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İSTANBUL AYDIN UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES

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Ph.D. THESIS

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İSTANBUL AYDIN ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜ
DOKTORA TEZ ONAY BELGESİ

Enstitümüz İngiliz Dili ve Edebiyatı Anabilim Dalı, İngiliz Dili ve Edebiyatı Doktora Programı Y1212.625009 numaralı öğrencisi Tuğba AYDIN YILDIZ'ın "THE ROLE OF DISCOURSE INFORMATION IN THE RESOLUTION OF RELATIVE CLAUSE ATTACHMENT AMBIGUITY IN L2 ENGLISH" adlı doktora tez çalışması Enstitümüz Yönetim Kurulunun 29/03/2018 tarih ve 2018/10 sayılı kararı ile oluşturulan jüri tarafından oybirliği ile Doktora tezi olarak kabul edilmiştir.

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Prof. Dr. Özer KANBUROĞLU

Enstitü Müdür Vekili

DECLARATION

I hereby declare that all information in this thesis document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results, which are not original to this thesis.

TUĞBA AYDIN YILDIZ

To my dear mother…

FOREWORD

I have always looked forward to writing this section of my thesis since I started to my program at İstanbul Aydın University in 2012. During the treatment, analyzing and writing processes, I have learnt to be patient, strong, brave and curious about what is next in order to finish a comprehensive thesis which I would be proud of on the field. I have thought that it would be the easiest part to thank the nice people around me, but actually, it becomes more and more difficult to fully express my sincere gratitude for everyone who deserves it.

Firstly, I must endless thank to my advisor, Dr. Filiz Çele, for everything she has taught me. We spent a long journey together with endless hours, full of discussing sentence processing, syntax, implicit causality, the previous studies and second language learning. She also taught me how to write an essay properly, how to present a study in conferences and how to design the experiments. Whenever I have interacted her in a classroom, at office, or at the library where she spends many hours, I have learnt new views not only about the thesis, but also about life. I am thankful to have her as my advisor because she is very careful and decided about the details that I have never paid attention to, and also, she has a deep insight and immense intellect in inspiring her students with constructive criticisms. She has read every detail of my thesis and gave me the key point feedbacks in spite of her busyness. Without her vision, my thesis would not be in the same academic quality as it is now. Sometimes, I was discouraged, lost interest or failed, and she has always been supportive, motivator and conducive in this long period.

I am greatly indebted to Dr. Zeynel Baran for helping me to organize the online experiment on E-Prime software that I have not known anything before determining the thesis subject. I have tried to set the online experiment for about eleven months with four different software experts, but still, there was a kind of deficiency about the results arising during the analysis. Thus, after searching on the internet, I have met Dr. Zeynel Baran, and desperately, I have mailed the situation, and he has decided to help me solve the problem without hesitation.

I have to thank to the participants of this study, because they have accepted to take the experiments of this thesis, paid the required attention and exercised due diligence.

I owe special thanks to my dear sister Kübra Aydın Atay and her husband Mehmet Atay, for comforting me every single time that I come to İstanbul in their house, as I am living in Zonguldak-Ereğli. They have been always welcomed me and, even sometimes, some of my friends or my family. Even they are younger than me, I have learnt how to overcome the problems in limited time and how to look from another perspective to a case. Without the atmosphere that they have created for me to study, I would not finish this thesis on time.

I cannot find words to express my appreciativeness to my husband, Dr. Avni Yıldız, for being with me with his heart and soul. He is the one who trust me to

finish this thesis ideally. Without his support, I would have some more problems that I have never met and he deserves the best special thanks for lightening me not only emotionally, but also professionally, as he is, also, an academician and nobody can understand me better than him. Mostly, I could not have enough time to spend with my two-year old boy, thus, whenever I have needed, he has always been there for me. He has not only been a father, but also a mother for our kid. I thank to the baby sitter of my child, Güllü Çubukçuoğlu and her family, and many other people who made my life easier in these years.
And my parents… I am greatly indebted to them for raising me as I am. My father, Kenan Aydın, who passed away eight years ago, and my mother, Sümer Aydın, have always guided me through their wisdom. From childhood to present, I have always felt their support and patience for me. After my father has gone, my mother has tried to become both a mother and a father. She is incredible, full of energy, an amazing role model, the only playmate for her grandson, a wise person with her life experience, helpful and a self-scarifying mother. Finally, I believe that my father is proud of me somewhere above…

