SYNTACTIC PROCESSING IN SECOND LANGUAGE ACQUISITION OF ENGLISH

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Abstract

Nazik Dinçtopal, "Syntactic Processing in Second Language Acquisition of English"

The present study investigates relative clause (RC) attachment preferences of end-state Turkish L2 speakers of English in their L2 and compares their sentence processing strategies to those of monolingual Turkish speakers and English native speakers in sentences including a complex genitive noun phrase (NP) modified by an RC such as the following:

Someone shot [$_{NPnon\text{-}local}$ the servant] of [$_{NPlocal}$ the actress] [$_{RC}$ who was on the balcony].

Although such constructions have been investigated in English in several previous studies, data from Turkish, a language with a relatively free SOV word order, can shed light on the issue in the exploration of cross-linguistic variation in RC attachment preferences. In Turkish, possession is realized through genitive-possessive constructions that are similar to the Saxon genitive in English. However, unlike English, it does not have an NP-PP-NP construction.

[$_{RC}$ Balkon-da dur-an] [$_{NPlocal}$ aktis-in] [$_{NPnon\text{-}local}$ hizmetçi-si]-ni vur-du-lar.

Balcony-LOC stand-SubjPART actress-GEN servant-3SG.POSS-ACC shoot-PAST-3PL

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

They shot the servant of the actress who was standing on the balcony.

Investigating RC attachment preferences of end-state Turkish learners of L2 English can also be revealing in the sense that it allows to test the role of first language (L1) in sentence processing strategies as well as availability of Universal Parser (UP)/Universal Grammar (UG) in L2 acquisition.

A set of online and offline sentence processing tasks was given to the participants. The results suggest that both native speakers of English and native speakers of Turkish prefer to attach the RC to the local NP in their respective languages while reading online and offline. The data confirm that both the L1 Turkish and L1 English groups go through serial processing while comprehending sentences consisting of RCs with complex genitive antecedents. They make an initial commitment to a specific attachment site, and they reanalyze their initial interpretations when the initial analysis proves to be incorrect. However, this initial preference is not solely determined by syntactical factors. The results suggest that native Turkish and English speakers use lexical information such as the animacy of the noun as well as the syntax in their initial judgments. Turkish learners of L2 English, on the other hand, do not show a clear attachment preference for either local or non-local NP in the absence of the lexical information while reading online and they seem to use the lexical information differently from the L1 speakers of both languages.

The results of the L1 data seem to confirm the predictions of the Unrestricted Race Model proposed by Van Gompel, Pickering, and Traxler (2000; 2001). The model suggests that the human parser makes and commits itself to a single analysis at a time. However, this analysis is not necessarily determined by syntax alone. The results of the study are compatible with the Unrestricted Race Model as L1 Turkish and L1 English

groups used the lexical information (i.e., animacy of the noun) during their initial analysis. Furthermore, there is evidence that the participants made a reanalysis when the first analysis did not prove to be correct.

The results of the L2 data are consistent with the Shallow Structure Hypothesis (SSH) of Clahsen and Felser (2006a, 2006b). The SSH suggests that unlike child L2 learners and adult native speakers, adult L2 speakers do not make syntactically detailed computations. Instead, they rely on the lexical-semantic sources of information while making analysis. The findings of this study confirm the prediction as the L2 speakers relied heavily on the lexical information in their analysis. The animacy information carried by the NP guided RC attachment preferences of L2 speakers. It is suggested that L2 speakers' reliance on lexical information results from a deficit in their implicit grammar, which seems to suggest that the UP is not available to L2 speakers as they cannot access UG (Clahsen & Felser, 2006b).

For several reasons, some researchers suggested that the investigation of RC attachment ambiguities do not address the universality of parsing principles (Carreiras & Clifton, 1993; Cuetos, Mitchell & Corly, 1996; Frazier & Clifton, 1996; Gibson, Pearlmutter, Cansseco-Gonzalez, and Hickok, 1996; Gilboy, Sopena, Clifton, & Frazier, 1995; Hemforth, Konieczny, Scheepers, and Strube, 1998; Pearlmutter & Gibson, 2001). Therefore, the results of this study should be interpreted considering this argument. Nevertheless, findings can still be revealing to understand cross-linguistic similarities and differences in RC ambiguity resolution.

Özet

Nazik Dinçtopal, "Syntactic Processing in Second Language Acquisition of English"

Bu çalışma nihai-durum ikinci dil olarak İngilizce konuşan Türklerin ikinci dilde ortaç cümleciklerini (OC) iliştirme tercihlerini araştırmakta ve onların cümle işleme stratejilerini aşağıdaki gibi bir OC ile tanımlanmış iyelik eki almış karmaşık ad öbeklerini (AÖ) içeren cümlelerde tekdilli Türkçe konuşan ve anadil olarak İngilizce konuşan kimselerle karşılaştırmaktadır.

Birisi [$_{OC}$ balkonda duran] [$_{AÖyerel}$ aktrisin] [$_{AÖyerel\ olmayan}$ hizmetçisini] vurdu.

Bu tip yapılar önceki çalışmalarda İngilizce'de araştırılmış olmasına rağmen, nispeten daha esnek sözcük sırası olan Türkçe'den edinilen veriler OC iliştirme tercihlerinin diller arası değişkenliğini araştırmak açısından konuya ışık tutabilir. Türkçe'de sahiplik, İngilizce'deki Sakson sahiplik yapılarına benzerlik gösteren iyelik eki almış AÖ'lerle sağlanır. Ancak, İngilizce'den farklı olarak AÖ-İÖ-AÖ yapıları yoktur.

Evrensel Ayrıştırıcı (EA) ve Evrensel Dilbilgisi'nin (ED) ikinci dilde varlığını test etmenin yanı sıra ikinci dilde cümle işleme stratejilerinde birinci dilin rolünü araştırmaya da olanak sağladığı için nihai-durum ikinci dil olarak İngilizce öğrenen Türkler'in OC iliştirme tercihlerini araştırmak oldukça açıklayıcı olabilir.

Katılımcılara bir dizi çevirimiçi ve çevirimdışı cümle işleme görevleri verilmiştir. Sonuçlar göstermektedir ki, hem anadil olarak İngilizce konuşanlar hem de anadil olarak Türkçe konuşanlar kişisel dillerinde çevirimiçi ve çevirim dışı okuma yaparken OC'yi

yerel olan AÖ'ye iliştirmeyi tercih etmişlerdir. Veriler doğrulamaktadır ki, hem birinci dili Türkçe olan hem de birinci dili İngilizce olan gruplar iyelik eki almış karmaşık AÖ önceli olan OC'ler içeren cümleleri kavrarken seri işleme yöntemini kullanmaktadırlar. Başlangıçta belli bir iliştirme alanına bağlılık göstermektedirler ve ilk analizlerinin yanlış olduğu kanıtlandığında ilk yorumlarını yeniden analiz etmektedirler. Ancak, bu ilk tercih sadece sözdizimsel etkenler tarafından belirlenmemektedir. Sonuçlar önermektedir ki, anadil olarak Türkçe ve İngilizce konuşanlar ilk kararlarında adın canlı adı olup olmaması gibi sözlüksel bilgiyi de sözdizimsel bilgi kadar kullanmaktadırlar. Diğer taraftan, ikinci dil olarak İngilizce öğrenen Türkler, çevirimiçi okuma yaparken sözlüksel bilginin olmadığı durumlarda yerel olan ya da yerel olmayan AÖ için net bir iliştirme tercihi göstermemektedirler ve sözlüksel bilgiyi her iki dili birinci dil olarak konuşanlardan farklı kullanıyor görünmektedirler.

Birinci dildeki bulgular Van Gompel, Pickering, ve Traxler (2000; 2001) tarafından önerilen Unrestricted Race Model'ini doğrular görünmektedir. Model, dilbilgisel ayrıştırıcının bir seferde tek bir analiz yaptığını ve kendini ona adadığını öne sürer. Ancak bu analiz sadece sözdizimsel etkenler tarafından belirlenmemektedir. Birinci dil olarak Türkçe ve İngilizce konuşanlar ilk analizleri süresince (adın canlı adı olması gibi) sözlüksel bilgiyi kullandıkları için çalışmanın bulguları Unrestricted Race Model ile uyumluluk göstermektedir. Buna ilaveten, ilk analizleri doğrulanmadığında, katılımcıların yeniden analiz yaptıkları konusunda kanıtlar vardır.

İkinci dil bulguları Clahsen ve Felser'in (2006a, 2006b) Shallow Structure Hypothesis'i (SSH) ile uyumludur. SSH ikinci dil öğrenen çocuk ve yetişkin birinci dil konuşanlarından farklı olarak, yetişkin ikinci dil konuşanlarının detaylı sözdizimsel

hesaplamalar yapmadıklarını öne sürmektedir. Onun yerine, analiz yaparken sözlüksel-anlamsal bilgi kaynaklarına güvenmektedirler. Bu çalışmanın bulguları ikinci dil konuşanların sözlüksel bilgiye aşırı derecede güvendikleri için bu öngörüyü doğrulamaktadır. AÖ'nün taşıdığı, adın canlılığı bilgisi ikinci dil konuşanların OC iliştirme tercihlerini yönlendirmiştir. İkinci dil konuşanların sözlüksel bilgiye güvenlerinin örtük dilbigilerinde bir eksiklik olduğuna, ki bunun da ED'ye erişemedikleri için EA'nın ikinci dil konuşanlarda hazır bulunmadığına işaret ettiği önerilmektedir (Clahsen & Felser, 2006b).

Çeşitli nedenlerle bazı araştırmacılar OC iliştirme iki anlamlılıklarının araştırılmasının ayrıştırıcı prensiplerinin evrenselliği konusuna hitap etmediğini öne sürmüştür (Carreiras & Clifton, 1993; Cuetos, Mitchell & Corly, 1996; Frazier & Clifton, 1996; Gibson, Pearlmutter, Cansseco-Gonzalez, and Hickok, 1996; Gilboy, Sopena, Clifton, & Frazier, 1995; Hemforth, Konieczny, Scheepers, and Strube, 1998; Pearlmutter & Gibson, 2001). Bu yüzden, bu çalışmanın bulguları bu iddiayı gözönünde tutarak yorumlanmalıdır. Bununla beraber, bulgular yine de OC iki anlamlılık çözümlemelerinin diller arası benzerliklerini ve farklılıklarını incelemek açısından açıklayıcı olabilir.

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ABBREVIATIONS

ABL	ablative case
ACC	accusative case
AFAmb	Animate NP-Animate NP: Ambiguous
AFLoc	Inanimate NP-Animate NP: Local Animate forced
AFNonLoc	Animate NP-Inanimate NP: Non-local Animate forced
DAT	dative case
GEN	genitive case
IFAmb	Inanimate NP-Inanimate NP: Ambiguous
IFLoc	Animate NP-Inanimate NP: Local inanimate forced
IFNonLoc	Inanimate NP-Animate NP: Non-local inanimate forced
IMPF	imperfective
LOC	locative case
PART	participle
PASS	passive
PAST	past tense
PASTCOP	past copula
PL	plural
POSS	possessive
SG	singular

CHAPTER 1

INTRODUCTION

Most second language acquisition (SLA) studies have mainly investigated the abstract linguistic knowledge of second language (L2) speakers. However, the issue how L2 speakers comprehend sentences as they actually read or hear has long been ignored (Juffs, 2005; Papadopoulou & Clahsen, 2003; Clahsen & Felser, 2006a). An important issue in L2 acquisition research is whether or not L2 speakers are capable of processing the target language input in the same way as native speakers do. This question has recently been examined in the context of end-state L2 acquisition. More specifically, L2 researchers try to understand whether or not problems in the end-state adult L2 are the result of non-target-like processing strategies or inaccessibility to Universal Grammar (UG) (Juffs & Harrington, 1995; Felser, Roberts, Marinis & Gross, 2003; Papadopoulou, 2005). How L2 speakers process L2 input has led SLA researchers to sentence processing research and sentence processing theories.

Several studies have investigated sentence processing strategies in the first language (L1). These studies have examined a wide range of structures to figure out what kinds of strategies the parser uses while processing sentences. Several views have been proposed to explain strategies readers or listeners use while processing sentences and resolving ambiguities.[1]

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1 There are two types of ambiguities: syntactic and lexical. Syntactic ambiguity results from two possible readings of a sentence as in (1), whereas lexical ambiguity is due to two possible readings of a word as in (2):

1) They 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

There are basically two main frameworks in sentence processing research: those that propose an innate syntactic modular parser and those that propose parallel processing through which the parser uses all possible sources of information including the syntax at the same time. Other accounts such as Parameterized Theories of parsing and the Unrestricted Race Model have also derived from these two frameworks.

The first framework, also known as the restricted accounts or the innatist accounts, is mainly influenced by the modular models of language acquisition. It is proposed that there is a universal parser which is mainly guided by the information provided by the innate syntax. There are several models within this framework, such as the *Right Association* (Kimball, 1973), the *Garden-Path Theory* (Fraizer, 1978; Frazier & Fodor, 1978), the *Minimal Chain Principle* (De Vincenzi, 1998) and the *Construal Hypothesis*, the revised version of the Garden Path Theory, (Frazier & Clifton, 1996) which all argue that the human parser goes through serial (i.e., two-stage) processing and makes an initial analysis by using the syntactic information. When necessary, the parser makes a reanalysis where it uses other sources of information such as lexical or thematic information or discourse context (Frazier, 1978; Frazier & Fodor, 1978; Frazier & Rayner, 1982, 1987; Clifton, Traxler, Mohamed, Williams, Morris, & Rayner, 2003; De Vincenzi, 1998; Fernandez & Sainz, 2004; Kamide & Mitchell, 1997; Konieczny & Hemforth, 2000; Penolazzi, De Vincenzi, Angrilli, & Job, 2005; Swinney, 1979; Zagar, Pynte, & Rativeau, 1997).

---

2) the order of
    a) the general
    b) the files

Another relevant set of models come from Parameterized Theories of Sentence Processing, which are mainly influenced by Chomsky's Principles and Parameters theory. Parameterized Theories of parsing such as *Recency* and *Predicate Proximity* (Gibson, Pearlmutter, Cansseco-Gonzalez, and Hickok, 1996; Pearlmutter & Gibson, 2001), *Parameterized Head Attachment* (Hemforth, Konieczny, Scheepers, and Strube, 1998) and *Modifier Straddling Strategy* (Cuetos, Mitchell & Corly, 1996) suggest that there are no universal parsing strategies. Instead, languages have one or two parameter settings available and the parser uses the parameterized information while making analyses. These accounts propose that parsing strategies may be language-dependent. Therefore, investigating ambiguity resolution strategies in different languages may not give universal accounts of language processing.

The second framework, also known as the unrestricted accounts, includes interactive approaches to sentence processing, which are influenced by the connectionist models of language acquisition. Models proposed in this framework such as the *Competition Model*, the *Constraint Satisfaction Model*, and exposure-based *Tuning Hypothesis* all argue for parallel processing whereby the parser uses all possible sources of information such as semantics and the discourse context which are initially active as well as the syntactic information. The parser makes only one analysis by using all available sources of information (Altman, van Nice, Garnham, & Henstra, 1998; Aoshima, Philips, & Weinberg, 2004; Demestre, & Garcia-Albea, 2004; Desmet, & Gibson, 2003; Gibson, & Pearlmutter, 1998; Garnsey, Pearlmutter, Myers, & Lotocky, 1997; MacDonald, Pearlmutter, & Siedenberg, 1994; MacWhinney, 1987; Bates &

MacWhinney, 1987; McClelland & Rumelhart, 1981; Ousterhout, Holcomb, & Swinney, 1994; Trueswell, Tanenhaus, & Garnsey, 1994).

And finally, the *Unrestricted Race Model* attempts to combine restricted and unrestricted models and argues for a two-stage sentence processing (Van Gompel, Pickering, & Traxler, 2000; 2001), according to which the parser goes through two-stages while processing sentences. However, the initial analysis does not necessarily have to be guided by the syntax alone. Other sources of information are available as well as the syntax at the initial analysis. However, since only one analysis is available at a time, the parser may have to make a reanalysis.

The models described above aim to account for L1 speakers' sentence processing behavior. However, there is no single model that can fully explain the totality of sentence processing strategies observed in native speakers of different languages. L2 sentence processing is even more complicated because of an already existing linguistic system, namely L2 learners' L1. Research in L2 sentence processing is rather limited. Many L2 studies have examined the end state grammars of late L2 learners mostly through offline grammaticality judgment tasks to address the question of whether it was possible for L2 learners to converge on the grammar of a native speaker in the structures tested. The aim of such studies is to investigate whether L2 learners have access to UG even after puberty. However, as Juffs (1998) and Juffs and Harrington (1995) point out, what seems like a divergence from native norms in the L2 grammar of a native speaker may actually result from processing difficulties rather than their inability to access UG or a competence deficit. Therefore, studies investigating the L2 acquisition phenomenon with alternative methodologies addressing issues such as reaction time (RT),

eyetracking, and Event-Related Brain Potential (ERP) experiments are essentially needed in SLA studies to measure their real time sentence processing behaviors.

Investigating L2 sentence processing will not only reveal certain aspects of the L2 acquisition phenomenon but also help us test sentence processing theories (Papadopoulou, 2005). Within the field of psycholinguistics, ambiguity resolution in sentence processing has been much studied. Several types of ambiguous constructions (e.g., main verb vs. reduced relative clause, subject vs. object extracted relative clauses, and relative clause attachment ambiguities) have been investigated (see Papadopoulou, 2005 for a review). Among these, relative clause attachment ambiguity resolution has received much attention as it seems to allow researchers to explore parametric variations in sentence processing (Papadopoulou, 2005).

In this thesis, attachment ambiguities of relative clauses with complex genitive antecedents are investigated in Turkish and English. The experiments in the study tested the RC attachment preferences of monolingual Turkish speakers, native English speakers and Turkish speakers of L2 English in structures such as the following;

(1) They shot [$_{\text{NPnon-local}}$ the servant] of [$_{\text{NPlocal}}$ the actress] [$_{\text{RC}}$ who was on the balcony].

(2) [$_{\text{RC}}$ Balkon-da dur-an] [$_{\text{NPlocal}}$ aktris-in] [$_{\text{NPnon-local}}$ hizmetçi-si]-ni]
Balcony-LOC stand-PART actress-GEN servant-3SG.POSS-ACC
vur-du-lar.
shoot-PAST-3PL

In the sentences above, the ambiguity rises as to which noun phrase (NP) the RC will be attached to since the RC can modify either the non-local or local NP.

Several studies have investigated the attachment ambiguities in RCs with complex genitive antecedents and cross-linguistic variations in RC attachment preferences have been observed(see Fodor, 2002a; Mitchell & Brysbaert, 1998; Papadopoulou, 2005 for a review of cross-linguistic differences in RC attachment preferences). Data from Turkish, a head-final, SOV language with a relatively free word order, can shed further light on this issue. In Turkish, possession is realized through genitive-possessive constructions that are similar to the Saxon genitive in English:

(3)

a) [$_{RC}$ Balkon-da dur-an] [$_{NPlocal}$ aktris-in] [$_{NPnon-local}$ hizmetçi-sin]-i]

Balcony-LOC stand-PART actress-GEN servant-3SG.POSS-ACC

vur-du-lar.

shoot-PAST-3PL

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

(Saxon Genitive)

c) They shot the servant of the actress who was standing on the balcony.

(Norman Genitive)

What is local in Turkish (3a) and in the Norman genitive construction (3c) in English (i.e. servant) becomes non-local in the Saxon genitive construction in (3b). Furthermore, while the Turkish sentence in (3a) and the English sentence in (3c) are ambiguous; the sentence in (3b) is not ambiguous. In (3b) the RC (*who was standing on the balcony*) can only modify the NP (*the servant*).

Given the differences between Turkish and English, an investigation of L2 processing of Turkish learners of English would be very revealing in terms of the

acquisition of the parametric variations by end-state L2 learners and their L2 processing routines.

The rest of the thesis is organized around the following five chapters. Chapter 2 gives a detailed summary of sentence processing research in the L1 and L2. Chapter 3 aims to provide a description of the RC constructions in English and Turkish. Chapter 4 describes the design of the study and reports on the two experiments, Experiment 1 and Experiment 2. Chapter 5 reports on the results of the experiments and finally Chapter 6 presents the discussion of the findings.

CHAPTER 2

THEORIES OF SENTENCE PROCESSING AND RELATIVE CLAUSE AMBIGUITY RESOLUTION IN THE L1 AND L2

Several psycholinguistic accounts have been proposed to explain how readers or listeners process sentences and resolve structural ambiguities. As mentioned before, two main frameworks have basically shaped the models in sentence processing research. Models of the first framework propose that the parser makes serial processing and the information provided by the innate syntactic module guides the processing behavior of readers or listeners. In cases of ambiguity, the parser goes through a second stage where it uses other sources of information such as semantics or discourse context. Models of the second framework propose that the parser makes parallel processing at one single stage through which all possible sources of information including the syntax are used simultaneously.

In what follows is the review of the approaches to sentence processing in general and ambiguity resolution of RCs in particular. RCs under investigation are the ones headed by complex genitive NPs (i.e., [NP1-*of*-NP2]-RC constructions) such as (4) in English and (5) in Turkish.

(4) They shot [$_{\text{NPnon-local}}$ the servant] of [$_{\text{NPlocal}}$ the actress] [$_{\text{RC}}$ who was on the balcony].

(5) [$_{\text{RC}}$ Balkon-da dur-an] [$_{\text{NPlocal}}$ aktris-in] [$_{\text{NPnon-local}}$ hizmetçi-si]-ni] vur-du-lar.

Balcony-LOC stand-PART actress-GEN servant-3SG.POSS-ACC shoot-PAST-3PL

Restricted Accounts of Sentence Processing

The Restricted Accounts, influenced by the innatist and modular views of language acquisition is also referred to as 'two-stage' models. In this account, it is argued that there is a universal parser which is guided by an innate grammar, more specifically, by an innate syntax. There are several different models developed within this framework and they all assume an autonomous, innate syntactic module to play the key role in sentence parsing. In this thesis, to refer to models proposed within this framework, I will use the terms *Restricted*, *Two-Stage* or *Innatist Accounts*.

Various specific parsing models formulated within this framework such as the *Right Association* (Kimball, 1973), the *Garden-Path Theory* (Fraizer, 1978; Frazier & Fodor, 1978) or the *Minimal Chain Principle* (De Vincenzi, 1998) all propose a modular sentence processing mechanism whereby the parser goes through *serial processing* and makes an initial commitment to a single syntactic structure using only a restricted domain of syntactic information. Other potentially relevant sources of information such as lexical information or the discourse context are ignored during the first stage of parsing. In case of temporary ambiguity, if the initial analysis guided by the syntactic information proves to be incorrect, the parser revises the initial analysis. Semantic constraints are used at this second stage of the analysis, if necessary (Frazier, 1978; Frazier & Fodor, 1978; Frazier & Rayner, 1982, 1987; Clifton et al., 2003; De Vincenzi, 1998; Fernandez & Sainz, 2004; Kamide & Mitchell, 1997; Konieczny & Hemforth, 2000; Penolazzi et al., 2005; Swinney, 1979; Zagar et al., 1997).

One of the most influential two-stage models, which propose an innate autonomous syntactic module in the human mind, is the "Garden-Path" model.

The Traditional Garden-Path Theory

Developed originally by Frazier (1978) and Frazier and Fodor (1978), *the Garden-Path Theory* proposes that the human sentence processing mechanism copes with temporary ambiguities of a natural language by initially choosing a single analysis. However, when there is more than one possible analysis for the sentence or when the initial analysis selected by the parser proves to be incorrect, the parser will often be led down by the garden-path.

Frazier (1978) proposes that the parser makes one initial syntactic analysis on the basis of some universal parsing principles such as *Late Closure* and *Minimal Attachment*. Frazier defines these two principles as follows:

> *Late Closure:* When possible, attach incoming lexical items into the clause or phrase currently being processed (i.e., the lowest possible nonterminal node dominating the last item analyzed).
> *Minimal Attachment:* Attach incoming material into the phrase-marker being constructed using the fewest nodes consistent with the well-formedness rules of the language.
>
> (Frazier 1978, p.76).

The Late Closure principle predicts that a reader of a sentence starting like (6) will initially interpret the sentence as in (6a) as the reading permits the NP, *a mile*, to be analyzed as the direct object of the verb *jog*. (6b) will be more difficult for the parser to process due to the Late Closure strategy. Here, the parser has to build an additional node that will construct (a mile seems like a short distance to him) as a new phrase.

> (6) Since Jay always jogs a mile …
> (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.
>
> (Frazier & Rayner, 1982, p. 179)

The Minimal Attachment strategy predicts a sentence beginning like (7) to be processed as in (7a) but not as in (7b) since the former requires fewer nodes.

(7) The city council argued the mayor's position …
(a) The city council argued the mayors position forcefully.
(b) The city council argued the mayor's position was incorrect.
(Fraizer & Rayner, 1982, p. 180)

According to the Minimal Attachment strategy, the reader or listener interprets sentences in terms of the simplest syntactic structure. In the example above, the parser does not normally attempt to structure (the mayor's position was incorrect) as a separate phrase. The Minimal Attachment strategy requires the parser make the syntactically simplest attachment by attaching the NP (the mayor's position) as the direct object of the verb (argue).

Since the human cognitive system is assumed to be parsimonious due to the limited working memory capacity, the so-called universal minimal attachment and late closure strategies are assumed to apply in all languages (Frazier & Rayner, 1987).

In RC ambiguity resolution, the Minimal Attachment principle in a relative clause construction such as "[$_{NPhigh}$ the servant] of [$_{NPlow}$ the actress] who was on the balcony" does not postulate a prediction in a certain direction (i.e., either for the higher or lower NP) for the structure in question since the nodes required for either attachment site is the same. Yet, the Late Closure strategy predicts the RC to be attached to the second (i.e., low) NP. The Garden-Path model predicts a structural preference for the low attachment of RCs modifying complex genitive NPs in all languages. However, the universality of the Late Closure principle has been questioned (e.g., Cuetos & Mitchell, 1988). It was argued that in RC ambiguity resolution, in some languages (e.g., Spanish); RCs are

attached to the high NP not the low NP. Furthermore, it has been noted that neither high nor low attachment of RC was proven to be systematically preferred across languages, which challenged the universality of the principles proposed under the Garden-Path Theory. To account for the inconsistent RC attachment preferences, Frazier, Clifton and their colleagues reformulated the Garden-Path Theory and developed the Construal Hypothesis (Carreiras & Clifton, 1993; Gilboy et al., 1995; Frazier and Clifton, 1996).

The Construal Hypothesis

According to the Construal Hypothesis, the parser distinguishes two classes of processing decisions: *primary* and *non-primary* relations. The primary relations (e.g., main clause versus reduced relative clause or NP attachment versus sentence complement) are guided by general parsing principles (i.e., late closure and minimal attachment). Non-primary relations (e.g., RCs with complex heads), on the other hand, are not guided by general structural preferences. They are construed by being associated with some region of the structure and interpreted using additional structural and nonstructural information. No general structural preference is seen in non-primary decisions.

The Construal Hypothesis is summarized as follows:

> a. Construal Principle
> Associate a phrase XP that cannot be analyzed as instantiating a primary relation into the current thematic processing domain.
> Interpret XP within that domain using structural and nonstructural (interpretive) principles.
>
> b. Current thematic processing domain
> The current processing domain is the extended maximal projection of the last theta assigner.
>
> (Frazier & Clifton, 1996; pp. 41-42)

To explain the principle, Frazier and Clifton (1996) listed several structural ambiguities some of which are first analyzed using only structural information and some of which are analyzed according to the *Construal Principle*. The former ambiguities are grouped under the term "structural attachment ambiguities" and the latter ones are categorized as "structural association ambiguities". The parser uses the general parsing principles guided by the syntactical information that it has to process the sentences such as (8a-c). Whereas to analyze the sentences like (9a-b) no general structural preference is followed. Rather, semantic information can influence attachment preferences.

> (8) Structural attachment ambiguities
> a. The horse raced past the barn fell (*main clause/ reduced relative*)
> b. John knew the answer to the physics problem was wrong/very well. (*NP versus S complement*)
> c. While Mary was mending the sock (it) fell off her lap (*direct object versus subject of* S_2).
> (9) Structural association ambiguities
> a. A table of wood that was from Galicia … (Relative clauses with complex head, [NP1-of -NP2] RC).
> b. Some girl hit some boy last night who was …. (*Extraposed relative clause*)
>
> (Frazier & Clifton, 1996; pp. 42-43).

There are inconclusive findings about the attachment preferences for the RCs in sentences such as (9a). It is stated that relative clauses may not be attached to a specific syntactic structure, but associated to the current domain following the Construal Hypothesis (Frazier & Clifton, 1996). Therefore, it is proposed that data revealing cross-linguistic differences in relative clause attachment is not surprising. Universal principles such as the Late Closure strategy do not apply to non-primary relations, such as RCs headed by complex genitive NPs (Gilboy et al. 1995; Frazier & Clifton, 1996).

According to the Construal Hypothesis, a relative clause will be associated to the extended maximal projection of the last thematic role assigner, which can be either NP1 or NP2 or their projections in the example (4).

> Relative Clause Construal Hypothesis:
> Associate a relative clause to the *current thematic processing domain* –the (extended) maximal projection of the last theta assigner.
> *Interpret* the relative clause with any ungrammatically permissible material in the associated domain using structural and semantic/pragmatic information.
>
> (Frazier & Clifton, 1996; pp. 31-32)

If NP2 (the actress) is an argument of NP1 (the servant) in a [NP1-*of*-NP2]-RC construction, then the whole NP headed by NP1 will define the current processing domain and the relative clause will associate to the entire NP because either NP1 or NP2 or their projections will be available as potential hosts for the RC. If the two hosts are available within the current processing domain, which host will be preferred by the parser?

