?
a) kaptan   b) tayfa

Sürekli azarlanan kasabın çırağı istifa etti.

Törende alkışlanan valinin misafiri kibarca gülümsedi.
Hangisi törende alkışlandı?
a) vali   b) misafiri

Hükümet anayasayı değiştirirken uzmanlar destek verdi.

Kütüphaneci tüm raflar düşmeden önce dergi okuyordu.

Hangisi dergi okuyordu?
a) raflar   b) kütüphaneci

Kasabada aranan katilin teyzesi ihbarda bulundu.

Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.
Hangisi dün ödüllendirildi?
a) kameraman   b) gazeteci

Şehre döndüğünde kaymakam köprüyü ulaşıma açtı.
Hangisi şehre döndü?
a) kaymakam   b) köprü

Kurul, sunumu dinleyip projeyi onaylamaya ikna oldu.

Fenerbahçe'de oynayan futbolcunun dedesi hastaneye kaldırıldı.

Soruları cevaplayan bakanın danışmanı sigara içiyordu.
Hangisi soruları cevapladı?
a) bakan   b) danışman

Gardiyan, koğuşları dolaşırken mahkumu gizlice gözetliyordu.

Mektup ortaya çıktığında muhbir kolayca yakalandı.
Hangisi kolayca yakalandı?
a) muhbir   b) mektup

Muhabire saldıran başkanın yardımcısı gözaltına alındı.

Saatlerdir konuşan kadının arkadaşı kafenin sahibiydi.
Hangisi saatlerdir konuşuyor?
a) arkadaş   b) kadın

APPENDIX L: MATERIALS FOR EXPERIMENT 10

In this experiment you will read English sentences.

Please press "Space key to complete reading each sentence.

Once you complete reading a sentence, you may see a question about it.

Please choose the best option, and press (A) or (B) on the keyboard to answer.

You will start with a practice session.

Click "I am ready!" when you are ready to start.

Practice Session

The boat of the fisher in the Black Sea drifted to the coast.
Which one of the following sank in the Black Sea?
a) the boat   b) the fisher

When the rain began pouring down, the tent became a shelter for the campers.

Until the sun sets, Mercury will be seen from our country.
Which one of the following will be seen from our country?
a) Mercury   b) the sun

The offender of the accident that happened in Ankara couldn't be found yet.

Experiment

The nurse listed the patient her doubts by looking into the results.
Who looked into the results?
a) the nurse   b) the patient

The peasants really got happy when the dam got completely filled up.

The mother of the baby who was sleeping in the crib was doing the cleaning.

The twin of the astronaut who returned from the space was meticulously examined.
Who returned from the space?
a) the astronaut   b) the twin

The lawyer got very angry at the intern when she criticized the prosecutor.

The researcher evaluated the findings when she conducted the research.
Who conducted the research?
a) the findings   b) the researcher

The wife of the dean who was taken to caesarean was resting in the room.

The employee of the publisher who was badly punched called the police.
Who was badly punched?
a) the employee   b) the publisher

The judge sentenced the defendant when he told the event.
Who told the event?
a) the defendant   b) the judge

The meteors fascinated the watchers by lighting up the earth.

The client of the interpreter who translated the text left the bureau.

The guitarist of the singer who attended the party was working at a hotel.
Who attended the party?
a) the singer   b) the guitarist

The device rapidly identified the tumour by going through the veins.

The cookie got more delicious when some cinnamon was added to it.
Which one of the following got more delicious?
a) the cookie   b) the cinnamon

The nephew of the principal who was enrolled in the school was playing in the garden.

The father of the thief who was brought to the station was interrogated.
Who was brought to the station?
a) the father   b) the thief

The professor used strong evidence in order to convince the jury.
Who used strong evidence?
a) the jury   b) the professor

The magician congratulated the gambler when he won the bet.

The lawyer of the man who was stabbed in the gallery won the case.

The assistant of the doctor who was called for the surgery was eating a meal.
Who was called for the surgery?
a) the doctor   b) the assistant

The goods extremely exhausted the salesman while he was crossing over the road.

The contractor tried to deceive the engineer while he was quoting the price.
Who was quoting the price?
a) the engineer   b) the contractor

The servant of the painter who tidies the kitchen found some money.

The hairdresser of the presenter who arrived at the studio was preparing the equipment.
Who arrived at the studio?
a) the hairdresser   b) the presenter

The authorities evacuated the customers when they received the warning.
Who received the warning?
a) the authorities   b) the customers

The plane smoothly passed by the storks while it was landing at the airport.

The bodyguard of the model who was saved from the crowd was very strong.

The sister of the actress who was defrauded on the phone testified.
Who was defrauded on the phone?
a) the actress   b) the sister

The climate deeply forced the animals to immigration as it suddenly changed.

The businessman decided the place himself while he was founding the university.
Who was founding the university?
a) the place   b) the businessman

The helper of the chef who learnt the job rented a diner.

The fiancée of the carpenter who declined the offer was sitting at the park.
Who declined the offer?
a) the fiancée   b) the carpenter

The fossils astonished the archaeologist when she completed the excavation.