April, 2018 **TUĞBA AYDIN YILDIZ**

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ABBREVIATIONS

AÖ	: Ad Öbeği
AÖ1	**:** Birinci ad öbeği
AÖ2	**:** İkinci ad öbeği
IC	**:** Implicit Causality
ICS	**:** Implicit Causality with singular embedded verb
ICP	**:** Implicit Causality with plural embedded verb
L1	**:** Native Language
L2	**:** Second Language
Non-IC	**:** Non-implicit Causality
NICS	**:** Non-implicit Causality with singular embedded verb
NICP	**:** Non-implicit Causality with plural embedded verb
NP	: Noun Phrase
NP1	: First noun Phrase
NP2	: Second Noun Phrase
RC	**:** Relative Clause
SSH	: Shallow Structure Hypothesis

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İKİNCİ DİL İNGİLİZCE'DE İLGİ TÜMCECİĞİ TERCİHİ BELİRSİZLİĞİNİN ÇÖZÜMÜNDE SÖYLEM BİLİM BİLGİSİNİN ROLÜ

ÖZET

Bu tezin amacı; ikinci dili İngilizce olan Türklerin ve anadili İngilizce olan konuşurların ilgi tümcecikleri iliştirme tercihinin çözümünde, söylem bilim bilgisinin rolünü araştırmak ve tümce işleme stratejilerini iki ad öbeğinden ve bir ilgeç öbeğinden oluşan [yerel olan ad öbeği + ilgeç öbeği + yerel olmayan ad öbeği] ve ilgi tümceciğine göre ayarlanmış karmaşık isim tamlaması yapısı içeren cümlelerde karşılaştırmaktır. Örneğin;
"Birisi balkonda duran [ilgeç öbeği] aktris [yerel ad öbeği] –in [ilgeç öbeği – sahiplik eki] hizmetçisini [yerel olmayan ad öbeği] vurdu".
Bu çalışma ikinci dil ve anadil konuşanların, söylem bilimsel bilgiyi ilgi tümceciği iliştirme belirsizliğinin çevirim içi ya da çevirim dışı deneylerinde, aynı ya da farklı işleyip işlemediklerini araştırmayı amaçlamaktadır. Söylem bilimsel ilişkilerden anlam çıkarma, ilgi tümceciği iliştirme belirsizliğinde söz dizimsel bilgiden üstün geleceği beklenilen örtülü nedensellik kavramının bir diğer ayırt edici özelliğidir, çünkü örtülü nedensellik fiilleri sebep konusunda ek bilgi gerektirmektedir. Daha önceki çalışmaların onayladığı gibi, söylem bilimsel sonuç çıkarma söz dizimsel işlemeyi etkileyebilir, örtülü nedensellik içeren fiiller yüksek bağlanmaya (yerel olmayan ad öbeği) ve örtülü nedensellik içermeyen fiiller ise alçak bağlanmaya (yerel ad öbeği) atfetme beklentisine sebep olmaktadır.
Bir dizi çevrimdışı (bir cümle tamamlama ve bir çoktan seçmeli test) ve bir çevrimiçi (kendi yönlendirmeli, kelime-kelime, çevrimiçi okuma testi) 30 ikinci dil konuşanına ve 30 tek dil konuşanına verilmiştir. Veriler tekrarlanan ölçülü ANOVA'da; koşul (örtülü nedensellik içeren ve içermeyen cümleler), tip (yerel ve yerel olmayan iliştirme tercihi içeren cümleler) ve denek değişkeni ile 2x2x2 şeklinde analiz edilmiştir. Örtülü nedensellik içeren ve içermeyen koşullarda, ana dil konuşurları için ilgi tümceciği iliştirme belirsizliği çözümünde söylem bilginin belirgin bir etkisi vardır, öte yandan, ikinci dil konuşurları her iki koşulda da sadece yerel olmayan iliştirme göstermişlerdir ki bu ikinci dil olan İngilizcenin işlenmesinde herhangi bir söylem bilim bilgisi etkisinin olmadığı anlamına gelir.
Bulgular ana dil İngilizcede, kısıtlamaya dayalı işleme teorilerinin ve modellerinin tahminleriyle uyumludur örneğin; Göndergesel Teori (Crain & Steedman, 1985; Altmann & Steedman, 1988). Bununla birlikte, ikinci dil konuşurlarının sonuçları, Sığ Yapı Hipotezi (Clahsen & Felser, 2006) ile açıklanabilir.