It is predicted that the parser prefers the host that is 'referential' and identified by the *Referentiality Principle* in which the heads of maximal projections introduce entities such as discourse participants into the discourse model or they correspond to already existing discourse entities. Hosts that are referential in this sense are preferred by the restrictive modifiers such as restrictive relative clauses (Frazier, 1990; Frazier & Clifton, 1996; Gilboy et al., 1995). To put it differently, in sentences like (4), *the servant* is the head of the whole complex NP. According to the referentiality principle, the head of the complex NP (i.e., *the servant* of the actress) is referential in the sense that it either introduces entities or corresponds to already existing discourse entities. Therefore, the

Referentiality Principle predicts a non-local NP (i.e., NP1) attachment (i.e., *the servant* in (4)) in complex genitive NPs modified by RCs (e.g.,4, 9a).

Frazier and Clifton suggest that in languages (e.g., English) which employ two forms of genitive constructions (i.e., Saxon and Norman genitives), an NP2 attachment is favored in Norman genitive constructions such as (4). Since the language already has a Saxon genitive to modify the '*servant*' (in *the actress's servant who was on the balcony*), the parser applies the Gricean Maxim of *Avoid Ambiguity* and prefers to attach the RC to the '*actress*' (in *the servant of the actress who was on the balcony*) when a Norman genitive is used. A Saxon genitive such as (the actress's servant) does not lead to ambiguity in an RC construction such as '*the actress's servant who was on the balcony*' as the only possible attachment is '*the servant*'. According to the Gricean Maxim of Avoid Ambiguity, if a language has both Saxon and Norman genitives, the use of Norman genitive implies a local NP attachment. In other words, the RC is taken to modify 'the actress' not 'the servant'. Accordingly, if the intention is to modify 'the servant' by the RC, the Saxon genitive is used. However, in a Norman genitive such as '*the servant of the actress*', there is ambiguity. In contrast, languages (e.g., Spanish) which have only Norman genitive type constructions (i.e., NP1-*of*-NP2) do not demonstrate a bias towards the local NP attachment in these constructions. Therefore, these languages choose the non-local NP by pursuing the Referentiality Principle (see also De Vincenzi & Job, 1993; Gilboy et al., 1995).

Although the revised theory can account for RC attachment preferences in English (e.g., Traxler, Pickering, & Clifton, 1998) and various other languages; such as Spanish (Cuetos & Mitchell, 1988; Gilboy & Sopena, 1996) and Korean (Jun & Kim, 2004), it

fails to account for non-local NP preference in languages such as Dutch (Brysbeart & Mitchell, 1996; Wijnen 1998) and no bias in languages such as Afrikaans (Mitchell, Brysbeart, Grondelaers & Swanepoel, 2000) in which two forms of genitive constructions (i.e., both Saxon and Norman) are found. In other words, the theory predicts that a non-local NP preference would be observed in languages where only one form of genitive construction exists. In languages where two forms of genitives (e.g., Saxon and Norman) are found, the speakers of the language should apply the Gricean Maxim of Avoid Ambiguity and choose local NP attachment in such constructions.

Parameterized Theories of Parsing

Other innatist models of parsing have directly been influenced by Chomsky's Principles and Parameters Theory. Parameterized theories of parsing such as *Recency* and *Predicate Proximity* (Gibsonat al., 1996; Pearlmutter & Gibson, 2001), *Parameterized Head Attachment* (Hemforth et al., 1998) and *Modifier Straddling Strategy (*Cuetos at al., 1996) claim that there are one or more parameter settings for a particular language and the parser utilizes this parameterized information while processing ambiguous sentences. According to these theories, parsing strategies are subject to language-specific parameters. Therefore, the accounts that argue for the presence of universal and invariant parsing principles will not be able to explain different attachment preferences in different languages. The most influential hypothesis in this framework is the Receny and Predicate Proximity Principles of Gibson et al. (1996).

Recency and Predicate Proximity

To explain the conflicting findings in English and Spanish, which challenged the universality of the late closure strategy, Gibson et al. (1996) proposed a parameterized account of RC attachment ambiguities (see also Gibson, & Schütze 1999; Pearlmutter & Gibson, 2001). In order to account for the cross-linguistic variation in RC attachment, they designed an experiment in which there were three NPs serving as potential hosts for the RC. The results indicated that Spanish native speakers had less difficulty with low attachments (NP3) than with either middle (NP2) or high attachments (NP1) and high attachments were easier than middle attachments in (10) and (11).

> (10) [$_{NP1}$the commentary] of [$_{NP2}$the book] about [$_{NP3}$the murders] that caused a furor
> (11) [$_{NP1}$the note] about [$_{NP2}$the book] about [$_{NP3}$the theories] that resulted in difficulty in understanding
>
> (Gibson et al. 1996, p. 54)

In other words, their attachment preference order was NP3, NP1, and NP2, which showed that Spanish speakers had less difficulty with low and high attachments respectively but middle attachment was the most difficult interpretation.

In light of the findings of the above study, Gibson et al. (1996) propose that participants' NP3 or NP1 preference can be determined by two factors. The first one is known as the *Recency Preference*, and it is very similar to the Late Closure principle. The reader or listener of the sentence prefers to attach the incoming material to the most recent NP (i.e., NP3 in (10, 11)) as a consequence of the constraints of the human short-term memory. The second factor leading to the high attachment preferences (i.e., NP1) is known as the *Predicate Proximity* factor. According to this, readers or listneners tend to attach the material close to the predicate phrase. The authors argued that the Recency

preference applies in all languages including English and Spanish. Nevertheless, in languages like Spanish, the Recency Principle is weaker than the Predicate Proximity Principle. Therefore, languages like Spanish favor NP1 attachment whereas languages like English prefer NP2 attachment.

Gibson et al. (1996) state that as all grammatical utterances have a predicate at their core the core predicate structure is ranked more highly than other attachment sites. Since the human parser is parsimonious in its use of resources, an attachment site close to a predicate phrase will be more preferred by the parser. Thus, the incoming material is processed in terms of (potential) predicate phrases.

The strength of the predicate phrase is determined by the average distance from the head of a predicate (verb) to its arguments in a language. This is explained by Gibson et al. (1996) as follows:

> The greater the average distance between a verb and its arguments, the more strongly the predicate needs to be initially activated in that language to permit the longer distance attachments. The more activated that the predicate is, the more the attachment to the predicate is preferred in an ambiguity and the higher the cost associated with attaching to non-predicate sites. Thus the greater the average distance between a verb and its arguments in a language, the greater the cost of violating Predicate Proximity in that language (p. 49).

This explanation predicts that a language with a rigid SVO word order like English will not have a very strong Predicate Proximity activation because the average distance of arguments to their verbal heads is relatively low, which in turn leads to a low activation of Predicate Proximity in English. Thus, Recency will dominate Predicate Proximity in English. Since Spanish has a relatively freer word order, it allows for VOS as well as its typical SVO word order. Therefore, Predicate Proximity activation will be stronger in Spanish than in English.

It is predicted that languages having VOS, VSO, SOV or OSV word orders will have relatively strong Predicate Proximity activations leading to high RC attachments. Languages having *rigid* SVO or OVS word orders, however, are expected to attach the RC to the lower NP (Gibson et al., 1996).

Although the model makes an effective prediction especially in three-site attachments, it is criticized for not having a specific definition of verb/argument distance (Mitchell & Brysbaert, 1998).

Unrestricted Accounts of Sentence Processing

In contrast to the models that argue for a universal and two-staged modular parsing in sentence comprehension, the proponents of unrestricted accounts do not assume any innate mechanisms governing sentence comprehension or production. This account is mainly derived from interactive or connectionist models of language acquisition which considers language processing the result of activations of neural networks and connections among them. While processing a sentence, all sources of information including syntax, semantics and the discourse context are activated at the same time and the processor comprehends a sentence or resolves ambiguities at one-stage using the information available from the constraints (Altman et al., 1998; Aoshima et al., 2004; Demestre, & Garcia-Albea, 2004; Desmet, & Gibson, 2003; Gibson, & Pearlmutter, 1998; Garnsey et al., 1997; MacDonald et al., 1994; MacWhinney, 1987; Bates & MacWhinney, 1987; McClelland & Rumelhart, 1981; Ousterhout, Holcomb, & Swinney, 1994; Trueswell et al., 1994).

Several specific models have been developed in this account, such as the Competition Model, the Constraint Satisfaction Model, and exposure-based Tuning Hypothesis.

The Competition Model

Similar to other data-driven, connectionist models, *the Competition Model* assumes that statistical properties of the input play a major role in determining the order of acquisition as well as the nature of the final state language (MacWhinney, 1987; Bates & MacWhinney, 1987). The model emphasizes the importance of lexicon as an organizer of the input. The processing principles of the model are based on the ways in which lexical items compete with each other during comprehension and production (MacWhinney, 1987).

Lexicalist Constraint-Satisfaction Models

Influenced by earlier interactive models (McClelland & Rumelhart, 1981), the C*onstraint-Satisfaction Model* assumes parallel processing. In essence, the model is not very different from the Competition Model developed by Bates and MacWhinney (1987) since the constraints in sentence comprehension are believed to compete for satisfaction. Comprehension is viewed as a process of concurrently deriving a number of linked representations of different types. The Constraint-Satisfaction Model abandons a modular and special purpose parser that combines knowledge of grammar with special purpose algorithms such as minimal attachment or late closure. It is claimed that both syntactic and lexical ambiguity are governed by the same types of knowledge representations and processing mechanisms and there is no specific language processing

mechanism. Language processing is viewed as just a reflection of general properties of memory perception and as disparate as concept learning, pattern recognition and decision making (MacDonald et al., 1994, p. 700).

While resolving ambiguities, both syntactic and lexical factors play a role and it is the lexicon that carries all types of information. Indeed, both types of ambiguity resolution (syntactic and lexical) stem from aspects of lexical representations (MacDonald et al., 1994; Trueswell et al., 1994). It is the lexicon that stores all types of knowledge associated with words, including their syntactic functions. Rather than merely listing these different types of information, the lexicon encodes grammatical and probabilistic relationships among them. "… the lexical representation for a word includes representation of the word's phonological form, orthographic forms, semantics, grammatical feature (including grammatical category), morphology (at least inflectional), argument structure, and X-bar structure" (MacDonald et al., 1994; p. 684).

Ambiguity resolution is viewed as a continuous process in which the most likely syntactic alternatives are evaluated with respect to evidence provided by syntactic input as well as salient semantic and discourse-based constraints (e.g., Trueswell et al., 1994).

In sum, the Constraint-Satisfaction Model assumes a processing system that uses the combination of contextual, phrase level and computational resource constraints. The system gives priority to lexical properties where the relative frequency of lexical elements is assumed to be influential in resolving ambiguities.

Several studies investigating the role of lexical information in syntactic ambiguity resolution found support for the Constraint-Satisfaction Model (Altman et al., 1998; Aoshima et al., 2004; Demestre, & Garcia-Albea, 2004; Desmet, & Gibson, 2003;

Gibson, & Pearlmutter, 1998; Garnsey et al., 1997; Ousterhout et al., 1994; Trueswell et al., 1994) whereas some others have failed to prove that the Constraint-Satisfaction Model can explain the resolution of ambiguities (Corley, 1995, cited in Mitchell and Brysbaert, 1998; Mitchell et al. 1995; Traxler et al., 1995).

For relative clause attachment ambiguities, the model predicts that the NP attracting the RC wins the competition and receives the attachment. To put it differently, the lexical or thematic information that the NP carries biases the reader to attach the RC to that specific NP. Therefore, the attachment preference would be reversed if the nouns in two sites (i.e., NP1 position and NP2 position) were exchanged (Mitchell, & Brysbaert, 1998).

The reader then would attach the RC to the same NP (e.g., the servant) in both of the following options regardless of its position:

(12)

a. The servant of the painter who was on the balcony was shot.

b. The painter of the servant who was on the balcony was shot.

In other words, regardless of the position of the NP (either NP1 or NP2) the same noun would take the RC attachment. However, this prediction was not supported in Corley (1996), which failed to exhibit such consistent RC attachment preference (cited in Mitchell, & Brysbaert, 1998). It is important to note that this model also predicts that there should not be any bias in studies that are carefully counterbalanced so that each of the NPs appears equally in the two competing sites. However, even in carefully counterbalanced studies this prediction was not borne out. The findings still reflected biases that are characteristics of the languages involved (Corley, 1996 & Gibson et al.,

1997 cited in Mitchell, & Brysbaert, 1998; Traxler, Pickering, & Clifton, 1995). In other words, it appeared that it was the syntax that determined the attachment preferences.

The Tuning Hypothesis

The Tuning Hypothesis, proposed by Mitchell and colleagues (Cuetos et al., 1996; Brysbaert, & Mitchell 1996; Mitchell, Cuetos, Corley, & Brysbaert, 1995), is very similar to the Constraint-Satisfaction Model because of its emphasis on lexical frequency, which is viewed as one type of constraint (MacWhinney, 1987; Bates & MacWhinney, 1987; Trueswell et al., 1994).

The main assumption of the Tuning Hypothesis is that the initial choice of structural analyses in parsing is determined not by general parsing principles, parameterized or otherwise, but by the experience the individual reader or listener may have had on previous encounters with ambiguities of the same kind. When the reader or listener faces ambiguity, the ambiguity will be initially resolved as the way it was most frequently resolved in the past (Cuetos et al., 1996). In other words, if the reader experienced the ambiguity resolved in a certain way in the past, s/he will try to resolve the ambiguity in the same way at new encounters. The statistical information about ambiguity resolution is the most important source for this hypothesis. Thus, the model relies heavily on corpus data.

For RC attachment ambiguities, the prediction is that the reader/listener will favor the host that received RC attachment most often when similar ambiguities are resolved in the language in question. If the reader of (4) has previously been exposed to contexts in which an RC modified the NP1 more than contexts in which an RC modified the NP2,

s/he will have the tendency to attach the RC to the NP1 when s/he encounters the same or similar ambiguities.

Several studies confirmed the prediction that the most frequent ambiguity resolution preference in the corpus would also be preferred in on-line processing (e.g., Brysbaert, & Mitchell, 1996; Desmet, Brysbaert, & De Baecke; 2002; Desmet & Gibson 2003).

For example, Brysbaert and Mitchell's (1996) study indicated that speakers of Dutch preferred high attachment of RC both in off-line and on-line tasks. Eye-tracking studies were also found to be consistent with corpus data.

Similarly, in their reanalysis of Mitchell and Brysbaert's (1998) study and of the corpus Desmet et al., (2002) also found a significant correlation between the corpus data and the RC attachment preferences of Dutch native speakers in on-line tasks. Thus, their findings supported the Tuning Hypothesis. Furthermore, Desmet et al. (2002) noted that human-referent NPs used in their on-line study attracted RCs, which was compatible with the corpus frequencies.

In a similar vein, Desmet and Gibson (2003) reanalyzed Gibson and Schütze's (1999) study which investigated attachment preferences with three potential NP sites. In the earlier study, Gibson and Schütze (1999) questioned the premises of the Tuning Hypothesis as they found that more frequent NPs were read more slowly than the less frequent NPs. However, Desmet & Gibson (2003) suggested that the items used in Gibson and Schütze's study might have biased the participants in the sense that the use of the pronoun 'one' while disambiguating sentences might have led the readers to make high attachment preference because the results of a corpus analysis and two on-line

reading experiments showed that the presence of this pronoun was responsible for the high attachment.

Nevertheless, the predictions of the Tuning Hypothesis are disconfirmed in several studies. For example, Hsiao and Gibson (2003) investigated on-line processing of subject (SR) vs. object-extracted (OR) RCs in Chinese and compared self-paced reaction times to corpus frequencies. They found that the more frequent SR was harder to comprehend than the less frequent OR. This shows that further studies comparing corpus data to on-line and off-line experiments are necessary to be able to discuss the role of exposure in sentence processing.

The Unrestricted Race Model

In an attempt to combine restricted and unrestricted models of sentence processing, Van Gompel et al. (2000) reviewed several eye tracking experiments investigating syntactic ambiguity resolution (e.g., RC attachment ambiguities and VP/NP attachment ambiguities) and found no support for either of these. They developed a new model named the *Unrestricted Race Model* according to which processing difficulty for ambiguous sentences is due to reanalysis; however, this does not mean that the parser relies only on the restricted syntactic information in the initial analysis. On the contrary, multiple sources of information can determine which analysis to be adopted initially. However, in this model only a single analysis is available at a time and reanalysis may be necessary (Van Gompel et al., 2000; 2001). The model argues that the reader analyzes sentences in two stages, but the initial analysis is not necessarily based on the syntax alone. Sources of information other than the syntactic information (e.g., lexical

information) are also employed at the initial analysis. With respect to the processing time of ambiguous sentences, the model is similar to the restricted, two-stage accounts in the sense that it does not predict longer reading times for ambiguous sentences than disambiguated ones (i.e., when the RC favors either local NP or non-local NP attachment) because an initial analysis is adopted regardless of its correctness. On the contrary, competition models assume longer RTs for ambiguous sentences than disambiguated ones since multiple sources of information are active at the same time. The Unrestricted Race Model, similar to the restricted accounts, predicts longer reaction times for balanced but non-preferred disambiguation than that for ambiguous sentences (van Gompel et al., 2000).

Table 1 provides a summary of the theories of sentence processing that has been discussed so far.

Table 1 Sentence Processing Models and Their Predictions

1. Restricted Accounts (Two-Stage/Serial Processing Models)		*2. Parameterized Accounts*		*3. Unrestricted Accounts (One-Stage/Parallel processing Models)*		*3. The Unrestricted Race Model*	
The parser is guided by an innate syntactic module. In the case of ambiguities, the parser uses structural information first. If the initial analysis does not prove to be correct, other sources of information are employed at the second stage.		There are one or more parameter settings for a particular language in terms of sentence processing strategies and the parser utilizes this parameterized information while processing ambiguous sentences.		The reader uses all possible information as well as syntax at the same time.		Only a single analysis is available at a time but the parser uses all sources of information provided as well as syntactic cues. A reanalysis might be necessary (Van Gompel, Pickering, & Traxler, 2000; 2001).	
Model	*Predictions*	*Model*	*Predictions*	*Model*	*Predictions*	*Model*	*Predictions*
Late Closure: When possible, attach incoming lexical items into the clause or phrase currently being processed (Frazier, 1978).	The Late Closure strategy predicts the RC to be attached to the second (low) NP, which has been already processed in a sentence like (1).	*Recency and Predicate Proximity:* *Recency:* The reader or listener of the sentence prefers to attach the incoming material to the most recent NP as a consequence of human short-term memory. *Predicate Proximity*: The reader shows an attachment preference that is as close as possible to the head of a predicate phrase (Gibson, Pearlmutter, Cansseco-Gonzalez, and Hickok, 1996).	Languages having VOS, VSO, SOV or OSV word orders will have relatively strong Predicate Proximity activations leading to high RC attachments. Languages having *rigid* SVO or OVS word orders are expected to attach the RC to the lower NP.	*Constraint Satisfaction Models:* The most plausible information satisfying the interpretation wins the competition and the parser associates incoming information accordingly (Desmet, & Gibson, 2003; Gibson, & Pearlmutter, 1998; Garnsey et al., 1997; MacDonald et al., 1994; Trueswell et al., 1998)	For relative clause attachment ambiguities, the model predicts that the NP attracting the RC wins the competition and receives the attachment. The attachment preference would be reversed if the nouns in two sites (i.e., NP1 position and NP2 position) were exchanged (Mitchell, & Brysbaert, 1998).	The parser makes an analysis by using multiple sources of information. The parser does not necessarily rely on the syntactical information in its initial analysis. However, only a single analysis is available at a time and a reanalysis might be necessary.	For RC attachment ambiguities, the model predicts longer reaction times for balanced but non-preferred disambiguation than that for ambiguous sentences but it argues that sources of information other than syntax will guide the initial analysis adopted by the parser.
The Construal Hypothesis: A relative clause will be associated to the extended maximal projection of the last thematic role assigner, which can be either NP1 or NP2 or their projections in (1). According to the *Referentiality Principle*, the head of the complex NP (i.e., *the servant* of the actress) is referential in the sense that it either introduces entities or corresponds to already existing discourse entities (Frazier & Clifton, 1996).	*The Referentiality Principle* predicts an NP1(high), *the servant* in (1), attachment in complex genitive NPs modified by RCs. In languages which employ two forms of genitive constructions, such as Saxon and Norman genitives in English, an NP2(low) attachment is favored in sentences like (1) because the parser applies the Gricean Maxim of *Avoid Ambiguity* and prefers to attach the RC to the NP2 when a Norman genitive is used.			*The Tuning Hypothesis:* The ambiguity will be initially resolved as the way it proved to be appropriate most frequently in the past (Cuetos, Mitchell, & Corley, 1996). The statistical information about ambiguity resolution is the most important source for this hypothesis. Thus, the model relies heavily on corpus data.	For RC attachment ambiguities, the prediction is that the reader/listener will favor the host that received RC attachment most often when similar ambiguities are resolved in the language in question. If the reader of (1) has read or heard contexts in which RC modified NP1 more than contexts in which RC modified NP2, facing the same or similar ambiguities, s/he will have the tendency to attach the RC to NP1.		

Other Factors Influencing Ambiguity Resolution

There are approaches to sentence processing which focus on other factors such as prosody and working memory. Although this study will not investigate those factors, a brief explanation of them may be helpful in understanding human sentence processing.

Prosody

Prosody is perceived as a constraint to be satisfied (Gibson & Pearlmutter, 1998) and it may play a crucial role in resolving ambiguities.

Fodor (1998a, 2002a; 2002b) argued that it is not possible to give a full account of ambiguity resolution without exploring the prosodic properties of the structure and language in question. She claimed that prosody is an important factor in parsing even when it is not there.

> *The Implicit Prosody Hypothesis (IPH):* In silent reading, a default prosody 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, 2002a, p. 112).

This partly universal, partly language specific hypothesis claims that the length of the RC is the determining factor in its attachment to a potential host. The theory predicts that there is less probability of a prosodic break before a short RC than before a long one and a language which has a prosodic break before an RC will favor the high attachment. Listeners attach the RC high when there is an overt break before the RC, and low when there is a break before NP2 only. This prosodic phrasing is also available in silent reading. The factor underlying the importance of prosody and prosodic breaks is that a

constituent likes to have a sister of its own size, and the preference for balanced weight comes from prosodic phrasing (Fodor, 1998a).

A few studies investigating IPH have indicated that prosody influences readers/listeners attachment preferences (Bradley, Fernandez, Lovric 2003; Fernandez, Fodor, Almedia, Bradley, & Quinn 2003; Gilboy, & Sopena, 1996; Jun, 2003; Pynte, & Collonna, 2000; Sekerina, 1997).

Working Memory

Memory constraints also influence sentence processing in the L1 and L2. Just and Carpenter's (1992) *Capacity Theory* proposes that processing and storage are mediated through the activation of working memory and there is an individual difference in the availability of this activation. This individual difference can influence language comprehension. The modularity of syntactic processing may be better explained as a working memory or capacity constraint that sometimes imposes informational encapsulation. The theory has two aspects: syntactic modularity and syntactic ambiguity. As for the syntactic modularity, the theory predicts that the larger capacity of some individuals permits interaction among syntactic and pragmatic information, through which their syntactic processes are not informationally encapsulated. With respect to syntactic ambiguity, the theory predicts that individuals having larger capacities can make multiple interpretations. In other words, readers or listeners with higher spans will use multiple sources of information and keep two interpretations while resolving syntactic ambiguities (e.g., RC attachment ambiguities) whereas low span readers' capacity will not be sufficient to have multiple interpretations and the reader will

abandon the less preferred interpretation. And if capacity permits, non-syntactic information can influence the syntactic decision. So, the theory predicts that only high spans will show any effect of ambiguity (Just & Carpenter, 1992; p. 131).

As for RC attachment preferences, Omaki (2005) investigated whether working memory constraints played a role in Japanese learners of L2 English as well as monolingual Japanese and English speakers. He found that working memory capacity influenced monolingual English speakers' off-line attachment preferences but it was not significantly influential in on-line processing. Furthermore, no significant effect of working memory was found in Japanese speakers' L1 and L2 attachment preferences.

However, individual differences in working memory can be influential in the resolution of syntactic ambiguities, as well.

The cross linguistic differences in RC attachment ambiguities have challenged the researchers and led to the emergence of several assumptions in the psycholinguistic research. Low (i.e., local) attachment preference has been found in English (e.g., Carreiras & Clifton, 1999; Cuetos & Mitchell, 1988; but see Traxler, Pickering, & Clifton, 1998), Norwegian, Romanian, and Swedish (Ehrlich, Fernández, Fodor, Stenshoel, & Vinereau, 1999 cited in Omaki 2005) whereas high (i.e., non-local) attachment preference has been attested in other languages such as Dutch (Brysbaert & Mitchell, 1996), Russian (Sekerina, 1997), German (Hemforth et al., 1998, Wijnen, 1998), French (Zagar et al., 1997), Japanese (Kamide & Mitchell, 1997), Spanish (e.g., Carreiras & Clifton, 1999; Cuetos & Mitchell, 1988) (for a review of cross-linguistic differences in RC attachment preferences, see Fodor, 2002a; Mitchell & Brysbaert, 1998, Papadopoulou, 2005). Table 2.2 summarizes the findings of previous studies.

Table 2 RC Attachment Preferences in the L1

Low (Local) Attachment		High (Non-local) Attachment	
English	Carreiras & Clifton (1999); Cuetos & Mitchell (1988)	Dutch	Brysbaert & Mitchell (1996)
Norwegian, Romanian, Swedish	Ehrlich, Fernández, Fodor, Stenshoel, & Vinereau (1999)	Russian	Sekerina (1997)
		German	Hemforth, Konieczny, & Scheepers (1998); Wijnen (1998
		Spanish	Carreiras & Clifton (1999); Cuetos & Mitchell (1988)
		Japanese	Kamide & Mitchell (1997)

As can be seen from the above summary, there is no single model which can explain cross linguistic differences in RC attachment preferences yet.

Accounting for RC attachment preferences in the L2 is even more difficult because of an extra factor that might be caused by the existence of an already existing linguistic system, namely the learners' L1.

Relative Clause Attachment Preferences in the L2

RC attachment in the L2 has been investigated in the context of L1 transfer and ultimate attainment in the L2 (Dussias, 2003; Juffs & Harrington, 1995; Felser, et al., 2003; Papadopoulou & Clahsen, 2003). The role of parametric variations in sentence processing is of particular significance in the study of L1 transfer in language processing. RC attachment ambiguity resolution, in particular, might allow SLA researchers to explore parametric variations in sentence processing (Papadopoulou, 2005). However, when tested in the L2, participants might be influenced by the parsing

strategies on attachment preferences in their L1. What follows is a review of studies conducted on L2 speakers' online and offline RC attachment preferences.

In one such study, Fernández (2002) compared RC attachment preferences of Spanish-English bilinguals to monolingual speakers of English and Spanish. The goal was to distinguish participants' initial decisions from their later decisions. While initial decisions are believed to be influenced by syntactic factors, later decisions are believed to be influenced by non-syntactic factors. She found that the way readers resolved the RC attachment ambiguities was affected by their dominant language. The effect of language dominance is reflected in different ways in off-line and on-line tasks.

In the online task, monolingual speakers of English and Spanish behaved similarly in their attachment preferences. Both groups preferred to attach the RC low (i.e., the local NP is selected). This finding supported the argument that initial choices in RC attachment preferences were guided by syntactic information. Bilinguals were tested in both of their languages and they did not show any clear attachment preferences in the on-line task.

In the offline task, monolingual Spanish speakers attached the RC to the high (i.e.,non-local) NP whereas monolingual English speakers attached it to the local NP. Bilinguals' attachment preference in the offline task was influenced by their dominant languages. Regardless of the language the bilingual participants were exposed to, they preferred the attachment site which was parallel to the attachment preferences of the monolinguals of their dominant language. In other words, the Spanish dominant group favored to attach the RC to the non-local NP whereas English dominant group preferred local NP attachment. Fernández suggested that the departure from the so called universal

locality principle (i.e., late closure) came from processing associated with post-syntactic components which were only available in the offline task. The findings may provide evidence for the role of syntactic parser during early decision (i.e., on-line processing) and the role of non-syntactic factors on the final decisions (i.e., off-line processing). Cross-linguistic differences were only evident in the offline task.

Felser, Roberts, Marinis, and Gross (2003), investigated the processing of ambiguous sentences by L1 and L2 learners of English. The main aim of the study was to examine whether or not advanced L2 learners were capable of acquiring the processing strategies of the target language, and also to study the extent to which L2 learners were influenced by structural and non-structural information during L2 processing. Two groups of advanced L2 learners of English with L1 Greek and L1 German participated in the study. Their RC attachment preferences were investigated through off-line and on-line tasks. They tested RC attachment ambiguity resolution in two types of sentences such as (13):

(13)

a. The dean liked the secretary *of* the professor who was reading a letter.

b. The dean liked the professor *with* the secretary who was reading a letter.

L2 learners were influenced by lexical-semantic properties of the preposition linking the two potential antecedent NPs (*of* vs. *with*) but there was no evidence for their use of structural information to disambiguate the sentences. They showed a strong preference for local NP (i.e., NP2) disambiguation for NPs linked by *with*. However, neither German, nor Greek L2 learners of English showed any attachment preferences at all for sentences containing complex genitive antecedents (i.e., NP-*of*-NP-RC type

constructions) in either task. Children's attachment preferences were not influenced by the type of preposition at all. They primarily relied on structure-based parsing principles during processing.

The authors concluded that adult L2 speakers' RC attachment preferences are determined by at least two interacting parsing strategies: The universal Recency preference that favors local NP attachment or the Predicate Proximity Principle that favors non-local NP attachment (Gibson et al., 1998). Recency takes precedence over Predicate Proximity for ambiguous RCs in two-site contexts in English, whereas Predicate Proximity outranks Recency in languages such as German or Greek that has a less restricted word order than English.