The crew respectfully greeted the captain when he finally arrived at the deck.
Who finally arrived at the deck?
a) the captain   b) the crew

The apprentice of the butcher who was always reprimanded resigned.

The guest of the governor who was applauded at the ceremony gently smiled.
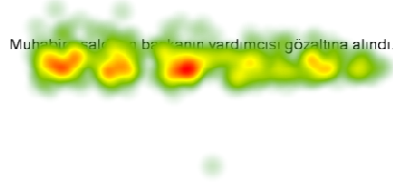Who was applauded at the ceremony?
a) the governor   b) the guest

The experts supported the government while it was working on the constitution.

The librarian was reading a magazine before all the shelves fell down.
Who was reading a magazine?
a) the shelves   b) the librarian

The aunt of the murderer who was wanted in the village reported him.

The cameraman of the journalist who was rewarded yesterday went abroad
Who was rewarded yesterday?
a) the cameraman   b) the journalist

The governor carefully examined the bridge when he came to the town_
Which one of the following came to the town?
a) the governor   b) the bridge

The committee approved the project when they listened to the presentation.

The grandfather of the footballer who played for Fenerbahçe was taken to the hospital.

The consultant of the minister who answered the questions was smoking.
Who answered the questions?
a) the minister   b) the consultant

The guardian secretly talked to the convict while he was wandering in the yard.

The informant was easily found because the letter had not been destroyed in time.
Which one of the following was easily found?
a) the informant   b) the letter

The deputy of the President who attacked the reporter was taken into custody.

The friend of the woman who talked for hours was the owner of the cafe.
Who talked for hours?
a) the friend   b) the woman

APPENDIX M: SAMPLE HEATMAPS

Prime (NP1 Attachment Forced - Active)

Muhabire saldıran bakanın yardımcısı gözaltına alındı.

Prime (NP2 Attachment Forced - Active)
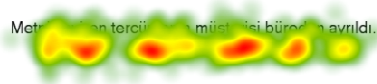
Metni çeviren tercümanın müşterisi bürodan ayrıldı.

Prime (NP1 Attachment Forced - Passive)

Sürekli azarlanan kasabın çırağı istifa etti.

Prime (NP2 Attachment Forced - Passive)

Kasabada aranan katilin teyzesi ihbarda bulundu.

Target (Active)

Stüd... ...sunu...nun kuaförü malze...eleri hazırlıyordu.

Stüdyoya varan sunucunun kuaförü malzemeleri hazırlıyordu.

Target (Passive)

Dün ...ndi...len gazet...inin kamerama... yurddışına gitti.

Dün ödüllendirilen gazetecinin kameramanı yurtdışına gitti.

APPENDIX N: CONSENT FORM (SAMPLE)

Araştırmaya Gönüllü Katılım Formu

Bu çalışma, ODTÜ Enformatik Enstitüsü Bilişsel Bilimler Bölümü doktora öğrencisi Zeynep Başer' in, Doç. Dr. Annette Hohenberger danışmanlığında ve Prof. Dr. Deniz Zeyrek Bozşahin eşdanışmanlığında yürütmekte olduğu doktora tezi araştırmaları kapsamında yer almaktadır. Bu form sizi araştırma koşulları hakkında bilgilendirmek için hazırlanmıştır.

Çalışmanın Amacı Nedir?

Araştırmanın amacı ana dili Türkçe olan yetişkin bireylerin ana dillerinde ve ikinci dillerinde (İngilizce) dil işleme süreçlerini incelemektir.

Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?

Araştırmaya katılmayı kabul ederseniz, sizden beklenen kitapçıkta yer alan cümleleri sırasıyla okuyup, cümleleri takip eden ilgili kısa cümle tamamlama sorularına cevap vermenizdir. Bu çalışmaya katılım yaklaşık 15 dakika sürmektedir.

Sizden Topladığımız Bilgileri Nasıl Kullanacağız?

Araştırmaya katılımınız tamamen gönüllülük temelinde olmalıdır. Çalışmada, sizden kimlik veya kurum belirleyici hiç bir bilgi istenmemektedir. Cevaplarınız tamamen gizli tutulacak, sadece araştırmacılar tarafından değerlendirilecektir. Katılımcılardan elde edilecek bilgiler toplu halde değerlendirilecek ve bilimsel yayımlarda kullanılacaktır. Sağladığınız veriler gönüllü katılım formundaki kimlik bilgileriyle eşleştirilmeyecektir.

Katılımınızla ilgili bilmeniz gerekenler:

Araştırma, genel olarak kişisel rahatsızlık verecek sorular içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda araştırmayı uygulayan kişiye, araştırmayı tamamlamadığınızı söylemek yeterli olacaktır.

Araştırmayla ilgili daha fazla bilgi almak isterseniz:

Katılımınız sonunda, bu araştırmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Bilişsel Bilimler bölümü doktora öğrencisi Zeynep Başer (E-posta: zeynepbaser@metu.edu.tr) ile iletişim kurabilirsiniz.

Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.

(Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

İsim Soyad   Tarih   İmza

APPENDIX O: DEBRIEFING FORM

KATILIM SONRASI BİLGİLENDİRME FORMU

Bu araştırma, daha önce de belirtildiği gibi ODTÜ Enformatik Enstitüsü Bilişsel Bilimler bölümü doktora öğrencisi Zeynep Başer tarafından Doç. Dr. Annette Hohenberger danışmanlığında ve Prof. Dr. Deniz Zeyrek Bozşahin eşdanışmanlığında doktora tezi kapsamında yürütülmektedir. Araştırmanın amacı, anadili Türkçe olan tek dilli ve farklı seviyelerde İngilizce bilen ana dili Türkçe olan bireylerde dil işleme süreçlerini incelemektir. Bu çalışma, anlam belirsizliği içeren karmaşık cümlelerin çözümlenmesi ve söz dizimsel hazırlama etkisini ölçmek için hazırlanmıştır.

Bu çalışmada özellikle sıfat fiillerin isim tamlamalarında tamlayan ya da tamlanan isim ile ilişkilendirilme eğilimi olup olmadığı incelenmektedir. İlgili literatürde yapılan çalışmalar, İngilizce ve Portekizce gibi dillerde sıfat fiile yakın olan (tamlayan) isim ile, İspanyolca ve Almanca gibi bazı dillerde ise sıfat fiilden uzak olan (tamlanan) isim ile ilişkilendirme eğilimi olduğunu göstermektedir. Diller arasındaki bu farklı tercihleri açıklamak için pek çok hipotez ileri sürülse de henüz fikir ayrılıkları devam etmektedir. Özellikle ikinci dil üzerinde yapılan çalışmaların farklı sonuçlar ortaya çıkardığı ve pek çok araştırmada ana dil ya da baskın dilden bağımsız olarak farklı eğilimlerinde uygulanan çalışmaya bağlı olarak değişkenlik gösterdiği görülmektedir. Bununla birlikte ana dili Türkçe olan tek dilli ve İngilizce bilen ana dili Türkçe olan katılımcılarla yapılan çalışmaların araştırmalardaki bir takım eksiklikler ve sonuçlardaki tutarsızlıklar nedeniyle yetersiz olduğu ve daha detaylı bir araştırmanın yapılması gerektiği görülmektedir. Bu çalışmayla ana dili Türkçe ve ikinci dili İngilizce olan ana dili Türkçe olan katılımcılarda sıfat fiilleri isim tamlamalarında belli bir yönde ilişkilendirme eğiliminin olup olmadığı, söz dizimsel hazırlama etkisinin anlamca belirsiz cümleleri çözümlemedeki etkisi, Türkçe ve İngilizce'de karmaşık cümle yapılarının bu kişilerde işleme süreçleri ve gösterimi ile ilgili bilgiler toplanması beklenmektedir. Buna göre oluşturulan çalışma ile katılımcıların daha açık olan cümlelerdeki seçimlerinin daha sonra anlamca belirsiz cümlelerdeki seçimlerini belli bir yönde etkilemesi, anlam belirsizliğini çözmede kullanılan yöntemlerin izlenmesi, sadece Türkçe bilen ve hem Türkçe hem İngilizce bilen katılımcılarda ortaya çıkabilecek farklılıkların dil işleme süreçleriyle ilgili daha detaylı bilgiler elde edilmesi beklenmektedir. Katılımcıların cümlelerin tekrar eden yapısını fark etmesi ve çalışmanın asıl amacını bilmesi halinde çalışmanın sonucunu etkileyebilecek şekilde belli bir strateji geliştirmesini önlemek amacıyla çalışmanın asıl amacı kısmen gizli tutulmuştur.

Bu çalışmadan alınacak ilk verilerin Aralık 2016 sonunda elde edilmesi amaçlanmaktadır. Elde edilen bilgiler sadece bilimsel araştırma ve yazılarda kullanılacaktır. Çalışmanın sağlıklı ilerleyebilmesi ve bulguların güvenilir olması için çalışmaya katılacağını bildiğiniz diğer kişilerle çalışma ile ilgili detaylı bilgi paylaşımında bulunmamanızı dileriz. Bu araştırmaya katıldığınız için tekrar çok teşekkür ederiz.

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Araştırmanın sonuçlarını öğrenmek ya da daha fazla bilgi almak için aşağıdaki isimlere başvurabilirsiniz.

Doç. Dr. Annette Hohenberger (hohenber@metu.edu.tr)

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Çalışmaya katkıda bulunan bir gönüllü olarak katılımcı haklarınızla ilgili veya etik ilkelerle ilgi soru veya görüşlerinizi ODTÜ Uygulamalı Etik Araştırma Merkezi'ne iletebilirsiniz.

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Başer, Z. & Hohenberger, A. (May, 2017). *Türkçe'de Sıfat Fillerin İsim Tamlamalarında Tamlayan ya da Tamlananı Nitelemesi: Yapısal Hazırlama ve İsim Tamlamalarında Canlı ya da Cansız Varlıkların Kullanımının Etkileri.* Paper presented at 31. Ulusal Dilbilim Kurultayı, Eskişehir, Turkey.