Anahtar Kelimeler: *Söylem bilim bilgisi, ilgi tümceciği iliştirme tercihi, örtülü nedensellik.*

THE ROLE OF DISCOURSE INFORMATION IN THE RESOLUTION OF RELATIVE CLAUSE ATTACHMENT AMBIGUITY IN L2 ENGLISH

ABSTRACT

The present thesis aims to examine the role of discourse information in determining the relative clause (RC) attachment preferences of Turkish second language (L2) speakers of English and monolinguals of English, and compares their sentence processing strategies in sentences including a complex noun phrase (NP) structure consisting of two NPs and a prepositional phrase (PP) [non-local NP + PP + local NP] modified by RC such as the following:

Someone shot the servant [non-local NP] of [PP] the actress [local NP] who [RC pronoun] was standing on the balcony.

The present study aims to investigate whether L2 speakers and the monolinguals perform the discourse information similarly or differently, during online and offline experiments of RC attachment ambiguity. Inference through the discourse relations is another distinguished feature of the IC (implicit causality) concept, which is supposed to overcome the syntactic information in the resolution of the RC attachment ambiguity, because the IC verbs require additional explanation about the reason "why". As the previous studies confirmed, the discourse inference can affect the syntactic process, IC verbs yield an expectation referring for the high attachment (non-local attachment) and non-IC verbs point to low attachment (local attachment).

A set of offline (a sentence completion and a multiple choice questions test) and an online (a self-paced, word-by-word online reading test) experiments were given to 30 L2 speakers and 30 monolinguals. The data were analyzed with a 2X2X2 repeated measures ANOVA by condition (IC and non-IC sentences) and type (local attachment forced, non-local attachment forced) as within-subject variables. With respect to IC and non-IC conditions, there is a significant effect of discourse information in the resolution of RC attachment ambiguity for the monolinguals, on the other hand, the L2 speakers showed only high attachment in both IC and non-IC conditions which means that there is not any discourse effect on processing L2 English.

This finding is consistent with the predictions of constraint based sentence processing theories and models such as; Referential Theory (Crain & Steedman, 1985; Altmann & Steedman, 1988) in L1 English. Nevertheless, the results of the L2 speakers' can be explained by the Shallow Structure Hypothesis (SSH) (Clahsen & Felser, 2006).

Keywords: *Discourse information, relative clause attachment ambiguity, implicit causality*

1. INTRODUCTION

Psycholinguistics is a field in which mental aspects and speech melt in the same pot. How language is processed in the brain is the fundamental question of this field. Language research also constitutes a subfield of psycholinguistics. As a part of the second language research, this study examines the properties of parsing strategies about the issue how second language speakers process sentences.

Relative Clause attachment ambiguity is believed to have an effective role on linguistic research especially for the last three decades. Moreover, it is important to investigate possible cross-linguistic effects of the relative clause attachment on the participants and to determine whether the strategies, which the participants use, varied from L1 or not, and the most important factor of all is to examine the effects of discourse information on syntactic relations. The present study aims to investigate whether adult Turkish L2 speakers of English apply discourse information during online and offline resolution of RC attachment ambiguity in the same way as monolinguals of English. In relation to this, whether Turkish L2 speakers utilize discourse information in resolving RC attachment ambiguity in English was examined following implicit-causality (IC) and non-implicit causality (non-IC) verbs.

The present study promises a different purview for current and future investigations on whether the Turkish parsers take one of the two Noun Phrases (NP), just because they include discourse relations (which means that the sentences with IC verbs require more explanation) or not. To the best of our knowledge, none of the recent studies in this field has been able to fill this gap comprehensively as mentioned in the Theoretical Background section. Therefore, it is essential to investigate RC attachment ambiguity from the perspective of syntactic information and discourse information relationship in a second language.