Furthermore, similar to native speakers, L2 learners are found to be influenced by the type of the preposition linking the RC to the NP. During on-line processing of NP-*with*-NP-RC constructions (13b) both native speakers and L2 learners attach the RC to the local NP. However, with complex genitive NPs, they did not show any preference for either non-local or local NP. This suggests neither recency nor predicate proximity could determine the attachment preference in NP-*of*-NP-RC constructions.

Felser et al. (2003) concluded that unlike children, L2 learners rely more on lexical information but not on universal, least-effort-based parsing strategies.

As Hahne (2001) notes, L2 learners' ability to make use of structural information during L2 processing might be more limited compared to that of native speakers. In Felser's study, there was no evidence for L1 transfer in L2 sentence processing. This might be because of the fact that the L2 learners might be at a stage "in between" transferring non-local NP preference from their L1 or acquiring local NP preference of

the target language because the results demonstrate that L2 learners were sensitive to the lexical information provided by the linking preposition (*with*) but they lack any clear preferences for complex genitive NPs, irrespective of the preferences found in their native languages or in the target language.

In another study, Papadopoulou and Clahsen (2003) investigated whether Spanish, Russian and German learners of L2 Greek behaved similarly to Greek native speakers in their RC and prepositional phrase (PP) attachment preferences. Three groups were tested by a grammaticality judgment task to test whether L2 learners could handle the construction under investigation. An additional acceptability judgment task was also given to measure the participants' offline attachment preferences. Also a self-paced reading experiment was used to test their attachment preferences while reading on-line. L2 learners were found to behave similarly with native speakers in their grammaticality and ungrammaticality judgments. Three groups of L2 learners exhibited the same attachment preferences regardless of their L1 but they differed from the native speaker control group both in the acceptability judgment task and the self-paced reading task. Results of self-paced reading task and the acceptability judgment task showed that similar to native speakers, L2 learners showed local attachment preferences (i.e., NP2) in the PP conditions (with). However, in NP+NP_{GEN} constructions, L2 learners did not show any preference whereas native speakers showed non-local attachment preferences (i.e., NP1) in the genitive (of) conditions.

Despite their native-like mastery of the construction under investigation, the L2 learners showed RC attachment preferences that were different from those of the native speakers. Moreover, the L2 learners did not exhibit L1-based preferences in their L2

Greek. The authors suggested that L2 learners integrate information relevant for parsing differently from native speakers. In contrast to the L1 parser who integrates the incoming ambiguous structure immediately during online processing, the L2 parser delays interpretation until sufficient lexical (or other information) has been processed. Similar attachment preference of native speakers and L2 learners in sentences with PP antecedents can be attributed to the presence of a lexical cue (i.e., NP-*with*-NP-RC constructions). However, when there is no cue like that (i.e., complex genitive noun phrases-NP-*of*-NP-RC constructions), the L2 learners did not show any bias at all. The native speakers of Greek used both structural and lexical or thematic information but the L2 learners' attachment preferences were mainly guided by lexical information.

In another study that investigated L1 effects in L2 processing, Dussias (2003) examined RC attachment in L1 Spanish-L2 English and L1 English-L2 Spanish participants. Monolingual speakers of English and Spanish were also tested as control groups. The attachment preferences were tested via online and offline tasks. The offline task was given both in English and in Spanish but the online task was given only in Spanish. In the English offline task, both L1 Spanish-L2 English and L1 English-L2 Spanish groups preferred to attach the RC local similar to the monolingual speakers of English. In offline tasks, there were clear transfer effects. In the Spanish offline task, L1 English-L2 Spanish group preferred to attach the RC local in their L2 Spanish despite the non-local attachment preference of the monolingual Spanish speakers. The L1 Spanish-L2 English group, on the other hand, preferred to attach the RC local in the L2 English. In the Spanish online task, monolingual Spanish speakers preferred non-local attachment, which was consistent with previous findings. L1 English-L2 Spanish group

did not show any significant bias for one site over another. This was taken as evidence for the view that L2 learners were not relying on the same syntactic analysis while processing target language sentences in the same way as monolingual Spanish speakers do. L1 Spanish-L2 English group also favored local attachment in their L1 which favors non-local attachment. Both English and Spanish L2 speakers favored local attachment of RCs in their L2. Dussias concluded that the preference of Recency or Late Closure might be a result of an extra burden on the bilingual brain. Thus, it uses memory limits parsimoniously and attaches the incoming material with the material that has recently been processed and by way of local attachment, minimizes the chances of exceeding memory limits. This is also reflected in their slower processing as opposed to the monolingual groups.

Omaki (2005) investigated working memory and RC attachment preferences of Japanese learners of L2 English. Native speakers of English and Japanese learners of English took an online computer-paced reading span, an offline computer-based attachment preference test, a cloze test, and online attachment preference test in English. Japanese speakers of English took all these tests in Japanese. The results showed that greater working memory capacity led to increased local (i.e., low) attachment preferences with the English native speaker group, which suggests that English native speakers did not show a consistent bias towards local attachment. He concluded that upon processing the Norman genitive construction, high-spans can consider the alternative Saxon genitive and apply the Gricean maxim of "Avoid Ambiguity", on the other hand, low-spans, lacking such parallel computations might be guided by Frazier and Clifton's (1996) Referentiality Principle. Advanced Japanese L2 speakers of

English, on the other hand, did not show any effect of working memory capacity for RC attachment preferences. Unlike the earlier study (Kamide & Mitchell, 1997), Japanese learners of English did not show a non-local attachment preference in their L1, Japanese. In their L2 English, some L2 learners behaved native-like in their ambiguity resolution and chose local attachment whereas some others preferred to attach the RC to the non-local NP. Omaki concluded that advanced L2 learners may behave like low-span native speakers in their ambiguity resolution because they experience greater processing difficulties in the L2.

A summary of the RC attachment preferences in the L2 can be seen in Table 2.3. below.

Table 3 RC Attachment Preferences in the L2

Study	Offline	Online
Fernández (2002) Spanish-English English-Spanish bilinguals	Influenced by their dominant languages (Non-local attachment in Spanish dominant group, local attachment in English dominant group)	No clear attachment preference
Felser, Roberts, Marinis, and Gross (2003) L1 Greek-L2 English L1 German- L2 English	No clear attachment preference	No clear attachment preference
Papadopoulou and Clahsen (2003) L1 Spanish- L2 Greek L1 Russian- L2 Greek L1 German- L2 Greek	No clear attachment preference	No clear attachment preference
Dussias (2003) L1 Spanish-L2 English L1 English-L2 Spanish	Local in their L2 (English) Local in their L2 (Spanish)	Local in their L2 (English) No clear attachment preference

In sum, most L2 studies investigating RC attachment preferences have compared the resolution of NP-*of*-NP-RC type structures to NP-*with*-NP-RC type structures to understand whether it is the syntactic or lexical information that guides L2 sentence processing. Felser et al. (2003), and Clahsen and Papadopoulou (2003) argued that L2 learners did not rely on phrase structure information to the same extent that native speakers do while processing target language input, yet they could use lexical-semantic information because they preferred to attach the RC to the local NP in constructions where complex NPs were linked by the preposition *with*.

Dussias's (2003) study, on the other hand, showed that L2 learners demonstrate native-like behavior in the resolution of RCs headed by complex genitive NPs (i.e., NP1-*of*-NP2-RC type constructions).

To summarize, there have been inconclusive findings in the resolution of RC attachment ambiguities in both L1 (e.g, Cuetos & Mitchell, 1988; Traxler et al., 1998; Brysbaert & Mitchell, 1996, Sekerina, 1997; Hemforth et al., 1998; Kamide & Mitchell, 1997; Zagar et al., 1997) and L2 (Dussias, 2003; Felser et al., 2003; Papadopoulou & Clahsen, 2003; Omaki, 2005) studies (for a review of cross-linguistic differences in RC attachment preferences, see Fodor, 2002a; Mitchell & Brysbaert, 1998; Papadopoulou, 2005). These contradicting findings are attributed to various conditions such as presence of different forms to express possessive relations (e.g., Saxon vs. Norman genitive (Frazier & Clifton, 1996), the parameterized property of the structure in question (e.g., Gibson et al., 1996; Pearlmutter & Gibson, 2001), prosody (Fodor, 1998a; 2002a; 2002b) or working memory constraints (Omaki, 2005). Omaki and Ariji (2004) claim that it will be more correct to conduct research with constructions that can provide better

predictions about the role of syntactic or lexical information in sentence processing (e.g., the influence of animacy on the processing of subject vs. object-extracted relative clauses). Frazier and Clifton (1996) similarly argued that the preposition *with* creates its own thematic processing domain and leads the RC to be attached to the most recent NP because otherwise it will be costly for the parser to attach the RC outside of the thematic domain. Thus, comparing RC attachment preferences in complex NPs headed by two different prepositions (with vs. of) may not be very illuminating in the speakers' use of syntactic or lexical information in language processing.

However, investigation of the ambiguity resolution of RCs modifying complex genitive NPs can contribute both to psycholinguistic research by identifying factors influencing ambiguity resolution in sentence processing (i.e., is it the lexical properties or structural properties that guide online sentence processing) and to L2 research by examining the role of the L1 RC attachment preference in processing in the L2. In the present study, the sentences are disambiguated using the animacy information the NPs carry rather than different prepositions to investigate the role of lexical information during RC ambiguity resolution strategies.

Before proceeding with the design of the study, I would like to prefer a brief discussion on the realization of complex genitive NPs and RCs in English and in Turkish.

CHAPTER 3

AMBIGUITY IN RELATIVE CLAUSES WITH COMPLEX GENITIVE ANTECEDENTS

In this chapter, construction and use of complex genitive NPs and relative clauses will be explored in English and in Turkish.

English

English Sentence Structure

Languages have different ways of identifying elements in a sentence. For instance, languages like Japanese mark subjects and objects with different suffixation to differentiate one from the other. Since English does not have such an option, it uses word order or position, which leads to a strict word order in sentence formation. The basic word order for English is SVO and English is considered as a head initial language, which reflects itself in its phrase structures, too. The major elements in a sentence are subject NP, a verb, and an object NP. A typical English sentence has the following order of elements:

Subject/auxiliary/main verb/direct object/indirect object/

(14) Marry / has / given / her dress / to Amy / for her graduation party.

If any of these elements are modified, it is expected that the modifier follows the modified element (e.g. speak *properly*). Most of the time this rule applies to phrase structures in English; a verb always precedes its objects. However, for NPs the modifier can both precede and follow the head noun (e.g. *nice* sweater, the sweater *which is green*).

The English Noun Phrase

A noun phrase, as defined by Göksel and Kerslake (2005), is any sequence of words that can function as the subject of a sentence. NPs in English range from simple nouns (e.g. book, computer) to complex NPs modified by an adjective phrase, prepositional phrase or a clause (e.g. a fast cyclist, the book on the table, or the window which was broken yesterday). In English, when an NP takes a modifier, the modifier position within the NP may change according to the type of the modifier. Modification of NPs is realized via clausal or non-clausal modification. Non-clausal noun modifiers are of two types: prenominal and postnominal. English allows for modifiers to precede their heads in certain phrase structures. NPs modified by adjectives are examples for this type. Adjectives, if used as complements, can occur in postnominal positions. However, when they are used as modifiers, they have to be placed before their heads. Otherwise, the sentence becomes ungrammatical:

(15) *A young lady wanted to see you.*

**A lady young wanted to see you.*

As for *postnominal modifiers*, they follow their head nouns as the name suggests. Locative phrases (16), (17), present-participal verb phrases (18) and past-participal verb phrases (19) belong to this group of modifiers (Baker, 1995, p.320):

(16) The boy [in the doorway] waved to his father.
(17) The baby [out there in the kitchen] is Jerry's niece.
(18) The man [holding the bottle] disappeared.
(19) The papers [removed from the safe by the robbers] have not been found.

Adjective phrases can also occur in postnominal positions but they are found to be marginal by Baker (1995, p. 321):

(20) The woman [eager to start the meeting] is John's sister.

Prepositional phrases (PPs) headed by prepositions *with* or *of* can also function as modifiers of an NP. The latter type of modification is referred to as *the postnominal genitive* by Baker (1995, p.322).

(21) The woman [with a string tied to her finger] knocked at the door.
(22) We are using [an idea of Carol's].

In this thesis, what concerns us more is the construction of RCs modifying complex genitive NPs. After a brief look at the construction of complex genitives, their modification by the relative clauses will be investigated.

Structure of Genitive Noun Phrases in English

To indicate possession, *genitive* constructions are used. In English, the general rule to construct genitives is adding a genitive marker, (-'s), to an NP. This type of genitive is referred to as Saxon genitive. However, in English, it is also possible to indicate possession through a Norman genitive, which requires an NP to take a PP as its complement. The structures of Saxon and Norman genitives are exemplified in (23) and (24) respectively:

(23) *the dean's office*

(24) the office of the dean

English Relative Clauses and Modification of Genitive Noun Phrases by Restrictive Relative Clauses

An NP can take an adjectival (i.e., relative clause) as its modifier, which is referred to as clausal modification. Relative clauses or adjectival clauses are constructions used to

modify the noun phrases they are attached to. The head-initial property of English leads the RCs follow their heads, (i.e., NP). A typical RC structure is given in (25):

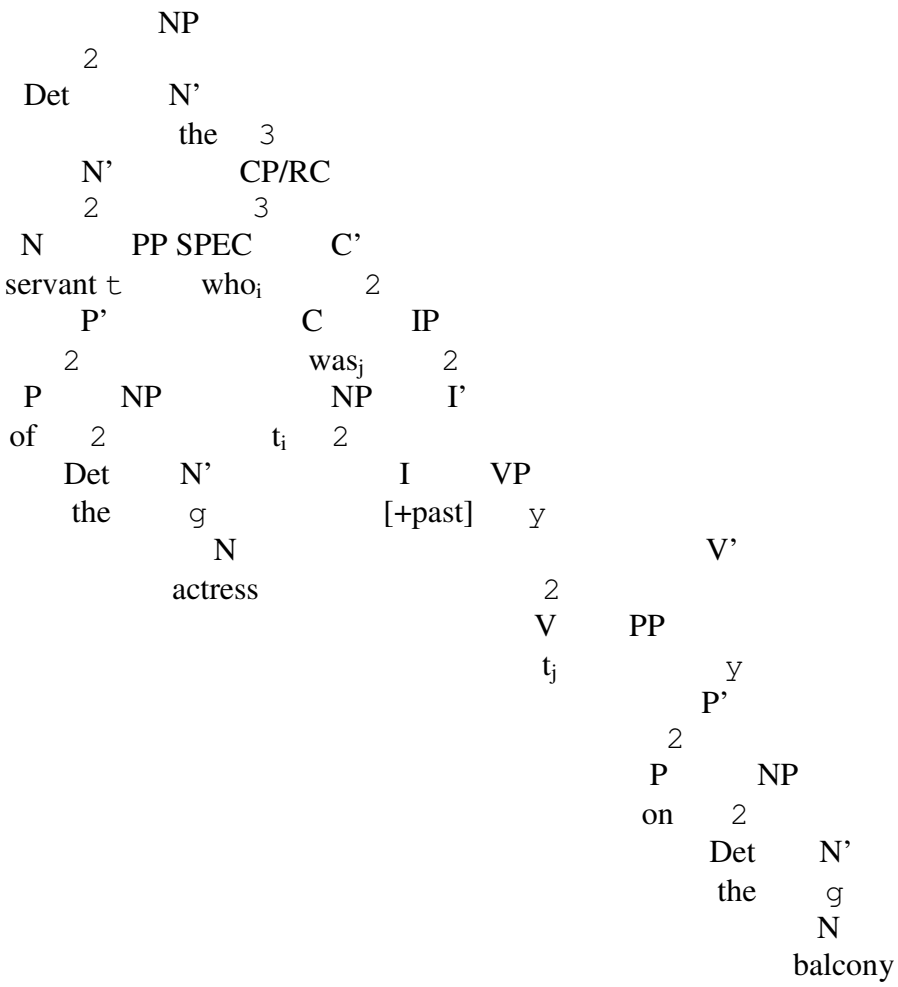
(25) The books which were written by foreign authors were burned.
(Baker, 1995, p. 332)

Every RC modifying an NP has one NP that the RC modifies as in (25) where the RC 'which accepted the candidate' modifies the NP 'the university'. However, when there are two possible NPs that an RC can modify, the interpretation and the attachment site may differ. A complex genitive NP is a noun phrase that can cause such interpretation problems due to the ambiguity caused by the relative clause such as the one in the example given below.

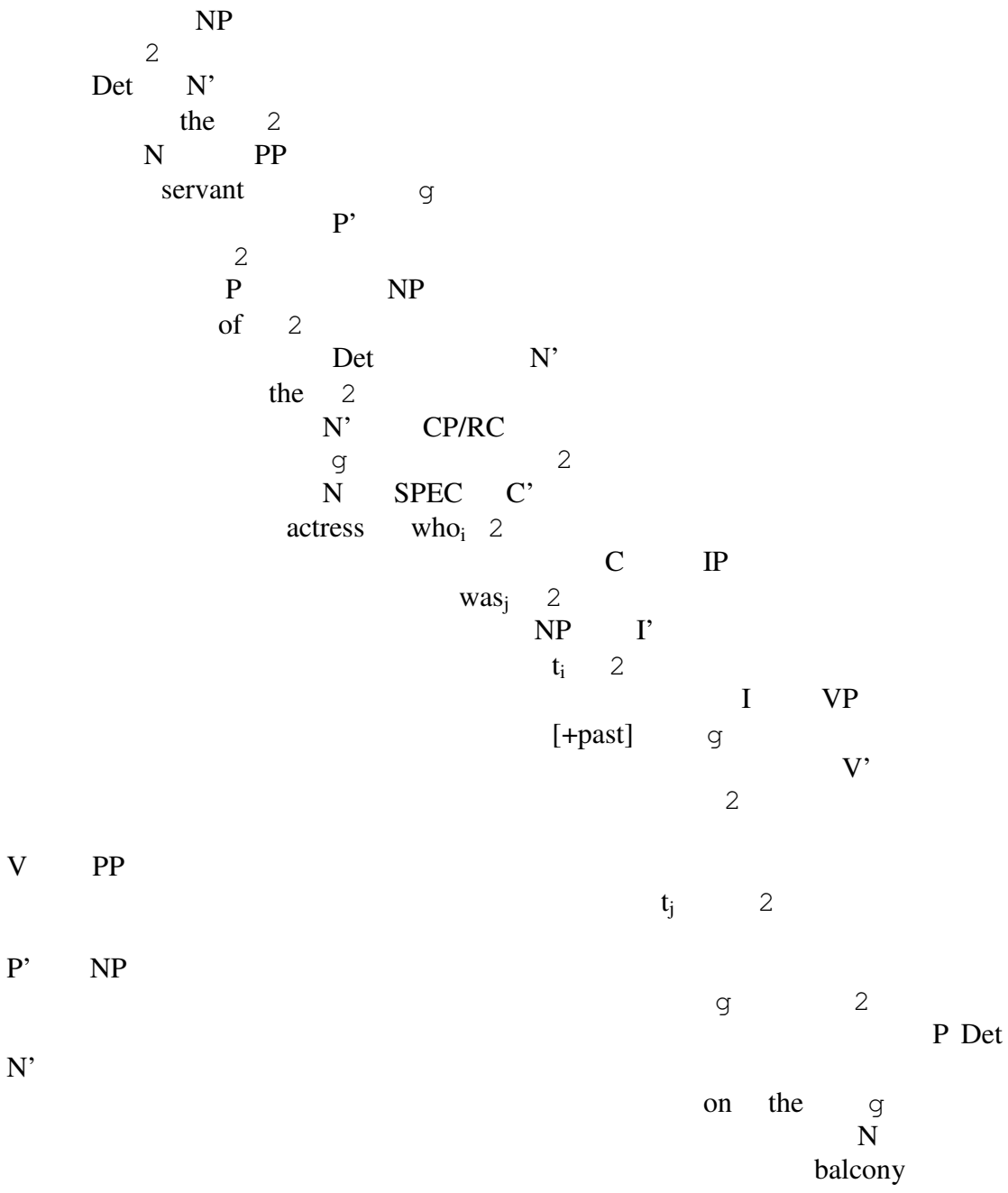
(26) [$_{\text{NPnon-local}}$ *the servant]* of [$_{\text{NPlocal}}$ *the actress]* [$_{\text{RC}}$ who was on the balcony]

In English, when possession is indicated via a Norman genitive as in (26), the interpretation may be ambiguous. That is, the reader or listener of a complex genitive NP modified by a restrictive RC may attach the RC to either the first or the second NP.

a)


NP
Det N'
the
N' CP/RC
N PP SPEC C'
servant t who$_i$
P' C IP
was$_j$
P NP NP I'
of t$_i$
Det N' I VP
the [+past]
N V'
actress
V PP
t$_j$
P'
P NP
on
Det N'
the
N
balcony

b)



As can be seen from the tree structures above, the RC can possibly modify the non-local NP (servant) as in (a) or local NP (actress) as in (b).

Turkish

Turkish Sentence Structure

Turkish is basically an SOV language, which places the verb in sentence- or clause-final position. The head final property of Turkish requires the head of phrases be placed in phrase-final position. The principles for the order of elements in Turkish can be summarized as Lewis (1967) states:

"The cardinal rule is that 'the qualifier precedes the qualified'; i.e. the adjective, participle, or qualifying noun precedes the noun; the adverb or complement precedes the verb; the modifying phrase or adverb precedes the adjective" (p. 239).

A typical example for basic Turkish word order is as follows:

Subject/ expression of time/ expression of place/ indirect object/ direct object/modifier of the verb/verb

(Lewis, 1967).

(27) Profesör/geçen Cuma/ hastanede/ öğrencilerine/ MR cihazını/ ikinci defa/ tanıttı.

Professor/ last Friday/ hospital-LOC/ student-PL-POSS-DAT/ MR machine-ACC/ present-PAST-3SG

The professor presented the MR machine to his students last Friday in the hospital for the second time.

Although Turkish is accepted to be an SOV language, unlike English, the order of the elements in a sentence or phrase is relatively free due to its inflectional morphology. This syntactic freedom for the order of elements can also be seen in phrase structures.

If any element is qualified, the element must follow its qualifier. The definite must precede the indefinite (Lewis, 1967). So, if a Turkish speaker wants to make 'MR machine' more definite, s/he will form a sentence such as (28a) If the speaker wants to make 'a student' more definite, then they will change places as in (28b).

(28)

a) Profesör MR cihazı-nı bir öğrenci-ye tanıt-tı.

Professor MR machine-ACC a student- DAT present-PAST-3SG

b) Profesör bir öğrenci-ye MR cihazı-nı tanıt-tı.

Professor a student- DAT MR machine-ACC present-PAST-3SG

If this property is important in the placement of elements in a sentence, in the construction, [[NP1-*of*-NP2]-RC], the attachment site that Turkish speakers choose may be influenced by their expectancy for the level of the definiteness of both NPs, which will be discussed on the basis of the results of the study in the discussion section.

The Turkish Noun Phrase and Turkish Genitive-Possessive Constructions

The Turkish NP is composed of an obligatory constituent, head and optional constituents, modifiers. In Turkish, modifiers must precede their heads. The same rule applies to the structure of NPs (Göksel & Kerslake, 2005).

In Turkish, the construction that is equivalent to the complex genitive NPs in English is realized through genitive possessive constructions which are marked with genitive and possessive suffixes on the first and second NP respectively, such as (29):

(29) Ayşe-nin kitab-ı

Ayşe-GEN book-3SG-POSS

The NP marked with a possessive suffix indicates a person or thing that is possessed. The only function a possessive suffix has is to indicate whether the possessor is 1st, 2nd or 3rd person, singular or plural (Göksel & Kerslake, 2005).

The possessive suffixes in Turkish refer to six grammatical persons (Göksel & Kerslake, 2005, Underhill, 1976):

Ben (I)	-*I*m	Biz (we)	-*I*m*I*z
Sen (you SG)	-*I*n	Siz (you PL)	-*I*n*I*z
O (he, she, it)	-*I*	Onlar (they)	-l*E*r*I*

(30) is an example of possessive constructions in Turkish.

(30) Çocuk-lar-ınız hangi okul-a gid-iyor-lar?

Child-PL-2PLPOSS which school-DAT go-IMPF-PL

Which school do your children go to?

When the speaker wants to make the possessor's identity explicit, a genitive-possessive construction is necessary. The genitive-possessive construction is a composite NP constructed of two NPs marked as follows:

(NP + genitive) + (NP + possessive)

(Göksel & Kerslake, 2005)

The following can be taken as an example to compare the genitive-possessive constructions in English and Turkish.

(31) Mary's dress

(32) Mary'nin elbise-si

Mary-GEN dress-2SGPOSS

In (31) the relationship of possession between 'Marry' and the 'dress' is indicated by the Saxon genitive, 's, attached to the possessor. In Turkish the same relationship is expressed by two suffixes, the genitive case suffix, -*I*n, attached to the possessor and the possessive suffix, -*sI* attached to the possessed as in (32).

The only genitive-possessive construction in Turkish (33) is the one that is equivalent to the Saxon genitive in English.

(33) Aktris-in hizmetçi-si-ni vur-du-lar.

Actress-GEN servant-3SGPOSS-ACC shoot-PAST-3PL

They shot the actress's servant.

They shot the servant of the actress.

Turkish Relative Clauses and Modification of Turkish Genitive-Possessive Constructions by Relative Clauses

Relative clauses are complex adjectival phrases modifying NPs. There are three participle suffixes, *-(y)An, -DIK,* or *–(y)AcAK*, used to construct RCs in Turkish. These suffixes correspond to the relative pronouns in English (Göksel & Kerslake, 2005). [2]

[2] There is one more RC type with a very limited use in Standard Turkish. This RC is constructed with the complementizer *ki*, which is borrowed from Persian, and its structure is quite similar to that of English.

The RC-forming three participles, *–(y)An, -DIK,* and *-(y)AcAK*, have different functions while relativizing NPs, such as relativization of different elements of a sentence (i.e. subject, object, oblique object) or indicating different tenses. The summary of strategies of relativization can be seen on Table 4 below:

Table 4 Summary of Strategies of Relativization in Turkish (adapted from Göksel & Kerslake, 2005)

Relativizing subjects	*-(y)An*
Relativizing objects	*-DIK /-(y)AcAK*
Relativizing oblique objects	*-DIK / -(y)AcAK*
Relativizing adverbials	*(y)An*
Relativizing possessors:	
(a) which are part of subjects	*(y)An*
(b) which are not part of subjects	*(y)An or -DIK / -(y)AcAK*
Relativizing possessed constituents	
a) which are part of subjects	*(y)An*
b) which are not part of subjects	*-DIK / -(y)AcAK*

Since the RC relativizes one of the two possible *subject* NPs in ambiguous relative clauses, the *–(y)An* participle is used in Turkish equivalent of the [[NP1-*of*-NP2]-RC] type ambiguous sentences in English:

(34) balkon-da dur-an aktris-in hizmetçi-si

balcony-LOC stand-PART actress-GEN servant-3SG.POSS

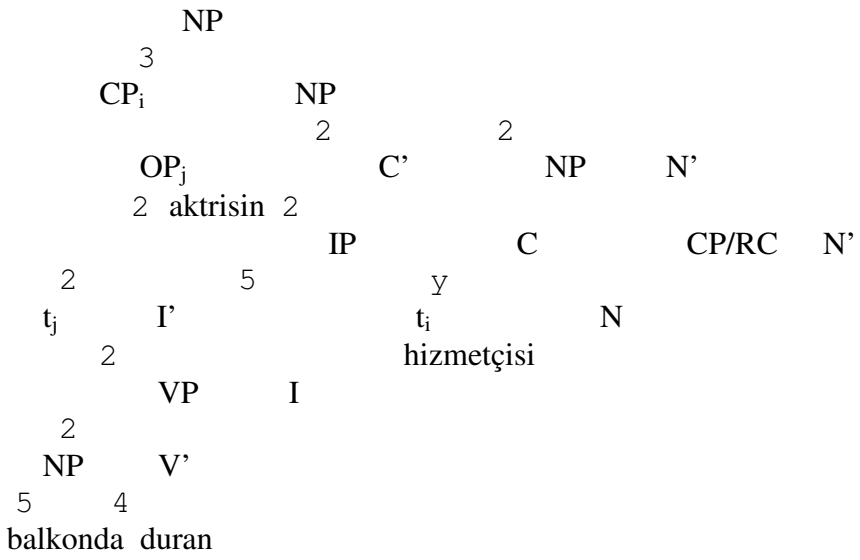
the servant of the actress who was on the balcony

the actress's servant who was on the balcony

Apart from *ki* clauses all relative clauses, as modifiers, precede NPs, their heads (see Göksel & Kerslake, 2005 for detailed information about RCs in Turkish).