Ambiguity studies are the main factors constructing consistent significant contributions as independent variables in the field of RC attachment. This study seeks to identify the preferences of the Turkish and English speakers, in RC attachment ambiguity resolution, or to determine whether there is L1 transfer or not. Furthermore, the most distinguished innovation is the inclusion of discourse relation that affects the syntactic relations such as inference or more explanations. For example, if you try to visualize a picture of a table full of delicious meals and a woman near the table with her kitchen apron, you probably think that the woman cooked all these meals, so you make an inference. This is called as inference, interpretation, adaptation and coherence. What is expected from the participants of this study is to infer from sentences with implicit causality verbs. The participants are adapted to attend scenarios such as they actively seek to establish the coherence of discourse. For instance:

(1) "Jack detests his sisters. They like rock music."

(Rohde, Levy & Kehler, 2011)

Even no linguistic element in (1) indicates a causal relationship, it, nevertheless, appears that the readers have an expectation of such relation exists within IC verbs like "detest" and consider making additional assumptions about the coherence of two sentences. There is not any syntactic signal in (1) but the comprehenders try to connect these two sentences such as; thinking that sisters like rock music but Jack does not, or, maybe Jack detests them because they listen to rock music too loudly. Thus, readers make an inference. IC verbs require an additional explanation, which means that if the cue in the sentence affects the reader, then the reader starts inferring, and this inference influences the syntactic process. Thus, discourse inference may affect the syntactic process especially on resolution of RC attachment ambiguity. "Detest" is an IC verb that requires a reason and additional information about why. IC verbs result in an expectation that they mention for high attachment, and non-IC verbs point out low attachment. Participants try to establish a coherence of discourse. Since the IC verbs have influence on the participant's preferences, they create a strong bias toward explanation (Au, 1986; Brown & Fish, 1983; Garvey & Caramazza, 1974; McKoon, Greene & Ratcliff, 1993). Kehler, Kertz, Rohde and Elman

(2008) reported that IC verbs yield far more explanation relation continuations as in (2) than context sentences with non-IC verbs as in (3).

(2) "John detests Mary. _____. [IC VERB]"

(3) "John babysits Mary. _____. [non-IC VERB]"

(Rohde et al., 2011)

The verbs like "detest" (IC verb) seem to impress speakers to ask the reason in a way that verbs like "babysit" (non-IC verb) do not. Recent studies in L1 English (e.g., Rohde, Kehler & Elman, 2006, 2007; Kehler et al., 2008; and Rohde et al., 2011) provide evidence that the comprehenders not only generate expectations concerning what coherence relations are likely to ensue based on the current context, but also that any successful model necessarily must incorporate those expectations. Hence, the participants try to establish a coherence of discourse via IC verbs in sentences (Hobbs, 1979). In other words, L2 parsers are supposed to be affected by the discourse information, which supported by verb type, in the same way that of the monolinguals.

The studies on RC attachment ambiguity make significant contributions to the field when examining sentence processing strategies in L2. However, many of these studies are grounded from syntax based resolution of RC attachment ambiguity (Brysbaert & Mitchell, 1996; De Vincenzi & Job, 1995; Ferreira & Clifton, 1986; Frazier & Rayner, 1982; Frazier, 1987; Konieczny, Hemforth & Voelker, 1994; Mitchell, Cuetos, Corley & Brysbaert, 1995, Rayner & Pollatsek, 1989) or semantic and lexical based resolutions (Dinçtopal, 2007; Kırkıcı, 2004). There are very few studies investigating the discourse information in the resolution of RC attachment ambiguity in L1 English, such as Rohde et al. (2011) study. This current study will bridge the gap in the literature, since to our knowledge, it is being one of the first studies examining the discourse information consisting IC and non-IC verb types, in L2 English. Moreover, the most distinguished questions are whether discourse relation affects the syntactic relations with inference, whether L2 speakers apply the same sentence processing strategy for the resolution of the RC attachment ambiguity as the monolinguals of English, or whether IC verbs yield more information or not.

We know very little about Turkish L2 speakers' preferences on these questions mentioned above, to what extent this system is employed in L2 processing, and the reason why it is necessary to do more research on RC attachment. L2 learners may not have the same processing strategies as the monolinguals of English that being a significant obstacle to acquire full native-like performance in the L2. Furthermore, resolution of the ambiguity in the L2 differs from L1 processing, such that, L2 learners may have difficulty with the online integration of different information sources. Hence, it becomes substantial to research whether there is any difference between the online and offline processing. Briefly, answers to the questions above, are likely to have important implications for theories of both L1 and L2 acquisition (Frazier, 1996).

1.1 The Rationale of the Study

There are a limited number of RC attachment studies and none of them can be accounted to be comprehensive enough for explaining RC attachment ambiguities in sentences that contain a relative clause pronoun followed by two verb groups, IC verbs and non-IC verbs. This study sheds light on the field of RC attachment ambiguity in L2 English, and at the same time, it puts forward some questions regarding the interaction between Turkish and English, which have not been comprehensively answered, yet. Furthermore, this study aims to investigate what extent the discourse information is utilized in the resolution of RC attachment ambiguity in real-time L2 sentence processing by the adult Turkish L2 speakers of L2 English.

The preliminary corpus data collected from L1 English speakers were compatible with the syntax based theories; however, regarding the L2 processing by Turkish L2 speakers of English, it was not possible to propose a full explanation for the processing strategies because there is not enough research or publication on the attachment biases. The findings of this study may contribute to the literature by exploring RC ambiguity from the aspect of L2 English by Turkish participants. In the absence of such data, it can only be speculated about the validity of the certain theories that used in this study. Consequently, although the present study does not claim to find the exact

resolution of RC attachment ambiguity, it reports that only syntactic factors are not the most effective components in the sentence processing.

The outline of this thesis is organized as follows: Chapter 2 provides information about the theoretical background and theories of sentence processing in the first and second language. Chapter 3 discusses the linguistic background of English and Turkish languages. Chapter 4 presents methodology of the thesis that includes the research questions, participants, data collection instruments and materials, and data analysis procedure. Chapter 5 provides information about the results that obtained using tests, which included multiple-choice questions, online self-paced reading task, and a sentence completion task. Chapter 6 includes the discussion section, chapter 7 presents overview about conclusions and chapter 8 presents limitations and suggestions for further studies. Finally, chapter 9 presents implications of the study.

2. THEORETICAL BACKGROUND: THE SENTENCE PROCESSING IN THE FIRST AND SECOND LANGUAGE

2.1 Introduction

The sentence processing models in the first and second language will be introduced in this section.

2.2 Theoretical Background: The Sentence Processing In The First Language

2.2.1 Introduction

In spite of vast amount of research, there is no single model to explain how sentence processing occurs. Turning the thoughts and emotions into words, or sending the feelings from brain to mouth happens without our conscious awareness. Thus, sentence processing is the study of how sentences are produced and interpreted. There are particular models explaining the characterization of speech production. Sentence processing theories have mainly focused on some basics such as two-stage models versus constraint-based models, syntax versus discourse information. According to two-stage sentence processing models, the parser makes initial analysis by only considering the syntactic information; however, from the constraint-based models perspective, different sources of information (discourse, pragmatics, lexical or etc.) can mutually influence the comprehension.

Recent studies on sentence processing arise in investigating cross-linguistic similarities or differences, and many of them have attempted to discern the universality or uniqueness of the theories. Main sentence processing theories have been built to emphasize the universal set of parsing principles of two-stage models such as Garden-Path by Frazier (1978). Although the constraint-based models emphasize the extent to which languages do not have universal strategies, it is essential to state that sentence processing is affected by some differences (Bates & MacWhinney, 1987; Bates, Devescovi & D'Amico, 1999).