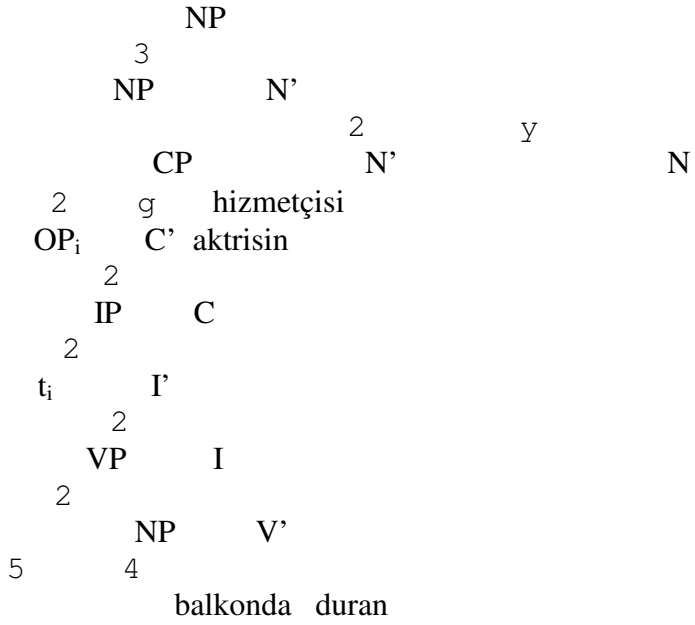
The structure is ambiguous when preceded by an RC. The two possible interpretations can be observed in (34) and (34)[3]. (34) represents a non-local attachment whereas (34) represents a local attachment.

a)



[3] Derivation of relative clauses in Turkish are discussed a lot in the literature (e.g., Kornfilt, 2000). Since RC derivation is beyond the scope of this study, tree structures are simplified and are only aimed to show the two interpretations of the same structure.

b)



As stated above, English and Turkish have different ways of realization of complex genitive NPs and RCs. To sum up, English has two forms of genitive constructions, namely Saxon and Norman genitives. When a Norman genitive structure is used, the sentence is ambiguous as to which NP the RC modifies. (26a) and (26b) are examples for these two interpretations. In Turkish, on the other hand, there is one form of genitive possessive constructions which is equivalent to the Saxon genitive in English with respect to the ordering of possessor and the possessed. However, as represented in (34) and (34), unlike the Saxon genitive in English, the genitive-possessive construction in Turkish is ambiguous. In this respect, it is similar to the Norman genitive.

Ambiguity resolution in RCs with complex genitive antecedents has not been investigated in Turkish. Examining RC attachment preferences of Turkish speakers will be revealing in the cross-linguistic investigation of ambiguity resolution in RCs. In this

study, RC attachment preferences of native speakers of English as well as Turkish speakers of L2 English are investigated. This may allow us to examine RC attachment in the context of L1 transfer and ultimate attainment in the L2 (Dussias, 2003; Juffs & Harrington, 1995; Felser, et al., 2003; Papadopoulou, 2003).

CHAPTER 4

METHODOLOGY

This chapter reports on the two experiments conducted in Turkish and English. Experiment 1 tested monolingual Turkish speakers' online and offline RC attachment preferences. Experiment 2 tested online and offline RC attachment preferences of native English speakers and L1 Turkish-L2 English learners. The online tasks measured participants' self-paced reading (i.e., reaction) times (RTs). The offline tasks were pen-and-paper tests.

Before moving on to the details of the experiments, it is necessary to clarify the variables and predictions of the hypotheses tested in this thesis. The study mainly investigates how globally or temporarily ambiguous sentences consisting of RCs with complex genitive antecedents are processed. The aim is to test serial (i.e, restricted, two-stage) versus parallel (i.e., unrestricted, one-stage) processing models in reference to individual models which make specific predictions about RC attachment preferences, such as Lexicalist Constraint-Satisfaction Models, the Construal Hypothesis, Recency and Predicate Proximity Principles, and the Unrestricted Race Model.

In order to test whether participants go through serial (two-stage) or parallel (one-stage) processing in RC ambiguity resolution, three versions of a target sentence were used in the experiments. As can be seen in the examples below, in options (a) and (b), the sentence is only temporarily ambiguous as the RC disambiguates the interpretation either favoring a non-local (35a-36a) or a local NP attachment (35b-36b). In (c) options, the RC can refer to either NP, which makes the sentence globally ambiguous as in (35c) and (36c).

(35) Animacy-Forced (AF) Condition

a . [$_{NPnon\text{-}local}$ The author] of [$_{NPlocal}$ the play] [$_{RC}$ that was killed last month] was famous.

($NP_{non\text{-}local}$ attachment forced)

b. [$_{NPnon\text{-}local}$ The play] of [$_{NPlocal}$ the author] [$_{RC}$ that was killed last month] was famous.

(NP_{local} attachment forced)

c. [$_{NPnon\text{-}local}$ The fan] of [$_{NPlocal}$ the author] [$_{RC}$ that was killed last month] was famous.

(Globally ambiguous)

(36) Inanimacy Forced (IF) Condition

a. [$_{NPnon\text{-}local}$ The ship] of [$_{NPlocal}$ the captain] [RC that was painted blue] looks gorgeous.

($NP_{non\text{-}local}$ attachment forced)

b. [$_{NPnon\text{-}local}$ The captain] of [$_{NPlocal}$ the ship] [RC that was painted blue] looks gorgeous.

(NP_{local} attachment forced)

c. [$_{NPnon\text{-}local}$ The pole] of [$_{NPlocal}$ the ship] [RC that was painted blue] looks gorgeous.

(Globally ambiguous)

The assumption here is that if readers use serial processing, they will show longer RTs in sentences such as (35a-36a) and (35b-36b) when the sentence disambiguates

towards a site that is non-preferred by readers. This is because readers are believed to make an initial analysis using the syntactic information available. Readers understand whether or not their first analysis is correct when they come to read the disambiguating region. If their first interpretation proves to be incorrect, they are forced to make another analysis. The necessity to make a second analysis is reflected as longer RTs on the disambiguating site and as overall longer RTs to read the whole sentence. In contrast, in globally ambiguous items as in (35c-36c), readers are expected to show shorter RTs because in such cases readers are believed to prefer only one of the interpretations of these ambiguous sentences. In a sense, because of their bias to interpret the sentence in a particular way, they will not perceive the ambiguity in such sentences. Therefore, they will not show longer RTs in processing ambiguous sentences.

However, if the participants use parallel processing, they are expected to show shorter RTs with the disambiguated items such as (35a-36a), (35b-36b) as all sorts of information (i.e., syntactic and lexical) are available at their disposal. Thus, even if the sentence forces RC attachment to the local or non-local NP, this will not cost them longer time to process the sentence as the available information will quickly lead them to the forced interpretation.

When it comes to processing ambiguous items, if readers use parallel processing, their RTs to the ambiguous items will be longer than those to the disambiguated ones. Since readers have simultaneous access to both syntactic and lexical information and the RC does not favor any of the NPs, readers will take longer to process such sentences.

As a model which assumes parallel processing, the Lexicalist Constraint-Satisfaction Model predicts that the lexical or thematic information that the NPs carry

biases the reader to attach the RC to either the local or the non-local NP. That is, the NP which carries the lexical or thematic information that attracts the RC receives the RC attachment. Therefore, as Mitchell and Brysbaert note (1998), if the nouns in two sites (i.e., NP1 position and NP2 position) were exchanged, the attachment preference of the reader would change as well. That is, the same NP is expected to take RC attachment regardless of its position in the sentence (as an NP1 or NP2). Therefore, experimental items were designed in such a way that the NPs in two sites (i.e, the local and non-local positions) exchange positions as in (35a-b) and (36a-b). That is, the local NP in (35a) is given as the non-local NP in (35b). The Lexicalist Constraint-Satisfaction Model predicts that irrespective of the syntactic position of the NPs, readers using lexical or thematic information will prefer the same NP in (a) and (b) sentences. The expectation is that if, for example, readers prefer the non-local NP (*the author*) for the RC attachment in (35a), they will prefer the same NP (*the author*) in (35b) even if it appears as the local NP in this sentence.

There are different models of sentence processing that argue for or against the claim that readers use either the syntax only or all possible sources of information at initial analyses. To address this issue, the experimental sentences were disambiguated using the animacy information. This is assumed to allow us to test the role of lexical information of NPs as well as the role of syntax in parsing sentences. To test the role of lexical information during online sentence processing, one more variable, namely, 'animacy' was controlled for. The nouns in two sites were either animate-inanimate or inanimate-animate. They were counterbalanced so that animate and inanimate nouns

equally took RC attachment and appeared in the non-local (i.e., NP1) and local (i.e., NP2) positions as in (35a-b) and (36a-b).

Thus, a total of six conditions were tested in the experiments:

a. Animate NP-Inanimate NP: Non-local Animate forced (AFNonLoc)

b. Inanimate NP-Animate NP: Local Animate forced (AFLoc)

c. Animate NP-Animate NP: Ambiguous (AFAmb)

d. Inanimate NP-Animate NP: Non-local inanimate forced (IFNonLoc)

e. Animate NP-Inanimate NP: Local inanimate forced (IFLoc)

f. Inanimate NP-Inanimate NP: Ambiguous (IFAmb)

Serial processing models argue for the use of syntactical information (i.e., the position of the NP) at the initial analysis. Parallel processing models, on the other hand, propose that both syntactic and other sources of information are available simultaneously and the parser does not need to make a reanalysis.

The Unrestricted Race Model, which combines features of both serial and parallel processing models, assumes that readers go through serial (two-stage) processing, they, nevertheless, use both syntactic information and lexical information at their initial analysis. In other words, readers are believed to have an initial attachment preference (either for non-local or local NP) but they will also use the animacy information as well in this analysis. If their initial analysis does not prove to be correct, they make a reanalysis and make the correct interpretation.

The Construal Hypothesis, which is essentially a serial processing model, predicts that the construal of RCs is recognized by the *Referentiality Principle* according to which the parser prefers the host that is "referential" (i.e., introduces entities such as

discourse participants into the discourse or corresponds to already existing discourse entities). Hosts that are referential in this sense, which are the heads of maximal projections, are preferred by the RC (Frazier, 1990; Frazier & Clifton, 1996; Gilboy et al., 1995). Accordingly, the Referentiality Principle predicts a non-local NP attachment in complex genitive NPs modified by RCs. However, in languages which employ two forms of genitive constructions, (i.e., Saxon and Norman genitives), a local NP attachment is favored in Norman genitive constructions (e.g., the servant of the actress who was on the balcony), because the parser is aware that the Saxon genitive form (e.g., the actress's servant who was on the balcony) can only modify the local NP (i.e., servant). Therefore, in line with the Gricean maxim of Avoid Ambiguity, the reader attaches the RC to the local NP (i.e., actress) with a Norman genitive construction.

According to the Referentiality Principle of the Construal Hypothesis, languages, such as Turkish, which have only one form of genitive constructions (e.g*., balkonda duran artistin hizmetçisi*) apply the Referentiality Principle and choose the main argument of the whole NP to attach the RC, which is the head of the whole NP (i.e., the non-local NP, *hizmetçi*).

(37) [$_{SPEC}$Aktris-in] [$_{HEAD}$hizmetçi-si]

Actress-GEN servant-3SGPOSS

actress's servant

the servant of the actress

What is interesting here is that while the Referentiality Principle of the Construal Hypothesis predicts the RC attachment to the local NP in Saxon genitive constructions in English, it predicts non-local NP attachment in head-final languages like Turkish.

Predicate Proximity and Recency principles which assume primacy of syntax in sentence processing predict that a language with a rigid SVO word order like English will not have a very strong Predicate Proximity activation because the average distance of arguments to their verbal heads is relatively low, which in turn leads to a lower activation of Predicate Proximity in English. Thus, Recency will dominate Predicate Proximity in English and the readers will attach the RC to the local NP. In languages, like Turkish, that have relatively freer word orders, Predicate Proximity activation will be stronger, leading to high (i.e., non-local) RC attachments. So, it is predicted that monolingual Turkish speakers will prefer to attach the RC to the non-local NP, which is closer to the predicate phrase (i.e., the main verb).

The specific predictions of each of these models are summarized in Table 5 below:

Table 5 Specific Predictions of the Models Tested in the Study

	Restricted Accounts (Serial Processing Models)	*Unrestricted Accounts (Parallel Processing Models)*	*The Lexicalist-Constraint Satisfaction Model*	*The Unrestricted Race Model*	*The Construal Hypothesis*	*Recency and Predicate Proximity*
General Predictions	The parser makes an initial analysis using the information provided by syntax. If this analysis proves to be incorrect, the participant makes another analysis where it uses other sources of information such as lexical information as well.	All sources of information including syntax, lexical or thematic information are available to the parser at the same time. The parser goes through only one stage of processing and does not need to make a reanalysis since all sources of information are available during the first analysis.	The lexical or thematic information that the NPs carry biases the reader to attach the RC to one of the NPs.	Readers make an initial analysis using all sources of information as well as syntax. However, when the initial analysis proves to be incorrect, they make a reanalysis.	Referentiality Principle guides the parser with RC attachment ambiguities. The head of the whole NP is referential in the sense that it either introduces entities to the discourse model or they correspond to already existing entities.	RC attachment preferences are subject to change in different languages. There are two principles which guide RC attachment preferences: Recency and Predicate Proximity. Languages with rigid word orders will apply the Recency Principle and favor the NP that is closer to the RC. Languages with relatively freer word orders will lead to strong activations of Predicate Proximity and favor the NP that is closer to the main argument of the sentence (i.e., the verb).
Predictions for Turkish	Participants will prefer a specific attachment site (either local or non-local[4]) in their initial analysis as syntax guides them towards that particular analysis.	They are expected to show shorter RTs to the disambiguated items than the ambiguous ones as all sorts of information (i.e., syntactic and lexical) are available.	No specific site (i.e.,NP position) is expected to be favoured for RC attachment in this study since each NP appears equally in both positions. Readers will take longer time to read ambiguous sentences than the disambiguated ones since they activate all sources of information at the same time.	Participants will make a specific attachment preference (either local or non-local NP) but the information provided by the noun (i.e., animacy) will bias the reader to that interpretation as well as the position of the noun.	Turkish participants will apply the Referentiality Principle and prefer the non-local NP which is the head of the whole NP.	Monolingual Turkish speakers will prefer to attach the RC to the non-local NP since it is the head of the whole NP and closer to the predicate phrase.
Predictions for English	Participants will prefer a specific attachment site (either local or non-local) in their initial analysis as syntax guides them towards that particular analysis.	They are expected to show shorter RTs to the disambiguated items than the ambiguous ones as all sorts of information (i.e., syntactic and lexical) are available.	No specific site (i.e.,NP position) is expected to be favoured for RC attachment in this study since each NP appears equally in both positions Readers will take longer time to read ambiguous sentences than the disambiguated ones since they activate all sources of information at the same time.	Participants will make a specific attachment preference (either local or non-local NP) but the information provided by the noun (i.e., animacy) will bias the reader to that interpretation as well as the position of the noun.	Languages having two forms of genitive constructions will apply the Gricean Maxim of Avoid Ambiguity and choose the local NP (NP2) in Norman genitive constructions.	Since English has a rigid word order, speakers of English will not have a strong activation of Predicate Proximity and they will apply the Recency Principle and attach the RC to the local NP.

[4] The traditional Garden Path Theory predicts that the RC will be attached to the NP that is close to the RC by following the so-called universal Late Closure Principle. However, the universality of Late Closure has been questioned by several studies (see Ch.3).

Experiment 1: Turkish

This experiment investigates online and offline RC attachment preferences of monolingual Turkish speakers. Research questions addressed in this experiment are as follows:

a. Do monolingual Turkish speakers prefer to attach the RC to the local or non-local NP?
b. Do monolingual Turkish speakers go through serial (two-stage) or parallel (one-stage) processing while parsing complex genitive NPs modified by RCs in Turkish?
c. Do Turkish speakers demonstrate similar RC attachment preferences in offline and online sentence processing?

Participants

Twenty monolingual Turkish speakers (11 male, 9 female) participated in this experiment. Before the participants took the online task, they were asked to fill in a background questionnaire which was taken from Gürel (2004) and translated into Turkish (see Appendix A). Following (Omaki, 2005), I took 80% accuracy in comprehension of unambiguous filler sentences as an inclusionary criterion. Accordingly, one of the participants was excluded from the analyses since her comprehension accuracy for the unambiguous fillers was lower than 80%. Therefore, the results are reported on nineteen participants (11 male, 8 female). Participants' mean age was 37.63 and they were either high school (N=7) or university (N=12) graduates. They all had normal or corrected-to-normal vision and they all actively used computers on a

daily basis at home or at work (see Appendix H for background information about the participants).

Online Task

Materials

48 experimental sentences and 60 unambiguous fillers were included in the experiment (see Appendix D for the experimental items and fillers). 24 of the experimental items disambiguated towards the animate noun as in (38), while 24 of them disambiguated towards the inanimate noun as in (39). Both types of experimental sentences were given in three versions forcing either local attachment as in (a), or non-local attachment as in (b) (i.e., globally ambiguous sentences) as in options (c).

(38) Animacy-Forced (AF) Condition

a. [$_{RC}$Geçtiğimiz ay öldür-ül-en] / [$_{NPlocal}$ kitab-ın] / [$_{NPnon-local}$yazar-ı] /

last month kill-PASS-PART book-GEN author-3SGPOSS

ünlü-ydü.

famous-PASTCOP

The author of the book that was killed last month was famous.

($NP_{non-local}$ attachment forced)

b. [$_{RC}$Geçtiğimiz ay öldür-ül-en] / [$_{NPlocal}$yazar-ın] / [$_{NPnon-local}$kitab-ı] /

last month kill-PASS-PART author-GEN book-3SGPOSS

ünlü-ydü.

famous-PASTCOP

The book of the author that was killed last month was famous.

(NP_{local} attachment forced)

c. [$_{RC}$Geçtiğimiz ay öldür-ül-en] / [$_{NPlocal}$yazar-ın] / [$_{NPnon\text{-}local}$baba-sı] /

last month kill-PASS-PART author-GEN father-3SGPOSS

ünlü-ydü.

famous-PASTCOP

The father of the author that was killed last month was famous.

(Globally ambiguous)

(39) Inanimacy Forced (IF) Condition

a. [$_{RC}$Maviye boyanan] / [$_{NPlocal}$kaptanın] / [$_{NPnon\text{-}local}$gemisi] /

Blue paint-PART captain-GEN ship-3SGPOSS

muhteşem görünüyor.

impressive see-PASS-IMPF

The ship of the captain that was painted blue seems/looks impressive.

($NP_{non\text{-}local}$ attachment forced)

b. [$_{RC}$Maviye boyanan] / [$_{NPlocal}$geminin] / [$_{NPnon\text{-}local}$kaptanı] /

Blue paint-PART ship-GEN captain-3SGPOSS

muhteşem görünüyor.

impressive see-PASS-IMPF

The captain of the ship that was painted blue seems/looks impressive.

(NP_{local} attachment forced)

c. [$_{RC}$Maviye boyanan] / [$_{NPlocal}$geminin] / [$_{NPnon-local}$direği] /

Blue paint-PART ship-GEN pole-3SGPOSS

muhteşem görünüyor.

impressive see-PASS-IMPF

The pole of the ship that was painted blue seems/looks impressive.

(Globally ambiguous)

The experimental sentences were disambiguated using the lexical information (i.e., animacy) that was available in the regions where the NPs appeared. Therefore, the second and third regions were the critical regions for the Turkish items. If the Turkish reader had a local attachment preference s/he would be expected to show longer reaction times in the second region in sentences such as (38a) and (39a), where the non-local NP attachment is forced.

If, on the other hand, the reader had a non-local attachment preference, s/he would show longer RTs in the third regions in sentences such as (38b) and (39b), where the local NP attachment is forced. For the ambiguous items, serial processing accounts expect shorter RTs whereas parallel processing models expect longer reaction times.

Due to the head-final nature of Turkish, the RCs will always appear in the first region. For conditions forcing a local NP-attachment and for the ambiguous conditions, the third region was taken as the critical region. However, for conditions forcing non-local NP, the second region is considered to be the critical region. The length of the experimental sentences and the words that appeared in the critical regions (i.e., region 2 and region 3) were balanced in order to control for the length effect on the reading times.

There was 1 word with 2-6 syllables (mean=3,4) in the second regions, and 1-2 words with 2-6 syllables (mean=3,7) in the third regions.

The experimental items were counterbalanced in three different lists. Each participant saw only one version of the test items. The experimental items and the fillers were run randomly so that each subject saw the sentences in a different order.

Procedure

The experiment was designed using Cedrus SuperLab Pro software, version 2.0. The stimuli were presented in a self-paced, phrase by phrase, non-cumulative moving window fashion in Times New Roman font and in font size of 40. The participants were told that it was a reading comprehension experiment and they were clearly instructed on how to carry out the task. 10 trial sentences were included and the researcher stayed with the participants while they were practicing with the trial sentences and gave explanation and help when necessary. The participants saw sentences in four segments as indicated by slashes as in (38) and (39) above. In order to see each segment, they had to press the 'space bar' on the keyboard. Each segment stayed in the middle of the computer screen until the next key-press. After each key-press, the segment that the participants read disappeared and the new phrase appeared on the screen. After they finished reading the sentences, a 'yes/no' question followed (please see the Appendix D for the questions). They responded to each question by pressing either 'yes' or 'no' buttons which were marked on the keyboard in green and red colors, respectively. No feedback was given regarding their responses. The participants' reading times for each segment in each

sentence and their yes/no answers as well as the time they took for answering each question were recorded by the computer in milliseconds.

The task took about 20-30 minutes in total depending on the participant's reading speed. There was no break during the online experiment.

Offline Task

Materials

26 globally ambiguous sentences (13 animate-animate, 13 inanimate-inanimate) and 31 unambiguous fillers were constructed for the offline task (see Appendix E for the experimental items and fillers). Both NPs in the experimental sentences carried the same lexical information regarding the animacy of the noun. Either the NPs both referred to animate nouns as in (40), or they both referred to inanimate nouns as in (41).

(40) Kafe-de otur-an kız-ın arkadaş-ı konuşkan birisi.
Cafe-LOC sit-PART girl-GEN friend-3SGPOSS talkative person
The friend of the girl who sits at a cafe is a talkative person.

Kafede oturan kimdir?

Who sits at the cafe?

a) kız
girl
b) arkadaşı
girl's friend (the friend of the girl)

(41) Ahşap-tan yapılan ev-in kapı-sı yan-ıyor.
Wood-ABL make-PASS-PART house-GENdoor-3SGPOSS burn-IMPF
The door of the house that is made of wood is on fire.

Ahşaptan yapılan hangisidir?

Which one is made of wood?

a) kapı
door
b) ev
house

The sentences were followed by a question as to which NP the RC refers to and two options were listed. Following Dussias (2003), the options given in (a) and (b) are counterbalanced such that both the first and second NPs appeared equally as an (a) and (b) option.

Procedure

The offline task given as a 'pen-and-paper test' was conducted at least one day after the online test. The participants read each sentence and they answered the question afterwards by circling one of the two options stated below. This task took approximately 10 minutes.

Experiment 2: English

This experiment aims to test RC attachment preferences of L1 Turkish L2 English speakers as well as native English speakers. The research questions investigated in this experiment are as follows:

a. Do L1 Turkish-L2 English speakers go through serial or parallel processing in comprehending temporarily and globally ambiguous sentences in their L2 English?
b. Do L1 Turkish-L2 English speakers prefer to attach the RC to the local or non-local NP while resolving temporarily and globally ambiguous sentences consisting of complex genitive NPs modified by an RC?
c. Do L1 Turkish-L2 English speakers demonstrate similar RC attachment preferences in offline and online sentence processing?
d. Do L1 Turkish-L2 English speakers demonstrate native-like ambiguity resolution strategies or do they transfer their L1 processing strategies while reading in the L2?
e. Do native speakers of English go through serial or parallel processing while comprehending temporarily and globally ambiguous sentences?
f. Do native speakers of English prefer to attach the RC to the local or non-local NP while resolving temporarily and globally ambiguous sentences consisting of complex genitive NPs modified by an RC?
g. Do they behave similarly in their online and offline attachment preferences?

Participants

Two groups of participants were tested in Experiment 2. 20 native speakers of English and 20 Turkish end-state L2 learners of English participated in this experiment. They all had normal or corrected-to-normal vision and they all actively used the computer on a daily basis. Before the online task, participants were asked to fill in a background questionnaire taken from Gürel (2004) (see Appendix B and C).

Since eight of the participants in the English native speaker group were found out to be multilingual and advanced speakers of a second or a third language including Turkish, they were excluded from the analyses to eliminate the effect of multilingualism as a confounding factor. The results report on twelve native speakers of English (10 American, 1 British, and 1 Canadian). All the native speakers of English (7 male, 5 female) were university graduates with a mean age of 33.4.

The L1 Turkish speakers of L2 English group started learning English as a foreign language in Turkey. The mean age of the participants was 37.85. The mean age of the participants' first exposure to English was 12.6. They all lived in a target language speaking country (USA or UK) for 3-10.5 years (mean length of stay in an L2 country: 5.54) to pursue undergraduate (N=1) or graduate (N=19) degrees. The participants were exposed to English for 10-46 years (mean length of L2 exposure: 25.47). These participants were grouped as end-state L2 speakers of English as the English they use is the final product of their L2 acquisition whether it is native-like attainment or any other outcome (Birdsong, 2006, p.11).

Online Task

Materials

48 experimental sentences and 50 unambiguous fillers were included in the experiment (see Appendix F for the experimental items and fillers)[5]. 24 of the experimental items disambiguated towards the animate noun as in (42), while 24 of them disambiguated towards the inanimate noun as in (43). Both types of experimental sentences were given in three versions forcing either non-local attachment as in (a), or local attachment as in (b), or neither (i.e., globally ambiguous sentences) as in (c) options.

(42) Animacy-Forced (AF) Condition

a. [$_{NPnon\text{-}local}$ The author] of [$_{NPlocal}$ the play] [$_{RC}$ that was killed last month] was famous.

($NP_{non\text{-}local}$ attachment forced)

b. [$_{NPnon\text{-}local}$ The play] of [$_{NPlocal}$ the author] [$_{RC}$ that was killed last month] was famous.

(NP_{local} attachment forced)

c. [$_{NPnon\text{-}local}$ The fan] of [$_{NPlocal}$ the author] [$_{RC}$ that was killed last month] was famous.

(Globally ambiguous)

[5] 40 of the filler items used in the online task were experimental items of another study which investigated processing routines of Turkish speakers of L2 English in subject-verb agreement. The rest of the 10 filler items were taken and adapted form Juffs (1998).

(43) Inanimacy Forced (IF) Condition

a. [$_{NPnon\text{-}local}$ The ship] / of [$_{NPlocal}$ the captain] / [RC that was painted blue] / looks gorgeous.

($NP_{non\text{-}local}$ attachment forced)

b. [$_{NPnon\text{-}local}$ The captain] / of [$_{NP\ local}$ the ship] / [RC that was painted blue] / looks gorgeous.

($NP_{\ local}$ attachment forced)

c. [$_{NPnon\text{-}local}$ The pole] / of [$_{NP\ local}$ the ship] / [RC that was painted blue] / looks gorgeous.

(Globally ambiguous)

The experimental sentences were disambiguated using the lexical information (i.e., animacy) that was available in the region where the RC appeared. Due to the head-initial nature of English, RCs always appear in the third region. Since the RC is the disambiguating component in the sentence, for the English items, the third region is taken to be the critical region.

If the reader had a local attachment preference, s/he would show longer reaction times in the third regions in sentences such as (42a) and (43a), where the non-local NP attachment is forced. If, however, the participant had a non-local attachment preference it was expected that s/he would show longer reaction times at the same region in sentences such as (42b) and (43b). For the ambiguous items, Serial processing accounts expect shorter RTs, whereas Lexicalist-Constraint Satisfaction models expect longer RTs for the whole sentence.

In order to control for the length effect on the reading times, the length of the experimental sentences and especially the segment where the RC appeared was balanced across all the experimental sentences (3-4 words, mean=3,44 and 4-6 syllables, mean= 4,66).

The experimental items were counterbalanced in three different lists as it was in the online task in Experiment 1. Each participant saw only one version of the items listed above. The experimental items and the fillers were run randomly so that each participant saw sentences in a different order.

Procedure

The procedure of the online task was the same as the online task in Experiment 1.

Offline Task

26 globally ambiguous sentences (13 animate-animate, 13 inanimate-inanimate) and 28 unambiguous fillers were constructed for the offline task (see Appendix G for the experimental items and the fillers)[6]. Both NPs in the experimental sentences carried the same lexical information regarding the animacy of the noun. Either the NPs referred to animate nouns as in (44), or they both referred to inanimate nouns as in (45).

(44) The friend of the girl that sits at a café is talkative.
Who sits at a café?
a) the friend
b) the girl

[6] The filler items were experimental items of another study which tested subject-verb agreement.

(45) The door of the house that is made of wood is on fire.
Which one of the following is made of wood?

a) the door

b) the house

As in the offline task in Experiment 1, all the items were followed by a question about the readers' attachment preference. Both the first and second NPs appeared equally in (a) and (b) options.

Procedure

The offline task was given as a 'pen-and-paper test' with a half-an-hour-break (native speaker group) or at least one day (L2 speaker group) interval with the online test.

The data from native speakers of English had to be collected on the same day for practical reasons. Therefore, the L1 group received only a half-an-hour-break before the offline experiment. Participants in other groups (Monolingual Turkish Speakers and L1 Turkish-L2 English group) received the offline task after a one-day interval to eliminate the effect of remembering if there would be any. The participants read each sentence, and they answered the question afterwards by circling one of the two options stated below the question. The task took approximately 10 minutes.

CHAPTER 5

RESULTS

This chapter reports on the results of the two experiments conducted in Turkish (Experiment 1) and in English (Experiment 2).

The organization of the chapter is as follows: Experiment 1 reports on monolingual Turkish speakers' online and offline RC attachment preferences. Online attachment preferences are determined on the basis of the participants RTs at critical regions and their answers to the comprehension questions following ambiguous items in the online task. The offline section reports on their RC attachment preferences by means of their answers to the questions in the offline task. Experiment 2 reports on RC attachment preferences of native English speakers and L1 Turkish-L2 English speakers in online and offline tasks.

Experiment 1: Turkish

Results of the Online Task

To answer the first and second research questions, which address sentence processing strategies of monolingual Turkish speakers, the participants' online RTs at the critical regions (region 3 for the local attachment-forced and ambiguous versions and region 2 for the non-local attachment-forced version) were analyzed. To conduct an analysis of variance, the distribution of the scores at the critical regions was examined. The results of the normality tests, skewness and kurtosis values indicated that the scores were not normally distributed. Thus, the data at the critical regions were transformed by means of logarithm 10 transformation and approached to normal distribution except for the AFLoc

and AFAmb conditions (skewness: $1.54_{AFLocRT3}$, $0.94_{AFNonLocRT2}$, $0.35_{AFAmbRT3}$, $0.88_{IFLocRT3,}$ $0.73_{IFNonLocRT2}$, $0.85_{IFAmbRT3}$; kurtosis: $4.3_{AFLocRT3}$, $0.88_{AFNonLocRT2}$, $2.4_{AFAmbRT3}$, $1.77_{IFLocRT3,}$ $0.82_{IFNonLocRT2}$, $0.87_{IFAmbRT3}$). It is recommended to use non-parametric tests when the normality assumption of ANOVA is not met (Field, 2000; Huck, 2004). However, the results are analyzed by means of parametric tests since the use of non-parametric tests would decrease the statistical power of the analyses conducted and increase the risk of making type 2 error (Field, 2000; Huck, 2004). To investigate the online RC attachment preferences of monolingual Turkish speakers a 2X3 two way repeated measures ANOVA was run with condition (animacy-forced and inanimacy-forced) and version (local attachment, non-local attachment and ambiguous) as within-subject variables. The RTs at the critical regions, region 2 for the AFNonLoc and IFNonLoc conditions and region 3 for AFLoc, AFAmb, IFLoc and IFAmb conditions were included in the statistical analysis.

There was a main effect for condition ($F(1, 151)=24.83$, $p<0.001$). This effect means that the participants behaved differently when the RC disambiguated towards the animate NP or the inanimate NP. There was a main effect for version ($F(1.91, 289.73)=23.22$, $p<0.001$). This effect suggests that monolingual Turkish speakers showed different RTs when the RC disambiguated towards the local NP or non-local NP or when the sentence was globally ambiguous.

To see whether it was only the syntax that guided this attachment preference or there was also an influence of the lexical features, it was necessary to examine the interaction between the condition and version. The interaction of condition and version was statistically significant at $p<0.005$ level ($F(1.99, 300.99)=5.99$, $p<0.005$). This

interaction means that both lexical features of the NPs (i.e., whether they are animate or inanimate) and the syntactical information (the attachment site) influenced the participants' online RTs at critical regions. Pairwise comparisons indicated that there was a significant difference between the mean RTs at critical regions. As can be seen from Figure 5.1 below, the mean RT was significantly higher when the non-local attachment was forced. More specifically, the participants' RTs at the critical region were significantly higher in sentences where the non-local attachment was forced. Their RTs at the critical regions were not that high when local attachment was forced or when the sentence was ambiguous. This high RT or longer pause in sentences where the RC disambiguated towards the non-local NP indicates that monolingual Turkish speakers preferred to attach the RC to the local NP while reading online. Furthermore, participants had a stronger local NP attachment preference when the RC modified the inanimate NP. That is, local NP attachment preference was found to be more salient in NPs where inanimate local NP attachment is forced (e.g., *maviye boyanan geminin kaptanı*) than in NPs where animate local NP is forced (e.g., *konuşma yapan dekanın fakültesi*). These results are illustrated in Figure 1 below.

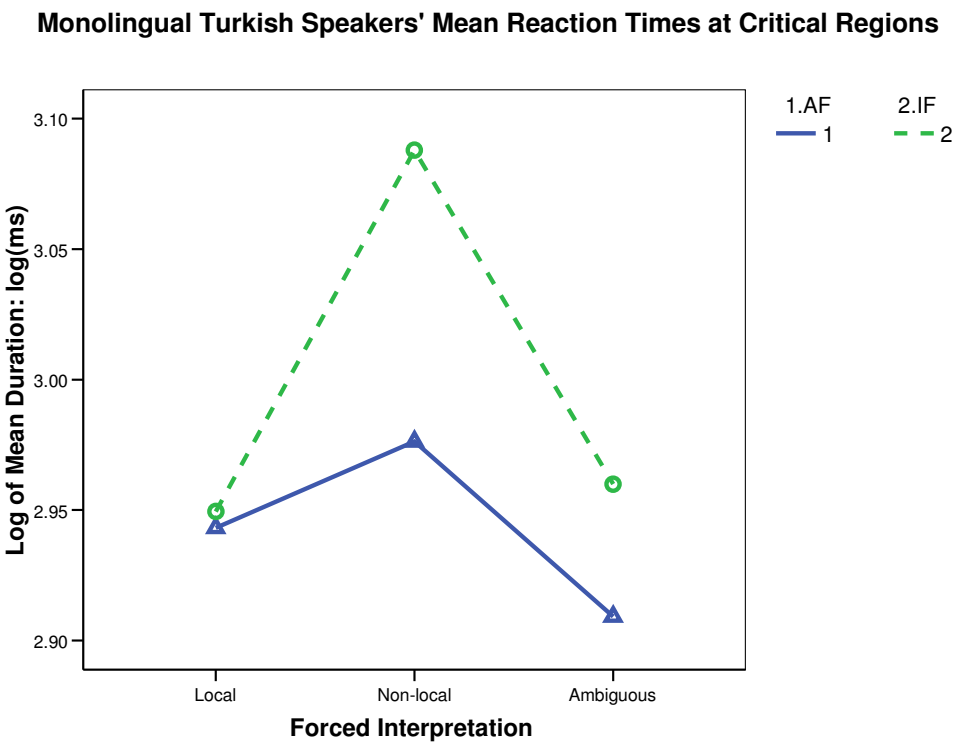


Figure 1 Monolingual Turkish speakers' mean reaction times at critical regions.

Figure 2 below shows monolingual Turkish speakers' mean reading times for each region. It is, as well, evident from the figure that they had processing difficulties when the RC disambiguated towards non-local NP.

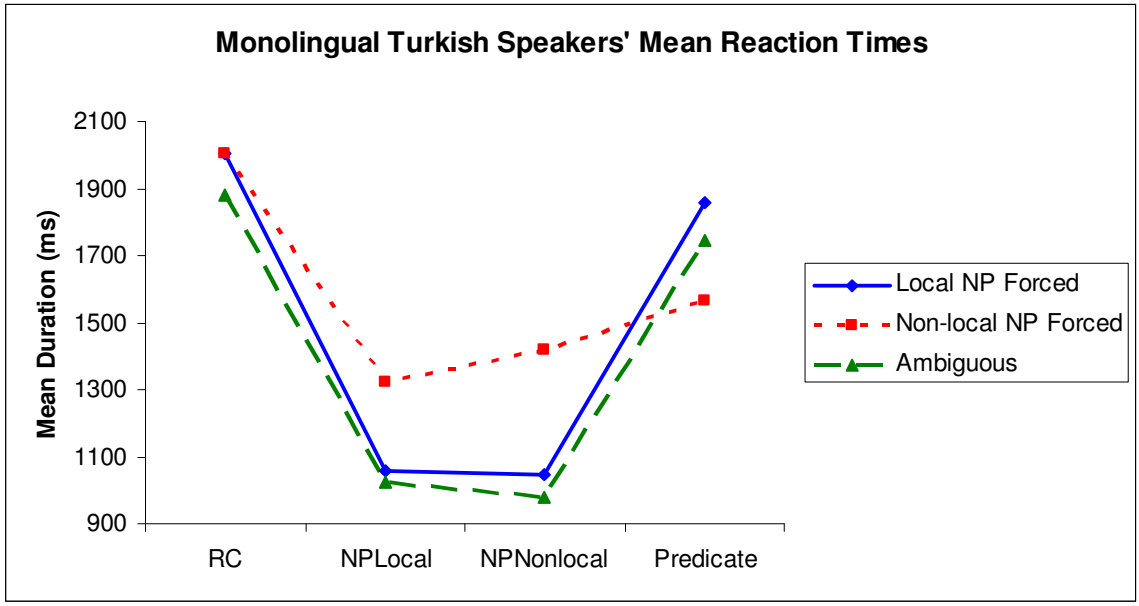


Figure 2 Monolingual Turkish speakers' mean reaction times.

However, monolingual Turkish speakers' answers to the comprehension questions following ambiguous sentences do not support their local attachment preferences. Turkish monolinguals preferred to attach the RC to the non-local NP (55%) over local NP (45%) while reading online. This preference was stronger when the NPs were animate nouns (59% non-local, 41% local) than when they were inanimate nouns (51% non-local, 49% local). For example, after ambiguous sentences involving two animate NPs such as 'Geçen hafta istifa eden müdürün sekreteri', Turkish native speakers were asked a 'yes/no' question such as "Geçen hafta istifa eden müdür müdür?", and their responses revealed that they preferred to attach the RC to the non-local NP, sekreter 59% of the time.

It is evident that their answers to the yes/no questions presented online are not consistent with their online RTs. This inconsistency might be a result of time pressure or another confounding factor, which will be examined in detail in the discussion section.

Results of the Offline Task

In line with their online RTs, monolingual Turkish speakers preferred to attach the RC to the local NP (66%) rather than to the non-local NP (34%) while making offline judgments with no time pressure. This preference was stronger when both NPs were inanimate (69% local, 31% non-local) than when they were both animate (63% local, 37% non-local).

Experiment 2: English

Results of the Online Task

To compare L1 and L2 English speakers in their online attachment preferences, their RTs at the disambiguating regions were analyzed. The critical region was the third region for the English items because disambiguating information was presented with the RC at that region. To run an analysis of variance, it was necessary to investigate whether the distribution was normal or not. Each groups' RTs at the disambiguating region (RT3) were examined for normality. The results of normality tests and skewness and kurtosis values indicated that the scores were not distributed normally. Similar to the statistical procedure used in Experiment 1, a logarithm 10 transformation was applied to the scores at RT3 for each group. With the log10 transformation, groups' RTs displayed a normal distribution (for the L1 group, skewness: $0.39_{AFNonLocRT3}$, $0.24_{AFLocRT3}$, $0.93_{AFAmbRT3}$, $0.13_{IFNonLocRT3}$, $0.62_{IFLocRT3,}$ $0.32_{IFAmbRT3}$; kurtosis: $-0.62_{AFNonLocRT3}$, $-0.42_{AFLocRT3}$, $-0.72_{AFAmbRT3}$, $0.31_{IFNonLocRT3}$, $0.8_{IFLocRT3,}$ $-0.44_{IFAmbRT3}$; for the L2 group $0.68_{AFNonLocRT3}$, $0.32_{AFLocRT3}$, $0.33_{AFAmbRT3}$, $0.23_{IFNonLocRT3}$, $0.29_{IFLocRT3,}$ $0.42_{IFAmbRT3}$;

kurtosis: $0.67_{AFNonLocRT3}$, $-0.60_{AFLocRT3}$, $-0.44_{AFAmbRT3}$, $-0.47_{IFNonLocRT3}$, $0.8_{IFLocRT3,}$ $-0.29_{IFAmbRT3}$).

To answer the research questions addressed in Experiment 2 regarding the online reading strategies of the L1 and L2 speakers of English, a 2X2X3 mixed design repeated measures ANOVA was conducted with group (native and nonnative) as between subjects variable and with condition (animacy-forced and inanimacy-forced) and version (local attachment, non-local attachment and ambiguous) as within-subject variables. The RTs at the critical region (RT3) went through statistical analysis.

The results of 2X2X3 mixed design repeated measures ANOVA indicated a significant main effect of version ($F(2, 524) = 5.96$, $p < 0.005$). This effect tells us that participants showed different RTs at the critical regions for non-local, local and ambiguous items regardless of group and condition. Furthermore, there was an interaction between group and version ($F(2, 524) = 6.57$, $p < 0.005$). This effect means that native and non-native groups showed different RTs for local, non-local and ambiguous items.

There was a significant interaction between animacy and attachment ($F(1.94, 507.36) = 7.49$, $p < 0.001$). This effect tells us that participants had a different attachment preference when the RC forced animate or inanimate NPs. As it can be seen from the plots below, native speakers of English showed stronger local NP preference when the RC is forced to refer to an inanimate NP. This preference was not that strong when the RC referred to the animate NP.

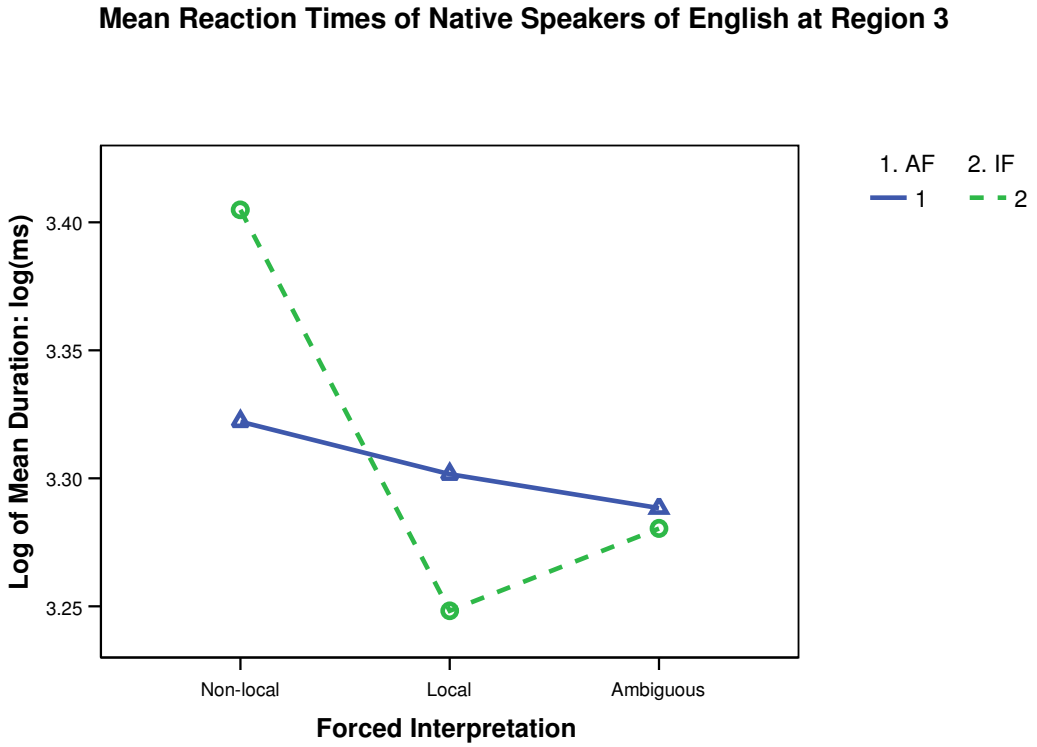


Figure 3 Mean reaction times of native speakers of English at region 3.

Native speakers' online attachment preference can be observed from Figure 4, which indicates their RTs throughout the whole sentence. As their RTs at the third region show, native speakers of English do not prefer to attach the RC to the non-local NP since their RTs at this region is higher for the non-local attachment forcing conditions.

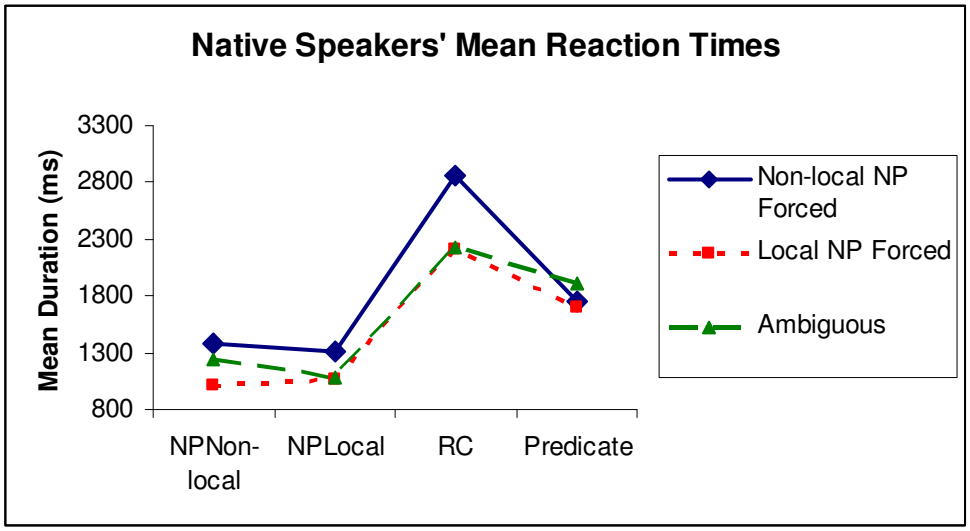


Figure 4 Native speakers' mean reaction times.

With respect to the L2 group, Figure 5 shows that Turkish speakers of L2 English prefer to attach the RC to the non-local NP when it is an animate noun. However, like native speakers, L2 learners also demonstrate a clear local NP attachment when the inanimate local NP is forced (IFLoc condition).

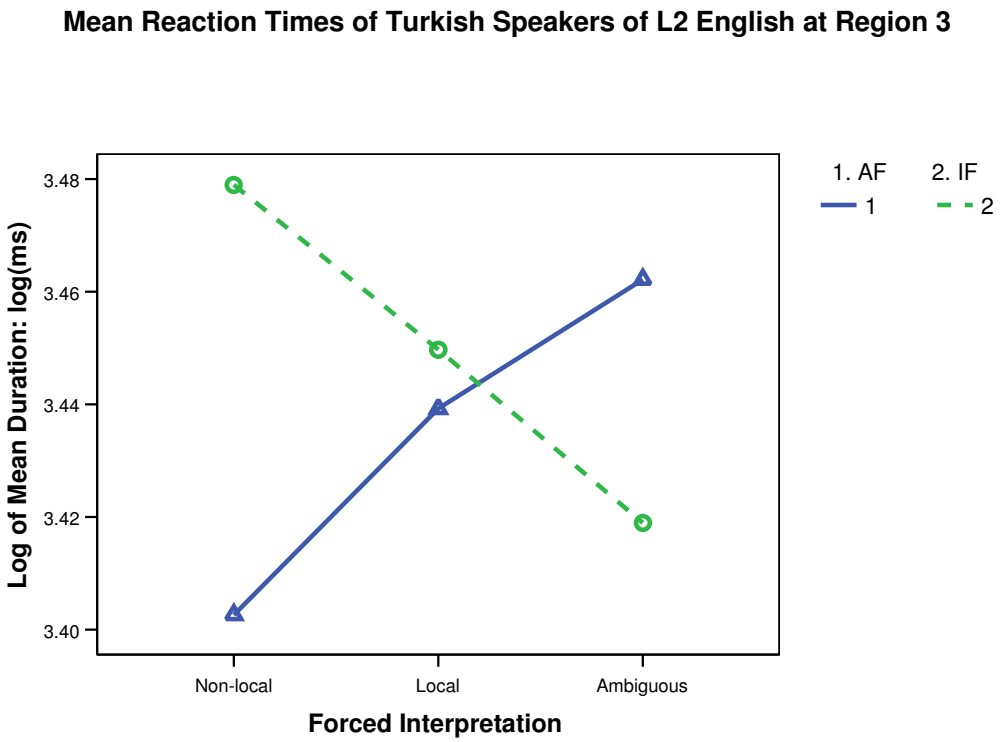


Figure 5 Mean reaction times of Turkish speakers of L2 English at region 3.

This attachment preference; however, is not observed without the animacy information. Figure 6 below presents mean RTs of L2 speakers. It seems that Turkish L2 speakers of English do not have any specific attachment preference since their RTs at each version (non-local attachment forcing, local attachment forcing and ambiguous) are almost the same. However, as can be seen in Figure 5 they have a non-local attachment preference when the RC refers to the animate noun whereas when the RC refers to the inanimate noun, they have a local attachment preference. This can be taken as further evidence for L2 speakers' reliance on lexical information.

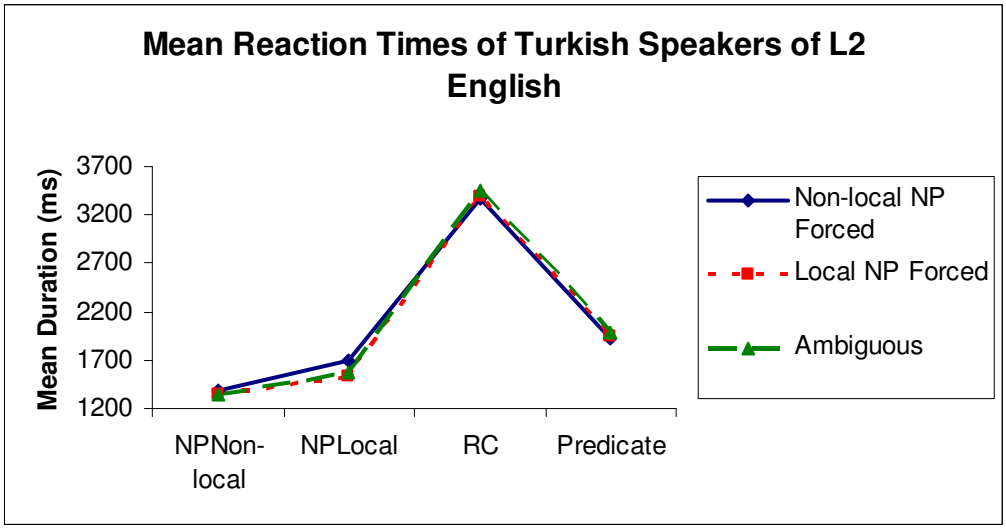


Figure 6 Mean reaction times of Turkish speakers of L2 English.

A significant main effect of group (native and nonnative) was also observed ($F(1,262) = 33.79$, $p < 0.001$). This effect shows that native speakers and L2 speakers of English differed significantly in their RTs at region 3. Figure 7 illustrates that L2 group was slower than the L1 group while reading the whole sentence as well as reading at region 3.

As can be seen from the plots above L2 learners behaved similarly to L1 speakers of English when the RC disambiguated towards the inanimate noun. A local attachment preference is observed in both groups when an inanimate noun is disambiguated by the RC. Although the L1 group showed a significant local attachment preference in both conditions (i.e., AF and IF), their local attachment preference is evidently stronger when the RC forces inanimate NP attachment. The L2 group showed a non-local attachment preference when an animate NP attachment was forced, but they preferred to attach the RC to the local NP when an inanimate NP is forced. The difference between the L1 and L2 group might suggest that for L1 speakers, the role of syntax dominated the role of

lexicon in their online attachment preference. For the L2 group, their attachment preference is mainly guided by the lexical-semantic information but not by the syntax.

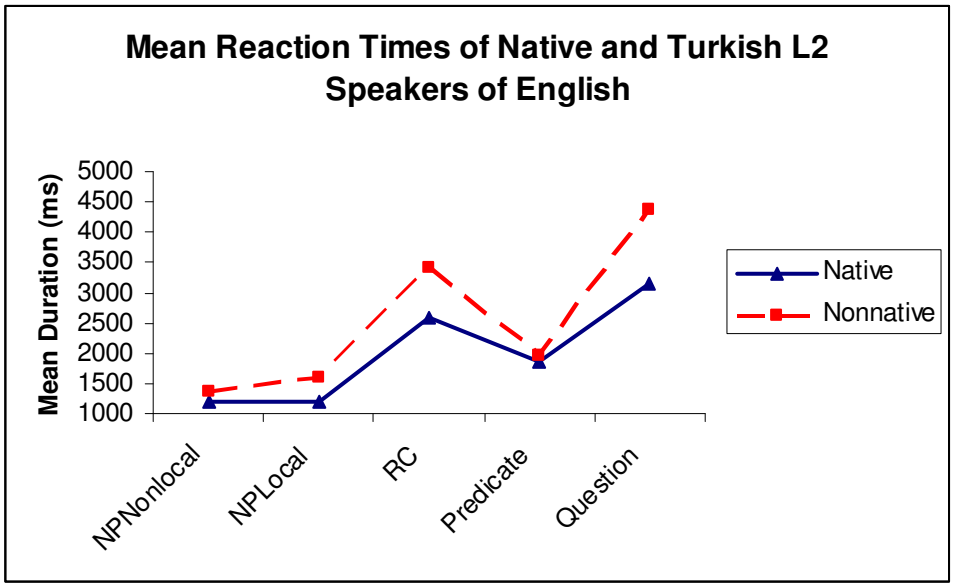


Figure 7 Mean reaction times of native and Turkish L2 speakers of English.

When their responses to comprehension questions following ambiguous items were analyzed, it was found that the native English speaker group preferred local attachment at a rate of 70% whereas the L2 group preference for local NP attachment was 44%. Thus, L2 group's non-local NP attachment was higher than their local NP attachment (56% versus 44%). This difference between the groups was statistically significant at the $p<0.001$ level ($t_{654}=6.214$).

When AF and IF conditions were analyzed separately, it was found that native speakers preferred to attach RC to the local NP in both conditions (AF, 71%; IF, 70%). Nonnative speakers preferred to attach the RC to the non-local NP in both conditions (AF, 58%; IF, 54%). The difference between the two groups was statistically significant

both at the AF condition (t_{262}=4.841, p<0.001) and at the IF condition (t_{262}=3.936, p<0.001).

Results of the Offline Task

In accordance with their online RTs, native speakers preferred to attach the RC to the local NP (78%) rather than to the non-local NP (22%). The L2 group; on the other hand, preferred to attach the RC to the non-local NP (69%) than to the local NP (31%). The difference between the two groups was statistically significant (t_{1063}=17.241, p<0.001).

When AF and IF conditions were analyzed separately, native speakers preferred to attach RC to the local NP in both conditions (AF, 79%; IF 77%). However, nonnative speakers preferred to attach the RC to the non-local NP in both conditions (AF, 66%; IF 70%). The difference between the two groups was statistically significant both at the AF condition (t_{531}=11.907, p<0.001) and at the IF condition (t_{530}=12.471, p<0.001).

Table 6 below displays a summary of the results of the two experiments and indicates the online and offline NP attachment preferences of monolingual Turkish speakers, native and Turkish L2 speakers of English. As can be seen from the table, monolingual Turkish speakers' RTs at critical regions and their offline NP preferences can be taken as evidence for their local attachment preferences in Turkish. Online RTs also indicate that their local attachment preferences are stronger with inanimate NPs. Their answers to the yes/no questions presented online are not consistent either with their online RTs or with their behavior in the offline task. This inconsistency might have resulted from a confounding factor, which might be either related to the data collection

procedure or another confounding factor. This inconsistency will be discussed in detail in the discussion section.

When reading on-line, native speakers of English preferred RC attachment to the local NP and this preference was stronger with inanimate local NPs (IFLoc condition). Their local attachment preference is also observable with their answers to the online comprehension questions and with the results of the offline task.

Finally, Turkish speakers of L2 English showed different NP preferences while reading online. Although similar to the native speaker group, they preferred to attach the RC to the local NP when the NP was inanimate (IFLoc condition). They preferred non-local NP attachment when the NP modified by the RC was animate (AFLoc condition). Their online and offline choices, however, showed a non-local NP preference.

Table 6 Online and Offline Attachment Preferences

Group	Online (RT) results		Online (Questions) results		Offline (Questions) results	
Monolingual Turkish Speakers	Local NP		Overall local NP preference rate (55%)		Overall local NP preference rate (66%)	
	AF	IF	AF	IF	AF	IF
	Local	Local (stronger)	Non-local (59%)	Non-local (51%)	Local (63%)	Local (69%)
Native Speakers of English	Local NP		Overall local NP preference rate (70%)		Overall local NP preference rate (78%)	
	AF	IF	AF	IF	AF	IF
	Local	Local (stronger)	Local (71%)	Local (70%)	Local (79%)	Local (77%)
L2 English group			Overall non-local NP preference rate (56%)		Overall non-local NP preference rate (69%)	
	AF	IF	AF	IF	AF	IF
	Non-local	Local	Non-local (58%)	Non-local (54%)	Non-local (66%)	Non-local (70%)

CHAPTER 6

DISCUSSION AND CONCLUSION

In this study, to test whether L1 and L2 readers go through serial or parallel processing, three versions of a sentence were used in the experiments (i.e., temporarily ambiguous sentences where the RC disambiguates towards a particular NP (local or non-local) and a globally ambiguous sentence where the RC can refer to either NP). If readers used serial processing, they would show longer reaction times in temporarily ambiguous sentences when the RC disambiguates towards the non-preferred site because they are believed to make an initial analysis through the syntactic information available. If this first parse proves to be incorrect, then they make another analysis. And they are expected to show shorter reaction times with the globally ambiguous items.

In contrast, if readers used parallel processing, they would show longer reaction times with the ambiguous items than the disambiguated ones as they are expected to use all possible information simultaneously. The experimental design of the online tasks aimed to counterbalance the positions (local vs. non-local) that each NP appeared in. In other words, an NP appeared equally in both first and second positions. The Lexicalist Constraint-Satisfaction Model predicts that readers would not show any attachment preference while reading online as the NPs in both sites could attract the RC equally.

The results of the two experiments demonstrated that participants in each group, namely monolingual Turkish speakers, native speakers of English, and Turkish speakers of L2 English preferred an initial attachment site. This was evident from the statistical analyses of their online RTs. Monolingual speakers of Turkish and native speakers of

English preferred to attach the RC to the local NP and they presented longer RTs at the critical regions when the RC disambiguated towards the non-preferred (i.e., non-local NP) site. And their online RTs for the ambiguous items were not longer than the disambiguated ones, which means that they had a particular attachment site in mind and they went on reading the sentence without thinking about other possible interpretations until a question is presented. This finding seems to provide evidence for serial processing models and seems to refute the arguments of parallel processing models. However, when the results are analyzed carefully, there is evidence for the use of lexical (i.e., animacy) information. The experimental design of the study was planned such that it would be possible to observe the mechanisms guiding readers' attachment preferences. In other words, to test whether it was only the syntax that guided readers' attachment preference or whether the readers used other sources of information, one more variable, namely, 'animacy' was controlled for. The experimental sentences were disambiguated using animacy information. The nouns in two sites were either animate-inanimate or inanimate-animate. The results of the repeated measures ANOVAs indicated that all groups used animacy information available while reading sentences online. Monolingual Turkish speakers' data revealed a statistically significant main effect for condition (i.e., animacy). Their online attachment preference was local when the RC referred to animate or inanimate nouns. Moreover, this preference was stronger when the RC referred to the inanimate noun. In other words, they read sentences such as (46a) and (47a) with more difficulty than sentences such as (46b, 46c) and (47b, 47c). To put it differently, they preferred sentence structures such as (46b) and (47b). Among the two, their local attachment preference was stronger when the NP was inanimate as in (47b).

(46) Animacy-Forced (AF) Condition

a. [$_{RC}$Geçtiğimiz ay öldür-ül-en] / [$_{NPlocal}$ kitab-ın] / [$_{NPnon-local}$yazar-i] /

last month kill-PASS-PART book-GEN author-3SGPOSS

ünlü-ydü.

famous-PASTCOP

The author of the book that was killed last month was famous.

($NP_{non-local}$ attachment forced)

b. [$_{RC}$Geçtiğimiz ay öldür-ül-en] / [$_{NPlocal}$yazar-ın] / [$_{NPnon-local}$kitab-ı] /

last month kill-PASS-PART author-GEN book-3SGPOSS

ünlü-ydü.

famous-PASTCOP

The book of the author that was killed last month was famous.

(NP_{local} attachment forced)

c. [$_{RC}$Geçtiğimiz ay öldür-ül-en] / [$_{NPlocal}$yazar-ın] / [$_{NPnon-local}$baba-sı] /

last month kill-PASS-PART author-GEN father-3SGPOSS

ünlü-ydü.

famous-PASTCOP

The father of the author that was killed last month was famous.

(Globally ambiguous)

(47) Inanimacy Forced (IF) Condition

a. [$_{RC}$Maviye boyanan] / [$_{NPlocal}$kaptanın] / [$_{NPnon-local}$gemisi] /

Blue paint-PART captain-GEN ship-3SGPOSS

muhteşem görünüyor.

impressive see-PASS-IMPF

The ship of the captain that was painted blue seems/looks impressive.

($NP_{non-local}$ attachment forced)

b. [$_{RC}$Maviye boyanan] / [$_{NPlocal}$geminin] / [$_{NPnon-local}$kaptanı] /

Blue paint-PART ship-GEN captain-3SGPOSS

muhteşem görünüyor.

impressive see-PASS-IMPF

The captain of the ship that was painted blue seems/looks impressive.

(NP_{local} attachment forced)

c. [$_{RC}$Maviye boyanan] / [$_{NPlocal}$geminin] / [$_{NPnon-local}$direği] /

Blue paint-PART ship-GEN pole-3SGPOSS

muhteşem görünüyor.

impressive see-PASS-IMPF

The pole of the ship that was painted blue seems/looks impressive.

(Globally ambiguous)

Similarly, English native speakers' local attachment preference was stronger when the RC referred to the inanimate noun. They read sentences such as (48a) and (49a) with more difficulty than (48b, c) and (49b, c). They preferred to modify complex genitive

NPs by RCs as in sentence structures such as (48b) and (49b). This preference was stronger with sentences such as (49b).

(48) Animacy-Forced (AF) Condition

a. [$_{NPnon\text{-}local}$ The author] of [$_{NPlocal}$ the play] [$_{RC}$ that was killed last month] was famous.

($NP_{non\text{-}local}$ attachment forced)

b. [$_{NPnon\text{-}local}$ The play] of [$_{NPlocal}$ the author] [$_{RC}$ that was killed last month] was famous.

(NP_{local} attachment forced)

c. [$_{NPnon\text{-}local}$ The fan] of [$_{NPlocal}$ the author] [$_{RC}$ that was killed last month] was famous.

(Globally ambiguous)

(49) Inanimacy Forced (IF) Condition

a. [$_{NPnon\text{-}local}$ The ship] / of [$_{NPlocal}$ the captain] / [RC that was painted blue] / looks gorgeous

($NP_{non\text{-}local}$ attachment forced)

b. [$_{NPnon\text{-}local}$ The captain] / of [$_{NP\ local}$ the ship] / [RC that was painted blue] / looks gorgeous

(NP_{local} attachment forced)

c.[$_{NPnon\text{-}local}$ The pole] / of [$_{NP\ local}$ the ship] / [RC that was painted blue] / looks gorgeous

(Globally ambiguous)

For the L2 group, the use of animacy information was much more explicit as it influenced their attachment preferences. To put it differently, L1 Turkish-L2 English group preferred to attach the RC to the local NP when the RC modified the inanimate noun as in (49b). Yet, they preferred non-local NP attachment when the RC modified the animate noun in the NP as in (48a).

The results, therefore, seem to confirm the predictions of the Unrestricted Race Model of Van Gompel et al. (2000). Recall that the Unrestricted Race Model argues that the parser makes and commits itself to an initial analysis through the use of both syntactic and lexico-semantic sources of information. The parser uses all possible sources of information at this initial analysis. When the initial analysis proves to be incorrect, it goes through a second stage where it makes a reanalysis. The participants' use of the lexical information (i.e., animacy) through their initial judgments seems to confirm this prediction. Furthermore, it is evident that the monolingual Turkish and L1 English group made an initial preference by choosing a local attachment.

As for the L1 Turkish-L2 English group, although they showed preference for a particular attachment site and went through two stages of analyses, their initial analysis is not guided by syntactic information. Rather, they relied more on the lexical information while processing sentences. Their attachment preferences are mainly guided by the lexical information rather than syntax.

For the L1 group, the results of this study do not seem to confirm the predictions of the Construal Hypothesis for Turkish although they confirm the predictions for English. The Construal Hypothesis predicts that RC attachment preferences are determined by the *Referentiality Principle*. According to the Referentiality Principle, the

head of the complex NP (i.e., *the servant* of the actress) is referential in the sense that it either introduces entities or corresponds to already existing discourse entities and it receives the RC attachment in complex genitive NPs modified by RCs. However, monolingual Turkish speakers did not prefer to attach the RC to the head of the complex NP. Rather, they attached it to its specifier. As predicted by the Construal Hypothesis, native speakers of English used Gricean maxim of 'Avoid Ambiguity' and attached the RC to the second NP.

The predictions of Recency and Predicate Proximity (Gibson et al., 1996) do not seem to be confirmed either. The Recency and Predicate Proximity Principles of Gibson et al. (1996) predict that languages with a relatively freer word order like Turkish would have stronger predicate activations because the average distance of arguments to their verbal heads might be relatively far. It is predicted that such languages will have relatively strong Predicate Proximity activations leading to high RC attachments (non-local NP in Turkish). In Turkish, what is closer to the predicate phrase is the non-local NP both linearly and hierarchically. However, monolingual Turkish speakers' online RTs and offline attachment preferences reflect a strong local attachment preference.

For English, it is predicted that a language with a rigid SVO word order like English will not have a very strong Predicate Proximity activation because the average distance of arguments to their verbal heads is relatively low, which in turn leads to a low activation of Predicate Proximity in English. Thus, Recency will dominate Predicate Proximity in English. Local attachment preferences of English speakers seem to confirm the predictions made by Gibson et al. (1996) in that sense.

Although the attachment preferences of English speakers are compatible with the Construal Hypothesis and Recency and Predicate Proximity Principles, neither the Construal Hypothesis nor the Recency and Predicate Proximity Principles can account for the attachment preferences of Turkish speakers. The results of Turkish data might have actually resulted from language specific properties of Turkish. Recall that although Turkish is accepted to be an SOV language, the order of the elements in a sentence or phrase is relatively free due to its inflectional morphology. This syntactic freedom for the order of elements can also be seen in Turkish phrase structures. The order of the elements in a sentence might change for several reasons in Turkish and one of these reasons is determined as definiteness by Lewis (1967). As Lewis (1967) notes, if any element is qualified in Turkish, the element must follow its qualifier and the definite must precede the indefinite.

If this property is important in the placement of elements in a sentence, in the construction, [[NP1-*of*-NP2]-RC], the attachment site that Turkish speakers choose may be influenced by their expectancy of the definiteness of both NPs. To put it more clearly, if Turkish requires the definite NP precede the indefinite NP, then readers may prefer the RC in (50) to be placed right before *the actress* to make that NP more definite. When the RC is placed before the actress, the reader/hearer may assume that it is specifically chosen in order to make "the actress" more definite and tend to attach the RC to *the actress.* If, on the other hand, the speaker or the writer wanted to specify the servant, s/he would place the RC in front of the servant (as in 51), which is perfectly acceptable in terms of Turkish sentence structure. In sum, Turkish native speakers are believed to prefer the local NP (i.e, NP1) 'aktris' in constructions such as (50) as they probably

assume that if RC was to modify the non-local NP (i.e, NP2) 'hizmetçi' they would have constructions like [NP1-RC-NP2] as in (51). Thus, the ordering of [RC-NP1-NP2] as in (50) makes them opt for local NP attachment.

(50)	Balkon-da	dur-an	*aktris-in*	hizmetçi-si
	Balcony-LOC	stand-PART	actress-GEN	servant-POSS
(51)	Aktrisin	balkonda	duran	*hizmetçisi*
	Actress-GEN	balcony-LOC	stand-PART	servant-POSS

Implicit prosody might possibly play a role in Turkish speakers' local attachment preferences. However, the prosodic breaks were not investigated in this particular study.

Both the L1 Turkish group and L1 English group favored local attachment while reading online and offline. However, Turkish speakers' answers to the comprehension questions presented online are not consistent with the results of the offline task and their RTs in the online task. L1 Turkish group seems to show a tendency to answer the online comprehension questions with a non-local attachment preference. Nevertheless, when the results are investigated carefully, it is observed that their non-local attachment preference is 55%, which is not a strong dominance over the local attachment preference (45%). Individual differences such as working memory might have led to this inconsistency in their answers to the questions presented online and offline. Factors related to the experimental design of the study might also account for the inconsistency. Although there was no time limit, the participants knew that the computer was recording the time they took to read the items. This might have led them to rush and give inconsistent answers to the questions presented online as well.

The data from L1 speakers is interesting in the sense that local attachment preferences of both the monolingual Turkish group and the English group were stronger when the NP was inanimate. When the NP was animate, this preference was not that strong. The significant main effects for condition (i.e., animacy) also support this result. The findings seem to suggest that retrieval of animate NPs is somehow easier than inanimate NPs in the memory that the L2 speaker wants to attach the RC close to the inanimate NP but not the animate NP. However, discussing the findings on a factor that is not tested in the particular study (such as working memory) might be *ad hoc* if not misleading.

As for the L2 speakers, they show an attachment preference only when they have lexical information. In other words, they rely more on lexical information than universal least-effort parsing strategies while parsing online, a result similar to the earlier findings by Felser et al. (2003) and Papadopoulou and Clahsen (2003). However, their use of lexical information neither resembles that of their monolingual counterparts in their L1 nor is it target-like. Both monolingual Turkish speakers and native speakers of English showed stronger local attachment preferences when the RC disambiguated towards the inanimate noun. The L2 group, similar to the L1 Turkish and L1 English groups, preferred to attach the RC to the local NP when the NP was inanimate. Nonetheless, the L2 speakers preferred to attach the RC to the non-local NP when the RC disambiguation forced the animate noun.

Figure 6 shows that Turkish speakers of L2 English do not exhibit a particular attachment preference without any information provided by the lexical property of the

NPs. In other words, their attachment preference is mainly guided by the lexical property of the NP, which is also observable from Figure 5.

The results of the present study are also compatible with the findings of previous studies on RC attachment ambiguities in the L1 and L2 (Dussias, 2003; Felser et al., 2003; Fernandez, 2002; Papadopoulou &Clahsen 2003) in the sense that neither the present study nor the previous studies found any specific attachment preference revealed by the L2 speakers' online RT data[7]. Their attachment preferences were neither similar to those of their monolingual counterparts in their L1 nor target-like. In other words, the data did not reveal any transfer effects in L2 speakers' sentence processing strategies. Their offline data showed a non-local attachment preference, which was as well neither influenced by their L1 nor was target-like.

The results of the present study (as well as the previous studies) seem to confirm the predictions of Shallow Structure Hypothesis (SSH) proposed by Clahsen and Felser (2006a, 2006b). The SSH suggests that L2 learners differ from both child and adult L1 speakers in their sentence processing as they do not rely on structure-based parsing strategies while resolving ambiguities in their L2. Clahsen and Felser (2006a) claim that "the syntactic representations that adult L2 learners compute are shallower and less detailed than those of native speakers" (p.32).

SSH accounts for the absence of L1 influence in the studies conducted on RC attachment ambiguity resolution in L2. Clahsen and Felser (2006a) review the RC ambiguity resolution studies in L2 such as Felser et al. (2003) and Papadopoulou and

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[7] Note that L1 Spanish-L2 English group in Dussias's (2003) study showed a local NP attachment preference although the L1 English-L2 Spanish group did not show a specific attachment preference in the online data.

Clahsen (2003) in which [NP-*of*-NP] versus [NP-*with*-NP] constructions were compared. They note that:

> For structure-based ambiguity resolution strategies to be transferred, a sufficient amount of structure must be present in the first place, and this must be of a form that allows the syntactic processor to operate on. If learners segment sentences from the L2 according to the thematic structure, then complex NPs such as *the servant of the actress* are likely to be treated as a single chunk, whereas a preposition signaling a new thematic domain such as *with* and its complement will form a separate chunk. Although L2 learners have demonstrated a clear NP2 attachment preference for *Relative Clause Construal* strategy, their apparent inability to apply any structure-based ambiguity resolution strategies in cases where the construal strategy fails is expected if their representations of NP *of* NP complexes lack the relevant structural detail (p. 33).

The SSH explains different attachment preferences of L2 learners in the two constructions. In the studies mentioned above, the researchers investigated the L2 learners' use of structural and lexical information by comparing [NP-*of*-NP] versus [NP-*with*-NP] constructions. L2 learners in those studies showed a native-like NP2 attachment preference with NP-*with*-NP constructions. This was taken as evidence for L2 learners' capacity in applying lexical information as successfully as native speakers of the languages tested. For NP-*of*-NP constructions, on the other hand, they did not show a clear attachment preference. Clahsen and Felser (2006a, 2006b) comment that the preposition *with* creates and signals a new thematic domain. Therefore, the parser will form a separate chunk with the preposition and its complement (as previously noted by Frazier & Clifton, 1996). Since the preposition *of* does not signal a new thematic domain like *with,* L2 learners are likely to treat it as a single chunk.

This explanation supports the online (i.e., data comes from their answers to comprehension questions) and offline attachment preferences of Turkish speakers of L2

English, which is neither target like, nor influenced by their L1. They seem to take the whole NP as a single chunk and attach the RC to the head of the whole NP (i.e., non-local NP).

However, it is important to note that the SSH is based on the experiments where the use of syntactic and lexical-semantic information was investigated in complex NPs linked by different prepositions (i.e., *of* vs. *with*). In both Felser et al. (2003) and Papadopoulou and Clahsen (2003) studies, disambiguation was provided with structural information. In other words, the disambiguating information was provided with *subject-verb agreement*. The hypothesis, therefore, fails to account for the use of animacy information in different attachment preferences of L2 speakers in our case. To put it differently, the L2 group favored attaching the RC to the local NP when it was inanimate, whereas the same group favored non-local attachment when the RC modified an animate NP in the present study. Although the SSH explains the L2 groups' reliance on the lexical information that the NPs carry, it fails to account for the different attachment preferences with different animacy information.

In sum, the results of the L2 data allow us to address the following issues in adult L2 sentence processing:

1. Automaticity in adult L2 sentence processing (Segalowitz, 2003)
2. L1 influence in L2 sentence processing
3. Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b)
4. L2 speakers' access to Universal Parser (UP)/Universal Grammar (UG)

In terms of automaticity, the difference between the native and L2 speakers of English indicate that the L2 group has not automatized in processing syntactically

ambiguous sentences. The significant main effect for group (i.e., native vs. nonnative), and Figure 5.7 indicates that the L2 group was much slower than the L1 group. Their slower reading times and reliance on the lexical information during online processing are taken as evidence for their lack of automaticity in sentence processing in the L2 (see Segalowitz, 2003; Clahsen & Felser, 2006a for similar arguments).

The results of the current study do not present any concrete evidence of L1 transfer effects in the L2 sentence processing strategies. The L2 speakers' online and offline attachment preferences resemble neither their L1 nor their L2. This finding seems to confirm the argument that there is a fundamental difference between L2 learners' interlanguage grammars and L1 grammars (Bley-Vroman, 1990, Clahsen & Muysken, 1986, cited in Clahsen & Felser, 2006b). Clahsen and Felser (2006b) argue that successful sentence processing is dependent on the accessibility of the grammatical information provided by the innate syntax. The reason why L2 learners depend less on the structural information in L2 sentence processing is believed to be the inadequate L2 grammar. Clahsen and Felser (2006b) further comment that whether L2 learners can develop native-like processing strategies is based on their convergence on the target-like grammar. If there is a fundamental difference between the L1 and L2 learners' interlanguage and if the L2 learner cannot access the innate syntax and if native-like processing is dependent on this innate grammatical knowledge, neither the UP nor the UG is available to the L2 speaker. Although Clahsen and Felser (2006b) interpret findings from a UG perspective, several studies have commented that investigation of RC attachment ambiguities do not address the universality of parsing principles as the structure in question displays cross-linguistic variation (Carreiras & Clifton, 1993;

Cuetos et al., 1996; Frazier & Clifton, 1996; Gibson et al., 1996; Gilboy et al., 1995; Hemforth et al., 1998; Pearlmutter & Gibson, 2001). Thus, it is difficult to comment on the availability of UG to L2 speakers with this study which investigated ambiguity resolution strategies which are believed to be language-specific but not universal.

Taken together, it can be concluded that when the NP is an inanimate noun, the RC will be attached to the local NP. This lexical information is dominated by the structural information with L1 speakers. L2 learners, on the other hand, as predicted by Clahsen and Felser (2006a, 2006b), compute shallower syntactic representations and rely more on the lexical-semantic information and not the structural information. The results of the L1 Turkish and L1 English data confirm the predictions of Unrestricted Race Model (Van Gompel et al., 2000; 2001) suggesting that the parser makes serial processing and only a single analysis is available at a time, yet this analysis is not necessarily guided by syntax alone. The reader makes use of all possible sources of information in the initial analysis and a reanalysis is done when necessary. The results of the L2 data are compatible with the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b) suggesting that L2 learners rely more on lexical information rather than syntax while processing temporarily ambiguous sentences. L2 speakers do not seem to transfer L1-based parsing strategies. They develop an interlanguage which is neither L1 nor target-like. Finally, it is difficult to comment on the L2 speakers' access to innate syntax with a study investigating a structure that shows cross-linguistic variation. Thus, giving generalizations on availability of UG is beyond the scope of this study.

Implications

The results of this study, in line with previous studies (Dussias, 2003; Felser et al., 2003; Fernandez, 2002; Papadopoulou &Clahsen 2003), indicate that L2 learners rely heavily on the lexical-semantic information while processing sentences in their L2. Unlike child and adult L1 speakers, they cannot integrate the information provided by syntax appropriately to process the target language sentences.

The results of this study, again in line with previous research findings, address the role of L2 input processing in the development of the L2 linguistic system.

L2 speakers who participated in this study received years of formal instruction in the L2 English, and also spent years in the L2 country. Nevertheless, they seem to have failed to converge on the native-speakers' processing strategies. This finding seems to suggest that there is necessity to focus more on formal properties of the L2 in language classrooms. Although this preference depends largely on the language teaching goals determined by each individual program or teacher, the findings in L2 sentence processing research suggest that L2 speakers try to compensate for the deficiencies in L2 grammar by largely depending on lexical-semantic information while processing the L2 input.

Recognizing the importance of psycholinguistic aspects of SLA and the role of input processing in L2 acquisition, VanPatten (1996) developed a model, Processing Instruction (PI), to teach grammar in language classrooms. As an alternative to traditional ways of grammar teaching, which depend on practice and drill activities, the goal of PI is to alter the processing strategies of L2 learners to provide them with better form-meaning connections than they would develop on their own with positive evidence

only. VanPatten (1996) observes that L2 learners rely on the content information while processing in the target language. For example, in the presence of a time adverbial such as "*yesterday*", the language learner does not pay attention to the past tense marker "–*ed*" inflected on the verb as the time adverbial allows the learner to interpret the input in the correct time and meaning. Therefore, PI encourages referential activities in which learners receive "structured input activities" and they are given the opportunity to process the form in the input in a controlled situation (e.g., controlling the processing of form-meaning relations in past tense without a time adverbial), which might lead to better form-meaning connections compared to a less controlled situation (VanPatten, 1996; 2002a; 2002b).

Several studies have been conducted to test the efficiency of PI (e.g., VanPatten & Cadierno, 1993; VanPatten & Oikkenon, 1996; see VanPatten 1996; VanPatten 2002a, 2002b for a review). The results of the studies have indicated that learners receiving PI gained the ability to process input better, but also their developing L2 system is positively affected in such a way that they could access the targeted linguistic features while constructing their output.

Although the studies are encouraging, whether the effects of PI are long-lasting or not is not certain yet. Moreover, Batstone (2002) has criticized PI as constraining the context to the targeted linguistic forms will eliminate the clues that learners will need in the discourse to make sense of new forms in the input. However, VanPatten (2002a) argues that the goal of PI is to speed up language learners' development of L2 linguistic system and to minimize potential impediments. Additionally, as the PI relies heavily on accuracy, the role of feedback and bottom-up analyses in the acquisition of target

language forms is considered significant. However, PI is meant to be a supplement or part of a communicative curriculum. Thus, it would only form a part of the total exposure to input that a learner would receive (VanPatten, 2002a). Nevertheless, more replication studies are needed to test the long term effectiveness of PI (VanPatten, 2002b) and any possible implementation of this method to teach ambiguity resolution in RCs in the L2.

Adopting PI will depend on the methodological issues in language classrooms such as learning objectives of a language classroom, and the needs, motivations and attitudes of language learners. Moreover, focusing more on other aspects of language, such as discourse, pragmatics, semantics, as well as syntax in language classrooms might help language learners compensate for the deficits in their L2 grammar. Yet, several studies in language teaching pedagogy are needed to test the indirect suggestions of this study.

Limitations

Further research that would address additional components that are not examined in this study such as the role of working memory, implicit prosody, L1 and L2 corpus could contribute greatly to our understanding of L1 and L2 sentence processing in general and RC attachment preferences in particular.

In addition, research studies that would test the L1 and L2 processing of late Turkish-English bilinguals could be very revealing for the field of L2 acquisition, L1 attrition as well as the representation and processing dichotomy proposed for monolingual and bilingual speakers.

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APPENDICES

A. Background Questionnaire Used for Monolingual Turkish Speakers

Bu çalışmaya katılmayı kabul ediyorum:

İmza:_____İsim Soyisim:_____

Tarih:_____

Kişisel Bilgiler (Gizli tutulacaktır.)

Soyisim, İsim:_____

Telefon no:_____E-mail adresi:_____

Cinsiyet: Kadın: Erkek:

Doğum Tarihi:_____Doğum Yeri: Şehir:_____ Ülke:_____

Meslek:_____

En son mezun olunan okul: Ortaokul: _____Lise: _____ Universite: _____

Bildiği Diller:

Anadil: _____

Yabancı Dil(ler): _____

Bildiğiniz yabancı dil(ler)i aşağıdaki dil becerilerinde nasıl seviyelendirirsiniz?

	Beşlangıç Düzeyinde	Orta Düzeyde	İleri Düzeyde	Anadili gibi
Okuma				
Yazma				
Konuşma				
Dinleme				
Genel Yeterlilik				

Katılımınız için teşekkürler!!!

B. Background Questionnaire Used for Native Speakers of English

I agree to participate in this study:

Signature:_____Name: _____

Date:_____

PERSONAL INFORMATION (Will Remain Confidential)

Last Name, First Name:_____

Telephone Number:_____E-mail address:_____

Sex: Female Male:

Date of Birth:_____Place of Birth: City:_____ Country:_____

Occupation:_____

Highest Level of Schooling: Secondary____High school__University _____

LINGUISTIC INFORMATION

Mother Tongue: _____

Language of Education:

Primary School:_____Secondary School:_____High School:_____University:_____

SECOND LANGUAGE(S): (besides English) _____

	Beginner	Intermediate	Advanced	Near-Native
Reading				
Writing				
Speaking				
Listening				
Overall Competence				

Thank you very much for your contribution!

C. Background Questionnaire Used for Turkish Speakers of L2 English

I agree to participate in this study:

Signature:_____Name: (Please print):_____

Date:_____

PERSONAL INFORMATION (Will Remain Confidential)

Last Name, First Name:_____

Telephone Number:_____E-mail address:_____

Sex: Female Male:

Date of Birth:_____Place of Birth: City:_____ Country:_____

Occupation:_____

Highest Level of Schooling: Secondary_____High school_____University _

LINGUISTIC INFORMATION

Mother Tongue: _____

Language of Education:

Primary School:_____Secondary School:_____

High School:_____University:_____

Age & Place of first exposure to English: _____

How often do you use English? _____

Where do you generally use English? Home:_____Work:_____

Social:_____

Have you lived in an English-speaking country before?_____If so, how long did you stay there?

Country (1) _____ Age of arrival: _____ Length of stay: _____

Country (2) _____ Age of arrival: _____ Length of stay: _____

ENGLISH LANGUAGE PROFICIENCY

Have you ever taken any standardized English Proficiency Test (e.g., TOEFL, IELTS)?_

Score:_____

How would you rate your linguistic ability in English in the following areas?

	Beginner	Intermediate	Advanced	Near-Native
Reading				
Writing				
Speaking				
Listening				
Overall Competence				

SECOND LANGUAGE(S): (besides English) _____

	Beginner	Intermediate	Advanced	Near-Native
Reading				
Writing				
Speaking				
Listening				
Overall Competence				

Thank you very much for your contribution!

D. Items and Yes/No Questions Used in the Online Task in Experiment 1

Experimental Items

Animacy Forced (a) NPnon-local, (b) NPlocal, (c) Ambiguous

1.
   a) Bugün konuşma yapan fakültenin dekanı gelecek vadediyor.
      Gelecek vadeden dekan mıdır?
   b) Bugün konuşma yapan dekanın fakültesi gelecek vadediyor.
      Gelecek vadeden fakülte midir?
   c) Bugün konuşma yapan dekanın asistanı gelecek vadediyor.
      Bugün konuşma yapan asistan mıdır?

2.
   a) Yeni kitabını yazan üniversitenin rektörü dün televizyondaydı.
      Televizyondaki rektör müydü?
   b) Yeni kitabını yazan rektörün üniversitesi dün televizyondaydı.
      Televizyondaki üniversite miydi?
   c) Yeni kitabını yazan rektörün oğlu dün televizyondaydı.
      Yeni kitabını yazan rektörün oğlu muydu?

3.
   a) Mavi yatını satan kitabın yazarı çok komik görünüyor.
      Komik görünen yazar mıdır?
   b) Mavi yatını satan yazarın kitabı çok komik görünüyor.
      Komik görünen kitap mıdır?
   c) Mavi yatını satan yazarın kardeşi çok komik görünüyor.
      Mavi yatını satan yazarın kardeşi midir?

4.
   a) Geçen hafta istifa eden şiretin müdürü sıkıntıda.
      Sıkıntıda olan şirket midir?
   b) Geçen hafta istifa eden müdürün şirketi sıkıntıda.
      Sıkıntıda olan müdür müdür?
   c) Geçen hafta istifa eden müdürün sekreteri sıkıntıda.
      Geçen hafta istifa eden müdür müdür?

5.
   a) Geçtiğimiz ay öldürülen kitabın yazarı çok ünlüydü.
      Ünlü olan kitap mıydı?
   b) Geçtiğimiz ay öldürülen yazarın kitabı çok ünlüdür.
      Ünlü olan yazar mıydı?
   c) Geçtiğimiz ay öldürülen yazarın babası çok ünlüydü.
      Geçtiğimiz ay öldürülen yazar mıydı?

6.

a) Mavi gözleri olan kliniğin doktoru iyi tanınır.
İyi tanınan klinik midir?
b) Mavi gözleri olan doktorun kliniği iyi tanınır.
İyi tanınan doktor mudur?
c) Mavi gözleri olan doktorun karısı iyi tanınır.
Mavi gözleri olan doktor mudur?

7.

a) Uyuşturucu kullanan uçağın pilotu çok yaşlı.
Yaşlı olan pilot mudur?
b) Uyuşturucu kullanan pilotun uçağı çok eski.
Eski olan uçak mıdır?
c) Uyuşturucu kullanan pilotun kardeşi çok yaşlı.
Uyuşturucu kullanan pilotun kardeşi midir?

8.

a) Oyuncak bebekleri olan evin çocuğu çok şirin.
Şirin olan çocuk mudur?
b) Oyuncak bebekleri olan çocuğun evi çok şirin.
Şirin olan ev midir?
c) Oyuncak bebekleri olan çocuğun arkadaşı çok şirin.
Oyuncak bebekleri olan çocuğun arkadaşı mıdır?

9.

a) Londra'da yaşayan şirketin muhasebecisi çok hırslı.
Hırslı olan muhasebeci midir?
b) Londra'da yaşayan muhasebecinin şirketi çok hırslı.
Hırslı olan şirket midir?
c) Londra'da yaşayan muhasebecinin arkadaşı çok hırslı.
Londra'da yaşayan muhasebecinin arkadaşı mıdır?

10.

a) Her gün spor yapan geminin kaptanı bizi çok etkiledi.
Bizi etkileyen gemi midir?
b) Her gün spor yapan kaptanın gemisi bizi çok etkiledi.
Bizi etkileyen kaptan mıdır?
c) Her gün spor yapan kaptanın karısı bizi çok etkiledi.
Her gün spor yapan kaptan mıdır?

11.

a) Geçen hafta katledilen çiftliğin hayvanlarının fotoğrafı çekildi.
Fotoğrafı çekilen çiftlik midir?
b) Geçen hafta katledilen hayvanların çiftliğinin fotoğrafı çekildi.
Fotoğrafı çekilen hayvanlar mıdır?

c) Geçen hafta katledilen hayvanların sahibinin fotoğrafı çekildi.
Geçen hafta katledilen hayvanlar mıdır?

12.

a) Ufak yüzgeçleri olan akvaryumun balığı çok şirin.
Şirin olan akvaryum mudur?
b) Ufak yüzgeçleri olan balığın akvaryumu çok şirin.
Şirin olan balık mıdır?
c) Ufak yüzgeçleri olan balığın eşi çok şirin.
Ufak yüzgeçleri olan balık mıdır?

13.

a) Geçen hafta tutuklanan şiirin yazarı herkesi şaşırttı.
Herkesi şaşırtan yazar mıdır?
b) Geçen hafta tutuklanan yazarın şiiri herkesi şaşırttı.
Herkesi şaşırtan şiir midir?
c) Geçen hafta tutuklanan yazarın karısı herkesi şaşırttı.
Geçen hafta tutuklanan yazarın karısı mıdır?

14.

a) Almanya'dan gelen evin kiracısı bizi üzdü.
Bizi üzen kiracı mıdır?
b) Almanya'dan gelen kiracının evi bizi üzdü.
Bizi üzen ev midir?
c) Almanya'dan gelen kiracının kardeşi bizi üzdü.
Almanya'dan gelen kiracının kardeşi midir?

15.

a) Üç dil bilen okulun öğrencisi bizi çok etkiledi.
Bizi etkileyen öğrenci midir?
b) Üç dil bilen öğrencinin okulu bizi çok etkiledi.
Bizi etkileyen okul mudur?
c) Üç dil bilen öğrencinin öğretmeni bizi çok etkiledi.

16.

a) Fabrikada çalışan biletin talihlisi ortadan kayboldu.
Ortadan kaybolan bilet midir?
b) Fabrikada çalışan talihlinin bileti ortadan kayboldu.
Ortadan kaybolan talihli midir?
c) Fabrikada çalışan talihlinin oğlu ortadan kayboldu.
Fabrikada çalışan talihli midir?

17.

a) Kalp krizi geçiren arabanın sürücüsü kazaya sebep oldu.
Kazaya sebep olan araba mıdır?

b) Kalp krizi geçiren sürücünün arabası kazaya sebep oldu.
Kazaya sebep olan sürücü müdür?
c) Kalp krizi geçiren sürücünün arkadaşı kazaya sebep oldu.
Kalp krizi geçiren sürücü müdür?

18.

a) Hastaları muayene eden hastenenin doktoru bizi çok şaşırttı.
Bizi şaşırtan hastane midir?
b) Hastaları muayene eden doktorun hastanesi bizi çok şaşırttı.
Bizi şaşırtan doktor mudur?
c) Hastaları muayene eden doktorun asistanı bizi çok şaşırttı.
Hastaları muayene eden doktor mudur?

19.

a) Hormonsuz sebze yetiştiren evin bahçıvanı yaşlanmış.
Yaşlanan bahçıvan mıdır?
b) Hormonsuz sebze yetiştiren bahçıvanın evi eskimiş.
Eskiyen ev midir?
c) Hormonsuz sebze yetiştiren bahçıvanın karısı yaşlanmış.
Hormonsuz sebze yetiştiren bahçıvanın karısı mıdır?

20.

a) Dün hastalanan ülkenin başbakanı huzursuz.
Huzursuz olan başbakan mıdır?
b) Dün hastalanan başbakanın ülkesi huzursuz.
Huzursuz olan ülke midir?
c) Dün hastalanan başbakanın kardeşi huzursuz.
Dün hastalanan başbakanın kardeşi midir?

21.

a) Dün istifa eden ülkenin büyükelçisi birçok sorunla karşı karşıya.
Birçok sorunla karşı karşıya olan büyükelçi midir?
b) Dün istifa eden büyükelçinin ülkesi birçok sorunla karşı karşıya.
Birçok sorunla karşı karşıya olan ülke midir?
c) Dün istifa eden büyükelçinin yardımcısı birçok sorunla karşı karşıya.
Dün istifa eden büyükelçi yardımcısı mıdır?

22.

a) Dün kazada yaralanan tarlanın çiftçisi çok zengin.
Zengin olan tarla mıdır?
b) Dün kazada yaralanan çiftçinin tarlası çok zengin.
Zengin olan çiftçi midir?
c) Dün kazada yaralanan çiftçinin karısı çok zengin.
Dün kazada yaralanan çiftçi midir?

23.

a) Anlaşmayı imzalayan şehrin valisi coşku içinde.
   Coşku içindeki şehir midir?
b) Anlaşmayı imzalayan valinin şehri coşku içinde.
   Coşku içindeki vali midir?
c) Anlaşmayı imzalayan valinin yardımcısı coşku içinde.
   Anlaşmayı imzalayan vali midir?

24.

a) Üç çocuğu olan ülkenin kraliçesi çok zengindir.
   Zengin olan ülke midir?
b) Üç çocuğu olan kraliçenin ülkesi çok zengindir.
   Zengin olan kraliçe midir?
c) Üç çocuğu olan kraliçenin kardeşi çok zengindir.
   Üç çocuğu olan kraliçe midir?

Inanimacy Forced (a) NPnon-local, (b) NPlocal, (c) Ambiguous

1.

a) Maviye boyanan kaptanın gemisi muhteşem görünüyor.
   Muhteşem görünen gemi midir?
b) Maviye boyanan geminin kaptanı muhteşem görünüyor.
   Muhteşem görünen kaptan mıdır?
c) Maviye boyanan geminin direği muhteşem görünüyor.
   Maviye boyanan direk midir?

2.

a) Bir yıl önce tamamlanan ressamın resmi harika görünüyor.
   Harika görünen resim midir?
b) Bir yıl önce tamamlanan resmin ressamı harika görünüyor.
   Harika görünen ressam mıdır?
c) Bir yıl önce bitirilen resmin galerisi harika görünüyor.
   Bir yıl önce bitirilen galeri midir?

3.

a) Bronzdan yapılan heykeltraşın heykeli çok etkileyici.
   Etkileyici olan heykel midir?
b) Bronzdan yapılan heykelin heykeltraşı çok etkileyici.
   Etkileyici olan heykeltraş mıdır?
c) Bronzdan yapılan heykelin tabanı çok etkileyici.
   Bronzdan yapılan heykel tabanı mıdır?

4.

a) Güzel manzaralı ahçının restoranı hoş görünüyor.

Hoş görünen ahçı mıdır?

b) Güzel manzaralı restoranın ahçısı hoş görünüyor.
Hoş görünen restoran mıdır?

c) Güzel manzaralı restoranın terası hoş görünüyor.
Güzel manzaralı olan restoran mıdır?

5.

a) Tahta çitleri olan çiftçinin çiftliği tuhaf görünüyor.
Tuhaf görünen çiftçi midir?

b) Tahta çitleri olan çiftliğin görevlisi tuhaf görnüyor.
Tuhaf görünen çiftlik midir?

c) Tahta çitleri olan çiftliğin kapısı tuhaf görünüyor.
Tahta çitleri olan çiftlik midir?

6.

a) Büyük pencereleri olan kadının evi esrarengiz görünüyor.
Esrarengiz görünen kadın mıdır?

b) Büyük pencereleri olan evin hanımı esrarengiz görünüyor.
Esrarengiz görünen ev midir?

c) Büyük pencereleri olan evin oturma odası esrarengiz görünüyor.
Büyük pencereleri olan ev midir?

7.

a) Dört saat süren rehberin turu çok sıkıcıydı.
Sıkıcı olan tur muydu?

b) Dört saat süren turun rehberi çok sıkıcıydı.
Sıkıcı olan rehber miydi?

c) Dört saat süren turun akşam yemeği çok kötüydü.
Dört saat süren akşam yemeği miydi?

8.

a) Mermer sütunları olan mimarın evi muhteşem görünüyor.
Muhteşem görünen ev midir?

b) Mermer sütunları olan evin mimarı muhteşem görünüyor.
Muhteşem görünen mimar mıdır?

c) Mermer sütunları olan evin girişi muhteşem görünüyor.
Mermer sütunları olan evin girişi midir?

9.

a) Elektronik göstergesi olan tamircinin makinesi düzgün çalışıyor.
Düzgün çalışan makine midir?

b) Elektronik göstergesi olan makinenin tamircisi düzgün çalışıyor.
Düzgün çalışan tamirci midir?

c) Elektronik göstergesi olan makinenin ekranı düzgün çalışıyor.
Elektronik göstergesi olan ekran mıdır?

10.
   a) Yüksek duvarları olan rahibin kilisesi gizemli duruyor.
      Gizemli duran rahip midir?
   b) Yüksek duvarları olan kilisenin rahibi gizemli duruyor.
      Gizemli duran kilise midir?
   c) Yüksek duvarları olan kilisenin bahçesi gizemli duruyor.
      Yüksek duvarları olan kilise midir?

11.
   a) Kırmızı tuğlaları olan mühendisin binası güvenli görünüyor.
      Güvenli görünen mühendis midir?
   b) Kırmızı tuğlaları olan binanın mühendisi güvenilir görünüyor.
      Güvenilir görünen bina mıdır?
   c) Kırmızı tuğlaları olan binanın çatısı güvenilir görünüyor.
      Kırmızı tuğlaları olan bina mıdır?

12.
   a) Limiti bir bütçeyle yapılan yönetmenin filmi başarılıydı.
      Başarılı olan yönetmen midir?
   b) Limiti bir bütçeyle yapılan filmin yönetmeni başarılıydı.
      Başarılı olan film midir?
   c) Limiti bir bütçeyle yapılan filmin ses kaydı başarılıydı.
      Limitli bir bütçeyle yapılan film midir?

13.
   a) Çok iyi çalınan bestecinin senfonisi ödül kazandı.
      Ödül kazanan senfoni midir?
   b) Çok iyi çalınan senfoninin bestecisi ödül kazandı.
      Ödül kazanan besteci midir?
   c) Çok iyi çalınan senfoninin giriş müziği ödül kazandı.
      Çok iyi çalınan giriş müziği midir?

14.
   a) Geçen yıl açılan sekreterin bölümü tanınmaya başladı.
      Tanınmaya başlanan bölüm müdür?
   b) Geçen yıl açılan bölümün sekreteri tanınmaya başladı.
      Tanınmaya başlanan sekreter midir?
   c) Geçen yıl açılan üniversitenin bölümleri tanınmaya başladı.
      Geçen yıl açılan bölümler midir?

15.
   a) Geçen hafta toplanan şefin orkestrası iyi bir performans gösterdi.
      İyi bir performans gösteren orkestra mıdır?
   b) Geçen hafta toplanan orkestranın şefi iyi bir performans gösterdi.
      İyi bir performans gösteren şef midir?

c) Geçen hafta toplanan kilisenin orkestrası iyi bir performans gösterdi.
Geçen hafta toplanan orkestra mıdır?

16.

a) Geçtiğimiz yıl kurulan aktörün tiyatrosu ünlüdür.
Ünlü olan aktör müdür?
b) Geçtiğimiz yıl kurulan tiyatronun aktörü ünlüdür.
Ünlü olan tiyatro mudur?
c) Geçtiğimiz yıl kurulan tiyatronun sahnesi ünlüdür.
Geçtiğimiz yıl kurulan tiyatro mudur?

17.

a) Küçük pencereleri olan köpeğin kulubesi ürkütücüydü.
Ürkütücü olan köpek midir?
b) Küçük pencereleri olan kulübenin köpeği ürkütücüydü.
Ürkütücü olan kulübe midir?
c) Küçük pencereleri olan evin kulübesi ürkütücüydü.
Küçük pencereleri olan ev midir?

18.

a) Çeşitli şubeleri olan müşterinin bankası iflas etti.
İflas eden müşteri midir?
b) Çeşitli şubeleri olan bankanın müşterisi iflas etti.
İflas eden banka mıdır?
c) Çeşitli şubeleri olan şirketin bankası iflas etti.
Çeşitli şubeleri olan şirket midir?

19.

a) Bir dizi deney içeren araştırmacının çalışması inandırıcı görünüyor.
İnandırıcı görünen çalışma mıdır?
b) Bir dizi deney içeren çalışmanın araştırmacısı inandırıcı görünüyor.
İnandırıcı görünen araştırmacı mıdır?
c) Bir dizi deney içeren araştırmanın ön çalışması inandırıcı görünüyor.
Bir dizi deney içeren ön çalışma mıdır?

20.

a) Geçen yıl kapanan çocuğun yetimhanesi korkunçtu.
Korkunç olan yetimhane midir?
b) Geçen yıl kapanan yetimhanenin çocukları korkunçtu.
Korkunç olan çocuklar mıdır?
c) Geçen yıl kapanan yetimhanenin yemekhanesi korkunçtu.
Geçen yıl kapanan yemekhane midir?

21.

a) Şehir merkezinde bulunan avukatın firması bir sürü vergi ödüyor.

Bir sürü vergi ödeyen firma mıdır?

b) Şehir merkezinde bulunan firmanın avukatı bir sürü vergi ödüyor.
Bir sürü vergi ödeyen avukat mıdır?

c) Şehir merkezinde bulunan firmanın muhasebe bölümü bir sürü vergi ödüyor.
Şehir merkezinde bulunan muhasebe bölümü müdür?

22.

a) Yüksek duvarları olan öğretmenin okulu iç karartıcıydı.
İç karartıcı olan öğretmen midir?

b) Yüksek duvarları olan okulun öğretmeni iç karartıcıydı.
İç karartıcı olan okul mudur?

c) Yüksek duvarları olan okulun bahçesi iç karartıcıydı.
Yüksek duvarları olan okul mudur?

23.

a) Acil çıkışı olan şoförün otobüsü iyi durumda.
İyi durumda olan şoför müdür?

b) Acil çıkışı olan otobüsün şoförü iyi durumda.
İyi durumda olan otobüs müdür?

c) Acil çıkışı olan otobüsün üst katı iyi durumda.
Acil çıkışı olan otobüs müdür?

24.

a) Barok tarzı olan müteahhitin binası yenidir.
Yeni olan müteahhit midir?

b) Barok tarzı olan binanın müteahhiti yenidir.
Yeni olan bina mıdır?

c) Barok tarzı olan binanın çatısı yenidir.
Barok tarzı olan bina mıdır?

Filler Items and Yes/No Questions Used in the Online Task in Experiment 1

1. Çocuğa alınan oyuncak çok pahalıydı.

   Çocuğa oyuncak mı alındı?

2. Misafire yapılan kek çok lezzetliydi.

   Misafire kurabiye mi yapıldı?

3. Öğrencilere verilen ödev zor görünüyordu.

   Öğrencilere ödev mi verildi?

4. Sınavdaki soru gerçekten zordu.

   Soru kolay mıydı?

5. Takımın eğitmeni oldukça deneyimliydi.

   Deneyimli olan takım mıydı?

6. Otelin reklamı oldukça başarılıydı.
   Başarılı olan otel miydi?
7. Makalenin yazarı birçok mektup aldı.
   Yazar mektup aldı mı?
8. Kapının anahtarı dün kayboldu.
   Anahtar bugün mü kayboldu?
9. Yönetmenin sekreteri biraz tembel.
   Tembel olan sekreter midir?
10. Adaya yöneltilen soru açık değildi.
    Adaya yöneltilen soru açık mıydı?
11. Müdürün kararı kesinlikle mantıksız.
    Mantıksız olan müdür müdür?
12. Ajana verilen mesaj çok gizliydi.
    Mesaj ajana mı verildi?
13. Sergideki heykel muhteşem görünüyor.
    Muhteşem görünen sergi midir?
14. Bebeğin dadısı oldukça yaşlı.
    Dadı yaşlı mıdır?
15. Öğrencinin hatası ciddi boyutta.
    Öğrenci hata mı yaptı?
16. Derginin editörü geçenlerde istifa etti.
    Derginin müdürü mü istifa etti?
17. Suçlunun avukatı dün öldürüldü.
    Öldürülen suçlu muydu?
18. Yoldaki işaretler pek iyi görünmüyordu.
    Yoldaki işaretler iyi görünüyor muydu?
19. Havaalanındaki uçak kalkışa hazır.
    Uçak kalkışa geçti mi?
20. Arkadaşımın kuzeni şehirden ayrılıyor.
    Şehirden ayrılan arkadaşım mıdır?

21. Şirketin muhasebecisi çok çalışıyor.
    Çok çalışan muhasebeci midir?
22. Vazonun yanındaki peçete kirli.
    Kirli olan vazo muydu?
23. Ziyaretçinin hediyesi oldukça değerli.
    Ziyaretçinin hediyesi değerli midir?
24. Evin arkasındaki ağaçlar kesildi.
    Evin arkasındaki ağaçlar kesildi mi?
25. Çocuğun halası okulu ziyaret etti.
    Okulu çocuğun teyzesi mi ziyaret etti?
26. Editöre gönderilen mektup oldukça ilginç.
    Editöre mektup mu gönderildi?
27. Caddeye giden ana yol kapanmış.
    Cadde mi kapanmış?
28. Restoranın sahibi oldukça zengin.
    Zengin olan restoran sahibi midir?
29. Spikerin duyurusunu kimse anlamadı.
    Spikerin duyurusu anlaşıldı mı?
30. Uzmanın önerisi herkesin dikkatini çekti.
    Uzmanın önerisi dikkat çekici miydi?
31. Adaya verilen formun doldurulması gerekli.
    Adaya form mu verildi?
32. Mimarın projesi dün kabul edildi.
    Mimarın projesi kabul edildi mi?
33. Hastanın hemşiresi uzun saatler çalıştı.
    Çalışan hasta mıydı?
34. Yazarın kitabı geçen hafta yayınlandı.
    Yazarın kitabı geçen ay mı yayınlandı?
35. Kitabın çevirmeni oldukça başarılıydı.
    Başarılı olan kitap mıydı?

36. Memura gelen tehdit araştırılıyor.

    Tehdidi memur mu araştırıyor?

37. Konferansın tercümanı çok para kazanıyor.

    Tercüman çok para kazanıyor mu?

38. Adaya giden vapur çok konforlu.

    Vapor konforlu mu?

39. Mahkemenin yargıcı emekli olacak.

    Mahkemenin yargıcı emekli oldu mu?

40. Belgeselin yapımcısı çok genç.

    Belgeselin yapımcısı yaşlı mı?

41. Virüslü bilgisayar servise gönderildi.

    Servise gönderilen bilgisayar virüslü müydü?

42. Çocuğun uygunsuz davranışı hemen cezalandırıldı.

    Çocuğa ceza verildi mi?

43. Mağazanın girişindeki güvenlik görevlisi çok genç.

    Mağazanın güvenlik görevlisi var mı?

44. Teknenin altındaki köpek balığı huzursuz.

    Teknedekiler mi huzursuz?

45. Soruya verilen cevap karmaşıktı.

    Soru mu karmaşıktı?

46. Kurbanın katili dün yakalandi.

    Katil yakalandı mı?

47. Sekretere gönderilen emailler silindi.

    Emailler silindi mi?

48. Evin yanındaki kamyonlar boşaltıldı.

    Boşaltılan ev miydi?

49. Kızın amcası oldukça genç.

    Genç olan kız mıdır?

50. Vadinin yanındaki nehri fabrikalar kirletiyor.

    Fabrikalar nehri mi kirletiyor?

51. Doktorun verdiği rapor ciddiye alınmalı.
    Doktora rapor mu verildi?
52. Mültecilerin beklentilerini ülke karşılayamıyor.
    Mültecilerin ülkeden beklentileri mi var?
53. Müdüre verilen ödenek kesildi.
    Ödenekleri müdür mü kesti?
54. Ameliyattaki risk henüz görüşülmedi.
    Ameliyatta risk mi var?
55. Milletvekilinin sözleri çoktan unutuldu.
    Milletvekili söz mü verdi?
56. Futbolcunun hayali sonunda gerçekleşti.
    Futbolcunun hayali gerçeklerşti mi?
57. Filmdeki aktör burda çok ünlüdür.
    Filmin aktörü ünlü müdür?
58. Düşmanın planları sonunda öğrenildi.
    Düşmanın planları mı vardı?
59. Kiracının sorumlulukları kontratta belirtilmiyor.
    Kontratta kiracının sorumlulukları belirtiliyor mu?
60. Sokaklardaki protesto basına yansıdı.
    Protesto televizyona mı yansıdı?

E. Items Used in the Off-line Task in Experiment 1

Experimental Items

Animate-animate

1. Kafede oturan kızın arkadaşı konuşkan birisi.
   Kafede oturan kimdir?
   a) kız
   b) arkadaşı

2. Bankaya giden müdürün karısı güzel giyinmiş.
   Bankaya giden kimdir?
   a) (müdürün) karısı
   b) müdür

3. Almaya'dan gelen öğrencinin oda arkadaşı iyi birine benziyor.
   Almanya'dan gelen kimdir?
   a) öğrenci
   b) (öğrencinin) oda arkadaşı

4. Yurtdışına giden mühendisin ağabeyi akıllı birine benziyor.
   Yurtdışına giden kimdir?
   a) (mühendisin) ağabeyi
   b) mühendis

5. Gözlük takan çocuğun annesi çok fazla konuşmuyor.
   Gözlük takan kimdir?
   a) (çocuğun) annesi
   b) çocuk

6. Konferansa katılan profesörün asistanı çok çalışkan biridir.
   Konferansa katılan kimdir?
   a) profesör
   b) (profesörün) asistanı

7. Fransa'da yaşayan tasarımcının en iyi mankeni çok yetenekli.
   Fransa'da yaşayan kimdir?
   a) tasarımcı
   b) manken

8. Rock müzik seven şarkıcının gitaristi seyirciyi büyüledi.
   Rock müzik seven kimdir?
   a) gitarist
   b) şarkıcı

9. Karakola gelen hırsızın ağabeyi şüpheli davranıyordu.
   Karakola gelen kimdi?
   a) hırsız
   b) hırsızın ağabeyi

10. Dün saldırıya uğrayan postacının oğlu solgun görünüyordu.
    Saldırıya uğrayan kimdi?
    a) postacının oğlu
    b) postacı

11. Hastanede çalışan kadının kızı mutlu görünüyor.
    Hastanede çalışan kimdir?
    a) kadın
    b) (kadının) kızı

12. Yazıyı yeniden yazan yazarın editörü sinirli görünüyordu.
    Yazıyı yeniden yazan kimdir?
    a) editör
    b) yazar

13. Mahkeme salonunda bekleyen katilin avukatı gergin görünüyor.
    Mahkeme salonunda bekleyen kimdir?
    a) katil
    b) (katilin) avukatı

Inanimate-inanimate

1. Ahşaptan yapılan evin kapısı yanıyor.
   Ahşaptan yapılan hangisidir?
   a) kapı
   b) ev

2. Dün çalınan arabanın CD çaları çok yeniydi.
   Çalınan hangisidir?
   a) araba
   b) CD çalar

3. Bir ay önce alınan bilgisayarın ekranı bozuldu.
   Bir ay önce alınan hangisidir?
   a) bilgisayar
   b) ekran

4. Geçen yıl açılan üniversitenin kütüphanesi çok güzel görünüyor.
   Geçen yıl açılan hangisidir?

a) üniversite
b) kütüphane

5. Kauçuktan yapılan ayakkabının topuğu çirkin görünüyor.
Kauçuktan yapılan hangisidir?
a) topuk
b) ayakkabı

6. Hollanda'dan ithal edilen lalelerin tohumları kayboldu.
Hollanda'dan ithal edilen hangisidir?
a) laleler
b) tohumları

7. Geçen yıl ödül alan filmin müziği büyüleyici.
Geçen yıl ödül alan hangisidir?
a) müzik
b) film

8. Listelerin zirvesinde yer alan grubun şarkısı çok hareketli.
Listelerin zirvesinde yer alan hangisidir?
a) grup
b) şarkı

9. Geçmişi 15. yüzyıla dayanan şehrin kilisesi büyüleyici görünüyor.
Geçmişi 15. yüzyıla dayanan hangisidir?
a) kilise
b) şehir

10. Büyük harflerle yazılan kitabın kapağı iyi okunuyor.
İyi okunan hangisidir?
a) kitap
b) kapak

11. Modern tarzda döşenen evin mobilyaları hoş görünüyor.
Modern tarzda döşenen hangisidir?
a) mobilyalar
b) ev

12. İspanyol bir yazar tarafından yazılan kitabın önsözü çok uzun.
İspannyol bir yazar tarafından yazılan hangisidir?
a) kitap
b) önsöz

13. Parlak renkte olan odanın perdeleri çok hoş görünüyor.
Parlak renkte olan hangisidir?

a) perdeler
b) oda

Filler Items

1. Arkadaşımın çağırdığı adamın sebzeleri çok tazeydi.
   Sebzeleri taze olan kimdir?
   a) arkadaşım
   b) adam

2. Kızın tartıştığı işadamının limuzini parıldıyordu.
   Limuzini olan kimdir?
   a) kız
   b) işadamı

3. Doktorun uyuşturduğu teknisyenin saatini annesi vermişti.
   Doktor kimi uyuşturdu?
   a) teknisyeni
   b) annesini

4. Manavın kandırdığı eskicinin vazosu değersizdi.
   Değersiz olan hangisidir?
   a) eskici
   b) vazo

5. Kadının kışkırttığı gencin şapkası eskiydi.
   Şapkası eski olan kimdi?
   a) kadın
   b) genç

6. Tüccarın konuştuğu adamın uçağı en hızlı olandı.
   Uçağı olan kimdir?
   a) tüccar
   b) adam

7. Satıcının anlaştığı köylünün arabası eskimişti.
   Arabası eskiyen kimdi?
   a) satıcı
   b) köylü

8. Polisin tutukladığı hırsız çok gençti.
   Genç olan hangisiydi?
   a) polis
   b) hırsız

9. Arkadaşımın evlendiği adamın ayakkabısı ufacıktı.
   Ayakkabisi ufak olan hangisiydi?
   a) arkadaşımın
   b) adamın

10. Kadının anlaştığı adamın deposu yandı.
    Deposu yanan kimdi?
    a) kadın
    b) adam

11. Hakimin yargıladığı adamın saati bozulmuş.
    Saati bozulan kimdir?
    a) adam
    b) hakim

12. Öğretmenin cesaretlendirdiği çocuğun gözleri bozuldu.
    Gözleri bozulan kimdir?
    a) öğretmen
    b) çocuk

13. Askerin savaştığı düşmanın botları yepyeniydi.
    Botları yeni olan kimdi?
    a) düşman
    b) asker

14. Babamın şaşırttığı çocukların oyunları çok komikti.
    Komik olan hangisiydi?
    a) çocuklar
    b) oyun

15. Doktorun çağırdığı hastanın pantolonu koyu renkti.
    Pantolonu koyu renk olan hangisiydi?
    a) hasta
    b) doktor

16. Annemin konuştuğu kadının kolyesi koptu.
    Kolyesi kopan kimdir?
    a) kadın
    b) annem

17. Uçak kiralayan işadamının arabası arızalandı.
    Arızalanan hangisidir?
    a) uçak
    b) araba

18. Tost yapan büfenin çikolataları bayattı.
    Bayat olan hangisidir?
    a) çikolatalar
    b) tostlar

19. Çocukların su döktüğü fidanlar büyümüş.
    Büyüyen hangisidir?
    a) çocuklar
    b) fidanlar

20. Kadının ütülediği pantolon epeyce eskimiş.
    Eskiyen hangisidir?
    a) ütü
    b) pantolon

21. Adamın dolabındaki mediller çok düzenliydi.
    Düzenli olan hangisiydi?
    a) mendiller
    b) adam

22. Çalışkan öğrencinin okulda sakladığı kitaplar çok fazlaydı.
    Okulda saklanan hangisidir?
    a) kitaplar
    b) öğrenci

23. Adamın rafa yerleştirdiği gömlek çok kirliydi.
    Kirli olan hangisiydi?
    a) adam
    b) gömlek

24. Yaşlı kadının paralarını koyduğu torba kayboldu.
    Kaybolan hangisidir?
    a) torba
    b) paralar

25. Acımasız düşmanın sigarasını söndürdüğü tabak kötü kokuyordu.
    Kötü kokan hangisiydi?
    a) sigara
    b) tabak

26. Kızgın adamın bıçağını koyduğu çanta kötü durumdaydı.
    Kötü durumda olan hangisiydi?
    a) bıçak
    b) çanta

27. Yorgun atletin yakasını süsleyen çiçekler çok etkileyiciydi.
    Etkileyici olan hangisidir?
    a) çiçekler
    b) yorgun atlet

28. İşçilerin çalışması müdürü memnun etti.
    Memnun olan kimdi?
    a) müdür
    b) işçiler

29. Şarkıcının selam verdiği adam şaşkınlık içinde salondan ayrıldı.
    Şaşkınlık içindeki kimdi?
    a) şarkıcı
    b) adam

30. Oyun sırasında ayağıma vuran çocuğa çok kızdım.
    Kızgın olan kimdir?
    a) çocuk
    b) ben

31. Kayığı kumların üzerine çekecek olan adam ortadan kayboldu.
    Ortadan kaybolan hangisidir?
    a) adam
    b) kayık

F. Items and Yes/No Questions Used in the Online Task in Experiment 2

Experimental Items

Animacy Forced (a) NPnon-local, (b) NPlocal, (c) Ambiguous

1.
   a) The dean of the faculty that gave a speech today is promising.
      Is the dean promising?
   b) The faculty of the dean that gave a speech today is promising.
      Is the faculty promising?
   c) The assistant of the dean that gave a speech today is promising.
      Did the assistant give a speech today?

2.
   a) The rector of the university that wrote a new book was on TV.
      Was the rector on TV?
   b) The university of the rector that wrote a new book was on TV.
      Was the university on TV?
   c) The son of the rector that wrote a new book was on TV.
      Did the son write a new book?

3.
   a) The author of the book that had a blue yacht is funny.
      Is the author funny?
   b) The book of the author that had a blue yacht is funny.
      Is the book funny?
   c) The brother of the author that had a blue yacht is funny.
      Did the brother have a blue yacht?

4.
   a) The manager of the company that resigned last week is still popular.
      Is the company popular?
   b) The company of the manager that resigned last week is still popular.
      Is the manager popular?
   c) The secretary of the manager that resigned last week is still popular.
      Did the manager resign last week?

5.
   a) The author of the play that was killed last month was famous.
      Was the play famous?
   b) The play of the author that was killed last month was famous.
      Was the author famous?
   c) The fan of the author that was killed last month was famous.
      Was the author killed last month?

6.

a) The doctor of the clinic that has blue eyes is successful.
   Is the clinic successful?
b) The clinic of the doctor that has blue eyes is successful.
   Is the doctor successful?
c) The wife of the doctor that has blue eyes is successful.
   Does the doctor have blue eyes?

7.

a) The pilot of the plane that uses illegal drugs is very old.
   Is the pilot very old?
b) The plane of the pilot that uses illegal drugs is very old.
   Is the plane very old?
c) The brother of the pilot that uses illegal drugs is very old.
   Does the brother use illegal drugs?

8.

a) The child of the house that has expensive toys is lovely.
   Is the child lovely?
b) The house of the child that has expensive toys is lovely.
   Is the house lovely?
c) The friend of the child that has expensive toys is lovely.
   Does the friend have expensive toys?

9.

a) The accountant of the company that lives in London is well-known.
   Is the accountant well-known?
b) The company of the accountant that lives in London is well-known.
   Is the company well-known?
c) The friend of the accountant that lives in London is well-known.
   Does the friend live in London?

10.

a) The captain of the ship that works out everyday impresses us.
   Does the ship impress us?
b) The ship of the captain that works out everyday impresses us.
   Does the captain impress us?
c) The wife of the captain that works out everyday impresses us.
   Does the captain work out every day?

11.

a) The animals of the farm that had been slaughtered had been photographed.
   Had the farm been photographed?
b) The farm of the animals that had been slaughtered had been photographed.
   Had the animals been photographed?

c) The owner of the animals that had been slaughtered had been photographed.
Had the animals been slaughtered?

12.

a) The fish of the aquarium that has a small fin is lovely.
Is the aquarium lovely?
b) The aquarium of the fish that has a small fin is lovely.
Is the fish lovely?
c) The mate of the fish that has a small fin is lovely.
Does the fish have a small fin?

13.

a) The poet of the poem that was arrested today shocked us.
Did the poet shock us?
b) The poem of the poet that was arrested today shocked us.
Did the poem shock us?
c) The wife of the poet that was arrested today shocked us.
Was the wife arrested today?

14.

a) The tenant of the house that came from Germany surprised us.
Did the tenant surprise us?
b) The house of the tenant that came from Germany surprised us.
Did the house surprise us?
c) The brother of the tenant that came from Germany surprised us.
Did the brother come from Germany?

15.

a) The student of the school that speaks three languages impresses us.
Does he student impress us?
b) The school of the student that speaks three languages impresses us.
Does the school impress us?
c) The teacher of the student that speaks three languages impresses us.
Does the teacher speak three languages?

16.

a) The winner of the ticket that worked in a factory disappeared.
Did the ticket disappear?
b) The ticket of the winner that worked in a factory disappeared.
Did the winner disappear?
c) The son of the winner that worked in a factory disappeared.
Did the winner work in a factory?

17.

a) The driver of the car that had a heart attack caused an accident.

Did the car cause an accident?

b) The car of the driver that had a heart attack caused an accident.
Did the driver cause an accident?

c) The friend of the driver that had a heart attack caused an accident
Did the driver have a heart attack?

18.

a) The doctor of the hospital that examined fifty patients impressed us.
Did the hospital impress us?

b) The hospital of the doctor that examined fifty patients impressed us.
Did the doctor impress us?

c) The assistant of the doctor that examined fifty patients impressed us.
Did the doctor examine fifty patients?

19.

a) The gardener of the house that grows organic fruits is old.
Is the gardener old?

b) The house of the gardener that grows organic fruits is old.
Is the house old?

c) The wife of the gardener that grows organic fruits is old.
Does the wife grow organic fruits?

20.

a) The prime minister of the country that got sick yesterday is restless.
Is the prime minister restless?

b) The country of the prime minister that got sick yesterday is restless.
Is the country restless?

c) The brother of the prime minister that got sick yesterday is restless.
Did the brother get sick yesterday?

21.

a) The ambassador of the country that resigned last week has a lot of problems.
Does the ambassador have a lot of problems?

b) The country of the ambassador that resigned last week has a lot of problems.
Does the country have a lot of problems?

c) The assistant of the ambassador that resigned last week has a lot of problems.
Did the assistant resign last week?

22.

a) The farmer of the land that got injured last week was prosperous.
Was the land prosperous?

b) The land of the farmer that got injured last week was prosperous.
Was the farmer prosperous?

c) The wife of the farmer that got injured last week was prosperous.
Did the farmer get injured last week?

23.

a) The mayor of the city that has signed the contract celebrates the victory.
   Does the city celebrate the victory?
b) The city of the mayor that has signed the contract celebrates the victory.
   Does the mayor celebrate the victory?
c) The deputy of the mayor that has signed the contract celebrates the victory.
   Has the mayor sign the contract?

24.

a) The queen of the country that has three children is wealthy.
   Is the country wealthy?
b) The country of the queen that has three children is wealthy.
   Is the queen wealty?
c) The sister of the queen that has three children is wealthy.
   Does the queen have three children?

Inanimacy Forced (a) NPnon-local, (b) NPlocal, (c) Ambiguous

1.

a) The ship of the captain that was painted blue looks gorgeous.
   Does the ship look gorgeous?
b) The captain of the ship that was painted blue looks gorgeous.
   Does the captain look gorgeous?
c) The pole of the ship that was painted blue looks gorgeous.
   Was the pole painted blue?

2.

a) The picture of the painter that was completed last year looks magnificent.
   Does the picture look magnificent?
b) The painter of the picture that was completed last year looks magnificent.
   Does the painter look magnificent?
c) The picture of the gallery that was completed last year looks magnificent.
   Was the picture completed last year?

3.

a) The statue of the sculptor that is made of bronze is interesting.
   Is the statue interesting?
b) The sculptor of the statue that is made of bronze is interesting.
   Is the sculptor interesting?
c) The base of the statue that is made of bronze is interesting.
   Is the base made of bronze?

4.

a) The restaurant of the cook that has a nice view looks attractive.

Does the cook look attractive?

b) The cook of the restaurant that has a nice view looks attractive.
Does the restaurant look attractive?

c) The terrace of the restaurant that has a nice view looks attractive.
Does the restaurant have a nice view?

5.

a) The farm of the farmer that has a wooden fence looks strange.
Does the farmer look strange?

b) The farmer of the farm that has a wooden fence looks strange.
Does the farm look strange?

c) The gate of the farm that has a wooden fence looks strange.
Does the farm have a wooden fence?

6.

a) The house of the woman that has big windows looks weird.
Does the woman look weird?

b) The woman of the house that has big windows looks weird.
Does the house look weird?

c) The room of the house that has big windows looks weird.
Does the house have big windows?

7.

a) The trip of the guide that lasted four hours was boring.
Was the trip boring?

b) The guide of the trip that lasted four hours was boring.
Was the guide boring?

c) The dinner of the trip that lasted four hours was boring.
Did the dinner last four hours?

8.

a) The house of the architect that has marble pillars looks impressive.
Does the house look impressive?

b) The architect of the house that has marble pillars looks impressive.
Does the architect look impressive?

c) The gate of the house that has marble pillars looks impressive.
Does the gate have marble pillars?

9.

a) The machine of the mechanic that has many indicators works well.
Does the machine work well?

b) The mechanic of the machine that has many indicators works well.
Does the mechanic work well?

c) The screen of the machine that has many indicators works well.
Does the screen have many indicators?

10.
   a) The church of the priest that has very high walls looks mysterious.
      Does the priest look mysterious?
   b) The priest of the church that has very high walls looks mysterious.
      Does the church look mysterious?
   c) The garden of the church that has very high walls looks mysterious.
      Does the church have very high walls?

11.
   a) The building of the engineer that has red bricks looks reliable.
      Does the engineer look reliable?
   b) The engineer of the building that has red bricks looks reliable.
      Does the building look reliable?
   c) The roof of the building that has red bricks looks reliable.
      Does the building have red bricks?

12.
   a) The film of the director that was made last year was successful.
      Was the director successful?
   b) The director of the film that was made last year was successful.
      Was the film successful?
   c) The recording of the film that was made last year was successful.
      Was the film made last year?

13.
   a) The symphony of the composer that was played well won the award.
      Did the symphony win the award?
   b) The composer of the symphony that was played well won the award.
      Did the composer win the award?
   c) The introduction of the symphony that was played well won the award.
      Was the introduction played well?

14.
   a) The department of the secretary that was opened last year became well-known.
      Did the department become well-known?
   b) The secretary of the department that was opened last year became well-known.
      Did the secretary become well-known?
   c) The department of the university that was opened last year became well-known.
      Was the department opened last year?

15.
   a) The orchestra of the conductor that gathered last week performed well.
      Did the orchestra perform well?
   b) The conductor of the orchestra that gathered last week performed well.
      Did the conductor perform well?
   c) The orchestra of the church that gathered last week performed well.

Did the orchestra gather last week?

16.
a) The club of the player that was founded last year is famous.
   Is the player famous?
b) The player of the club that was founded last year is famous.
   Is the club famous?
c) The stadium of the club that was founded last year is famous.
   Was the club founded last year?

17.
a) The kennel of the dog that has small windows is frightening.
   Is the dog frightening?
b) The dog of the kennel that has small windows is frightening.
   Is the kennel frightening?
c) The kennel of the villa that has small windows is frightening.
   Does the villa have small windows?

18.
a) The bank of the client that had several branches went bankrupt.
   Did the client go bankrupt?
b) The client of the bank that had several branches went bankrupt.
   Did the bank go bankrupt?
c) The bank of the company that had several branches went bankrupt.
   Did the company have several branches?

19.
a) The study of the researcher that involved many experiments is convincing.
   Is the study convincing?
b) The researcher of the study that involved many experiments is convincing.
   Is the researcher convincing?
c) The piloting of the study that involved many experiments is convincing.
   Did the piloting involve many experiments?

20.
a) The orphanage of the child that was closed last year was horrible.
   Was the orphanage horrible?
b) The child of the orphanage that was closed last year was horrible.
   Was the child horrible?
c) The cafeteria of the orphanage that was closed last year was horrible.
   Was the cafeteria closed last year?

21.
a) The firm of the lawyer that is in the downtown pays a lot of tax.
   Does the firm pay a lot of tax?

b) The lawyer of the firm that is in the downtown pays a lot of tax.
Does the lawyer pay a lot of tax?
c) The accounting department of the firm that is in the downtown pays a lot of tax.
Is the accounting department in the downtown?

22.

a) The school of the teacher that had very high walls was depressing.
Was the teacher depressing?
b) The teacher of the school that had very high walls was depressing.
Was the school depressing?
c) The garden of the school that had very high walls was depressing.
Did the school have very high walls?

23.

a) The bus of the driver that has emergency exits is dependable.
Is the driver dependable?
b) The driver of the bus that has emergency exits is dependable.
Is the bus dependable?
c) The upper deck of the bus that has emergency exits is dependable.
Does the bus have emergency exits?

24.

a) The building of the constructor that has a baroque style is new.
Is the constructor new?
b) The constructor of the building that has a baroque style is new.
Is the building new?
c) The roof of the building that has a baroque style is new.
Does the building have a baroque style?

Filler Items

The following items appeared in the test in 4 conditions; SS, SP, PP and PS. Each condition had its corresponding question form as exemplified in the first item. The rest of the items include only the SS form of the question for practicality purposes.

1. a) The toy for the kid was very expensive.
b) The toy for the kids was very expensive.
c) The toys for the kids were very expensive.
d) The toys for the kid were very expensive.
Question (a): Was the toy for the kid cheap?
Question (b): Was the toy for the kids cheap?
Question (c): Were the toys for the kid cheap?
Question (d): Were the toys for the kids cheap?

2. a) The responsibility of the resident is mentioned in the contract.
b) The responsibility of the residents is mentioned in the contract.
c) The responsibilities of the residents are mentioned in the contract.
d) The responsibilities of the resident are mentioned in the contract.
Question (a): Is the responsibility of the resident mentioned in the contract?

3. a) The assignment for the student was rather challenging.
b) The assignment for the students was rather challenging.
c) The assignments for the students were rather challenging.
d) The assignments for the student were rather challenging.
Question (a): Was the assignment easy?

4. a) The advisor of the student is not well-informed.
b) The advisor of the students is not well-informed.
c) The advisors of the students are not well-informed.
d) The advisors of the student are not well-informed.
Question (a): Is the advisor well-informed?

5. a) The question in the exam is very difficult.
b) The question in the exams is very difficult.
c) The questions in the exams are very difficult.
d) The questions in the exam are very difficult.
Question (a): Is the question in the exam difficult?

6. a) The trainer of the team is experienced.
b) The trainer of the teams is experienced.
c) The trainers of the teams are experienced.
d) The trainers of the team are experienced.
Question (a): Is the trainer experienced?

7. a) The warning to the pilot was reported several times.
b) The warning to the pilots was reported several times.
c) The warnings to the pilots were reported several times.
d) The warnings to the pilot were reported several times.
Question (a): Was the warning reported?

8. a) The representative from the faculty was reluctant to join the committee.
b) The representative from the faculties was reluctant to join the committee.
c) The representatives from the faculties were reluctant to join the committee.
d) The representatives from the faculties were reluctant to join the committee.
Question (a): Was the representative reluctant?

9. a) The expectation of the immigrant was not met.
b) The expectation of the immigrants was not met.
c) The expectations of the immigrants were not met.

d) The expectations of the immigrant were not met.
Question (a): Was the expectation of the immigrant met?

10. a) The question to the candidate was not clear enough.
b) The question to the candidates was not clear enough.
c) The questions to the candidates were not clear enough.
d) The questions to the candidate were not clear enough.
Question (a): Was the question clear?

11. a) The decision of the manager is insensible.
b) The decision of the managers is insensible.
c) The decisions of the managers are insensible.
d) The decisions of the manager are insensible.
Question (a): Is the decision of the manager sensible?

12. a) The message to the spy was confidential.
b) The message to the spies was confidential.
c) The messages to the spies were confidential.
d) The messages to the spy were confidential.
Question (a): Was the message revealed?

13. a) The statue in the exhibition is gorgeous.
b) The statue in the exhibitions is gorgeous.
c) The statues in the exhibitions are gorgeous.
d) The statues in the exhibition are gorgeous.
Question (a): Is the statue in the exhibition gorgeous?

14. a) The nanny of the baby was very old.
b) The nanny of the babies was very old.
c) The nannies of the babies were very old.
d) The nannies of the baby were very old.
Question (a): Was the nanny young?

15. a) The error of the student was unpredictable.
b) The error of the students was unpredictable.
c) The errors of the students were unpredictable.
d) The errors of the student were unpredictable.
Question (a): Was the error predictable?

16. a) The editor of the magazine was unwilling to resign.
b) The editor of the magazines was unwilling to resign.
c) The editors of the magazines were unwilling to resign.
d) The editors of the magazine were unwilling to resign.
Question (a): Was the editor of the magazine willing to resign?

17. a) The lawyer of the robber was murdered.
b) The lawyer of the robbers was murdered.
c) The lawyers of the robbers were murdered.
d) The lawyers of the robber were murdered.
Question (a): Was the robber murdered?

18. a) The sign on the road was not visible.
b) The sign on the roads was not visible.
c) The signs on the roads were not visible.
d) The signs on the road were not visible.
Question (a): Was the sign on the road visible?

19. a) The plane at the airport is ready to take off.
b) The plane at the airports is ready to take off.
c) The planes at the airports are ready to take off.
d) The planes at the airport are ready to take off.
Question (a): Is the plane in the airport ready to take off?

20. a) The operation of the surgeon was video-taped.
b) The operation of the surgeons was video-taped.
c) The operations of the surgeons were video-taped.
d) The operations of the surgeon were video-taped.
Question (a): Was the operation video-taped?

21. a) The train to the city is expensive.
b) The train to the cities is expensive.
c) The trains to the cities are expensive.
d) The trains to the city are expensive.
Question (a): Is the train to the city cheap?

22. a) The accountant of the company is working hard.
b) The accountant of the companies is working hard.
c) The accountants of the companies are working hard.
d) The accountants of the company are working hard.
Question (a): Is the accountant working hard?

23. a) The napkin near the vase is dirty.
b) The napkin near the vases is dirty.
c) The napkins near the vases are dirty.
d) The napkins near the vase are dirty.
Question (a): Is the napkin clean?

24. a) The gift from the visitor is quite valuable.
b) The gift from the visitors is quite valuable.
c) The gifts from the visitors are quite valuable.

d) The gifts from the visitor are quite valuable.
Question (a): Is the gift from the visitor valuable?

25. a) The tree behind the house was cut down for the view.
b) The tree behind the houses was cut down for the view.
c) The trees behind the houses were cut down for the view.
d) The trees behind the house were cut down for the view.
Question (a): Is the tree cut down for the view?

26. a) The aunt of the boy was invited to the school to solve the problem.
b) The aunt of the boys was invited to the school to solve the problem.
c) The aunts of the boys were invited to the school to solve the problem.
d) The aunts of the boy were invited to the school to solve the problem.
Question (a): Was the aunt of the boys invited to the school?

27. a) The letter to the editor is quite interesting.
b) The letter to the editors is quite interesting.
c) The letters to the editors are quite interesting.
d) The letters to the editor are quite interesting.
Question (a): Is the letter to the editor read?

28. a) The main road to the hospital is sealed off.
b) The main road to the hospitals is sealed off.
c) The main roads to the hospitals are sealed off.
d) The main roads to the hospital are sealed off.
Question (a): Is the road to the hospital sealed off?

29. a) The command to the soldier is very tough.
b) The command to the soldiers is very tough.
c) The commands to the soldiers are very tough.
d) The commands to the soldier are very tough.
Question (a): Is the soldier tough?

30. a) The announcement by the anchor is not understood.
b) The announcement by the anchors is not understood.
c) The announcements by the anchors are not understood.
d) The announcements by the anchor are not understood.
Question (a): Is the announcement by the anchor clear?

31. a) The recommendation by the expert was neglected by the board.
b) The recommendation by the experts was neglected by the board.
c) The recommendations by the experts were neglected by the board.
d) The recommendations by the expert were neglected by the board.
Question (a): Was the recommendation neglected?

32. a) The form for the applicant is lost.
b) The form for the applicants is lost.
c) The forms for the applicants are lost.
d) The forms for the applicant are lost.
Question (a): Is the forms lost?

33. a) The project by the architect was approved.
b) The project by the architects was approved.
c) The projects by the architects were approved.
d) The projects by the architect were approved.
Question (a): Did they approve the project?

34. a) The nurse for the patient was working without a break.
b) The nurse for the patients was working without a break.
c) The nurses for the patients were working without a break.
d) The nurses for the patient were working without a break.
Question (a): Was the nurse working hard?

35. a) The book of the author was published last month.
b) The book of the authors was published last month.
c) The books of the authors were published last month.
d) The books of the author were published last month..
Question (a): Was the book rejected by the publisher?

36. a) The translator of the textbook is very successful.
b) The translator of the textbooks is very successful.
c) The translators of the textbooks are very successful.
d) The translators of the textbook are very successful.
Question (a): Is the translator successful?

37. a) The advertisement on the board is difficult to read.
b) The advertisement on the boards is difficult to read.
c) The advertisements on the boards are difficult to read.
d) The advertisements on the board are difficult to read.
Question (a): Is the advertisement easy to read?

38. a) The threat to the official was investigated in detail.
b) The threat to the officials was investigated in detail.
c) The threats to the officials were investigated in detail.
d) The threats to the official were investigated in detail.
Question (a): Did they investigate the official?

39. a) The interpreter of the conference is making a lot of money.
b) The interpreter of the conferences is making a lot of money.
c) The interpreters of the conferences are making a lot of money.

d) The interpreters of the conference are making a lot of money.
Question (a): Is the interpreter poor?

40. a) The ticket for the concert was sold out.
b) The ticket for the concerts was sold out.
c) The tickets for the concerts were sold out.
d) The tickets for the concert were sold out.
Question (a): Was there any ticket left?

The following 10 items were taken and adapted from Juffs (1998).

1. The tall man in his uniform was a very nice person.
   Was the tall man a nice person?
2. The large birds eaten in the garden could not see the cat.
   Were large birds eaten in the garden?
3. The black horse chosen at the stadium won five prizes this year.
   Did the horse win fifty prizes?
4. The bad boys seen during the afternoon were playing in the park.
   Were the boys playing in the dark?
5. The young woman invited in her uniform was stressful.
   Was the woman stressful?
6. The big cat taken into the house was trembling.
   Was the cat taken into the cottage?
7. The fast runner noticed at the race was accused of doping.
   Was the runner a drug dealer?
8. The children watched in the playground started fighting.
   Did the children watch the fight?
9. The new car washed before the rain is dirty now.
   Did the rain was the car?
10. The questions asked by the students surprised the teacher.
    Did the students ask questions to the teacher?

G. Items Used in the Offline Task in Experiment 2

Experimental Items

Animate-animate

1. The friend of the girl that sits at a café is talkative.
   Who sits at a café?
   a) the friend
   b) the girl

2. The wife of the manager that went to the bank looked nervous.
   Who went to the bank?
   a) the manager
   b) the wife

3. The roommate of the student that comes from Germany looks friendly.
   Who comes from Germany?
   a) the roommate
   b) the student

4. The brother of the engineer that went abroad is intelligent.
   Who went abroad?
   a) the engineer
   b) the brother

5. The mother of the boy that has eye glasses does not speak much.
   Who has eye glasses?
   a) the boy
   b) the mother

6. The assistant of the professor that attends the conferences is ambitious.
   Who attends the conferences?
   a) the assistant
   b) the professor

7. The top model of the designer that lives in France is talented.
   Who lives in France?
   a) the designer
   b) the top model

8. The guitarist of the singer that loves rock music impresses the audience.
   Who loves rock music?
   a) the guitarist
   b) the singer

9. The brother of the thief that was at the police station looked suspicious.
   Who was at the police station?
   a) the thief
   b) the brother

10. The son of the postman that got robbed yesterday looks pale.
    Who got robbed?
    a) the son
    b) the postman

11. The daughter of the woman that works at a hospital looks happy.
    Who works at a hospital?
    a) the woman
    b) the daughter

12. The editor of the author that rewrote the text is angry.
    Who rewrote the text?
    a) the editor
    b) the author

13. The lawyer of the murderer that waits in the courtroom looks nervous.
    Who waits in the courtroom?
    a) the murderer
    b) the lawyer

Inanimate-inanimate

1. The door of the house that is made of wood is on fire.
   Which one of the following is made of wood?
   a) the door
   b) the house

2. The CD player of the car that was stolen yesterday was brand new.
   Which one of the following was stolen?
   a) the car
   b) the CD player

3. The monitor of the computer that was bought a month ago got broken.
   Which one of the following was bought a month ago?
   a) the computer
   b) the monitor

4. The library of the university that was renovated last year looks beautiful.
   Which one of the following was renovated last year?
   a) the university
   b) the library

5. The heels of the shoes that are made of rubber look ugly.
   Which ones of the following are made of rubber?
   a) the heels
   b) the shoes

6. The seeds of the tulips that were brought from the Netherlands disappeared.
   Which ones of the following were brought from the Netherlands?
   a) the tulips
   b) the seeds

7. The soundtrack of the film that received an award last year is very charming.
   Which one of the following received an award?
   a) the soundtrack
   b) the film

8. The song of the band that is at the top of the list is lively.
   Which one of the following is at the top of the list?
   a) the band
   b) the song

9. The church of the city that dates back to the15th century is fascinating.
   Which one of the following dates back to the 15th century?
   a) the church
   b) the city

10. The furniture of the room that has a modern style looks good.
    Which one of the following has a modern style?
    a) the furniture
    b) the room

11. The cover of the book that has an antique printing looks interesting.
    Which one of the following has an antique printing?
    a. the book
    b. the cover

12. The preface of the book that is written by a Spanish author is very long.
    Which one is written by a Spanish author?
    a) the book
    b) the preface

13. The curtain of the room that has a bright color looks beautiful.
    Which one has a bright color?
    a) the curtain
    b) the room

Filler items

1. Which of the following sounds correct?
    a) The reason for the delay has not been announced.
    b) The reason for the delay have not been announced.

2. Which of the following sounds correct?
    a) The network of the computers were not working all day.
    b) The network of the computers was not working all day.

3. Which of the following sounds correct?
    a) The textbooks for the teachers were supplied by the publisher.
    b) The textbooks for the teachers was supplied by the publisher.

4. Which of the following sounds correct?
    a) The symptoms of the disease has to be observed carefully.
    b) The symptoms of the disease have to be observed carefully.

5. Which of the following sounds correct?
    a) The painting in the auction was the most precious piece of art.
    b) The painting in the auction were the most precious piece of art.

6. Which of the following sounds correct?
    a) The boy with the roses have been waiting for hours.
    b) The boy with the roses has been waiting for hours.

7. Which of the following sounds correct?
    a) The books on the shelves were damaged because of humidity.
    b) The books on the shelves was damaged because of humidity.

8. Which of the following sounds correct?
    a) The murders in the metro has not yet been solved.
    b) The murders in the metro have not yet been solved.

9. Which of the following sounds correct?
    a) The beach in the town is overcrowded at this time of the year.
    b) The beach in the town are overcrowded at this time of the year.

10. Which of the following sounds correct?
    a) The thief of the cars are caught red-handed.
    b) The thief of the cars is caught red-handed.

11. Which of the following sounds correct?
    a) The footballers in the team is not motivated enough to win.
    b) The footballers in the team are not motivated enough to win.

12. Which of the following sounds correct?
    a) The complaints about the products were discussed in the meeting yesterday.
    b) The complaints about the products was discussed in the meeting yesterday.

13. Which of the following sounds correct?
    a) The computers in the laboratory is upgraded every year.
    b) The computers in the laboratory are upgraded every year.

14. Which of the following sounds correct?
    a) The headline in the newspaper are about the embezzlement by the president.
    b) The headline in the newspaper is about the embezzlement by the president.

15. Which of the following sounds correct?
    a) The trench for the soldiers was dug in ten days.
    b) The trench for the soldiers were dug in ten days.

16. Which of the following sounds correct?
    a) The leader of the rebels were sentenced to death.
    b) The leader of the rebels was sentenced to death.

17. Which of the following sounds correct?
    a) The fountains in the park is cleaned once in two months.
    b) The fountains in the park are cleaned once in two months.

18. Which of the following sounds correct?
    a) The results of the tests are going to be announced on our website.
    b) The results of the tests is going to be announced on our website.

19. Which of the following sounds correct?
    a) The signature on the form is claimed to be fake.
    b) The signature on the form are claimed to be fake.

20. Which of the following sounds correct?
    a) The decision about the refugees have to be taken urgently.
    b) The decision about the refugees has to be taken urgently.

21. Which of the following sounds correct?
    a) The guards in the garden are always armed.
    b) The guards in the garden is always armed.

22. Which of the following sounds correct?
    a) The documentary about the war were directed by a famous actor.
    b) The documentary about the war was directed by a famous actor.

23. Which of the following sounds correct?
    a) The resignation of the minister have led to chaos in the cabinet.
    b) The resignation of the minister has led to chaos in the cabinet.

24. Which of the following sounds correct?
    a) The names of the participants are ordered alphabetically.
    b) The names of the participants is ordered alphabetically.

25. Which of the following sounds correct?
    a) The reason for the demonstrations are against the dramatic increase in tax rates.
    b) The reason for the demonstrations is against the dramatic increase in tax rates.

26. Which of the following sounds correct?
    a) The buildings in the city were restored after the earthquake.
    b) The buildings in the city was restored after the earthquake.

27. Which of the following sounds correct?
    a) The titles of the chapters is listed in the content page.
    b) The titles of the chapters are listed in the content page.

28. Which of the following sounds correct?
    a) The passports of the passengers are checked by the police.
    b) The passports of the passengers is checked by the police.

H. Background Information about the Participants of the Study

Background Information about Monolingual Turkish Speakers

Number of Participants	Gender	Age	Education	L1
19	11 M 8 F	37.63	7 High School 12 University	Turkish

Background Information about Native Speakers of English

Number of Participants	Gender	Age	Education	L1	L2	L3
12	7M 5 F	33.4	7 University 5 Graduate School	English	3 beginner 6 intermediate 2 advanced	6 Beginner 3 Intermediate

Background Information about Turkish Speakers of L2 English

Number of Participants	Gender	Age	Education	L1	L2	Age of First Exposure to English	Place of First Exposure to English	Length of Stay in an English Speaking Country	Years of Exposure to English
20	5 M 15 F	37.85	1 University 19 Graduate School	Turkish	English	12.6	2 Germany 1 Malta 17 Turkey	5.54	25.47

I. ANOVA Table for the Online Task in Experiment 1

Summary of ANOVA for Condition and Version as within Subjects Factors

Source	SS	df	MS	F
Condition	5.04	1	5.04	20.747*
Error	3.67	151	2.43	
Version	8.37	2	4.18	15.798*
Error	8.00	302	2.65	
Condition*Version	1.06	1.902	5.59	2.346
Error	6.84	287.156	2.38	

p<.001

J. ANOVA Table for the Online Task in Experiment 2

Summary of ANOVA for Condition and Version as within Subjects, Group as Between-Subjects Factors

Source	SS	df	MS	F
Between subjects				
Group	1.102	1	1.102	33.791*
Error(between)	8.545	262	.033	
Within subjects				
Condition	.043	1	.043	.704
Condition*Group	.005	1	.005	.082
Error (condition)	16.000	262	.061	
Version	.551	2	.275	5.959*
Version*Group	.607	2	.304	6.569*
Error (Version)	24.216	524	.046	
Condition*Version	.865	1.936	.447	7.496*
Condition*Version* Group	.159	1.936	.082	1.373

p<.005