In fact, the universality of the parsing principles has been much discussed whether the certain strategies have the same validity for all languages or not (Bates & MacWhinney, 1987; Gibson, Pearlmutter, Canseco- Gonzales & Hickok, 1996; Carreiras & Clifton, 1999; Cuetos & Mitchell, 1988; Cuetos, Mitchell & Corley, 1996; De Vincenzi & Job, 1995; Gibson et al., 1996; Frazier, 1978, 1987; Frazier & Clifton, 1996; Hemforth, Konieczny & Scheepers, 1997; Inoue & Fodor, 1995; Mazuka & Lust, 1990; Mitchell, Cuetos & Zagar, 1990). In the following pages, current theories of sentence processing that offer different strategies about the RC attachment ambiguity will be discussed.

2.2.2 Two-stage sentence processing models

2.2.2.1 Introduction

Two-stage models are related to how readers comprehend words of a sentence and are mainly focused on incremental reading (two-stage). According to the two-stage models, the parsers process sentences as a whole phrase at a time. The recovery from initial misanalysis causes processing difficulties of varying degrees (Bader, Bayer & Meng, 1999). To avoid these difficulties, the constraint-based parsing pursues more than one single analysis simultaneously. It is not easy to rule out the two-stage parsing since the parser develops alternative sources of information along the lines of more or less preferred interpretations. However, in the constraint-based parsing, it is not hard for readers to use more than one structure simultaneously. Because the two-stage models suggest updating the initial analysis from the aspect of computational economy, the parser does not need to pay attention to other possibilities. As Gorrel (1995) stated, the two-stage models constitute single analysis at a time. Furthermore, a single preferred structure is computed for an ambiguous string, and if this structure is incompatible with subsequent material, a reanalysis is required. However, the constraint-based models constitute more than one analysis at a time. Hence, multiple structures are computed for an ambiguous string at the points of disambiguation, and incompatible structures are abandoned. For instance, Van Berkum, Brown and Hagoort (1999) directly confirmed the predictions of Crain and Steedman (1985), which means that discourse or referential sources of information are applied at the same time.

Therefore, the current study assumes that the parser's decision is guided by different varieties of information (e.g., discourse information) as supported by implicit causality. In the following section, main two-stage models (e.g., the Garden-Path, Late Closure, and Minimal Attachment Theories) will be introduced.

2.2.2.2 Garden-Path Model

The Garden-Path effect is the processing difficulty arising when parsing preferences are discomforted (Hopf, Bader, Meng & Bayer, 2003). Detecting RC attachment ambiguity, the two-stage parser initially considers preferring the syntactical information. If the initial analysis is incorrect, this situation leads to a correct reanalysis of ambiguities. In case of ambiguities and absence of syntactic information, the parsers hesitate interpreting the sentences because there is no other source of information. After encountering any possible ambiguity, the parsers reanalyze the sources of information to obtain the proper reading. In contrast to the two-stage parsing, the constraint-based parser uses different sources of information (e.g., discourse or pragmatic) all at once, so there is no need to reanalyze a sentence. In other words, a Garden-Path sentence is an ambiguous sentence which leads to the conscious processing breakdown at the point of disambiguation (Bader, Bayer & Meng, 1999). A parser, who applies the process in an incremental manner, immediately integrates each word into the on-going ambiguous sentence on encountering the word, without any delay and any buffering of words before integration. This process is supported by syntactic ambiguity resolution (Pickering, Traxler & Crocker, 2000).

The Garden-Path theory, which was improved by Frazier (1978), submits that the reader is led down Garden-Path in the event of two possible comprehension of a sentence, and the initially chosen one being wrong. As in the example (4), until the parser reads the full sentence, s/he initially analyzes the sentence differently because the verb "*barn*" can be comprehended as the main verb.

(4) "The horse raced past the barn fell."

(Frazier, 1978)

What Frazier (1978) brings forward is that the parser principally comprehends sentences syntactically at the first stage. With an example, it is easier to comprehend how the parsing process occurs in two stages such as, "*Bill knew*

the girl at the bakery shop ... was telling stories." At first, the object of the main verb (*knew*) is expected to be the NP (*the girl*); however, after reading the second verb "*was*", the NP "*the girl*" becomes the subject of the clause. In such cases, the second analysis (second stage of the parsing process) is required.

(5a)"Since Jay jogs *a mile* seems like a short distance to him."

(5b)"Since Jay jogs *a mile*, this seems like a short distance to him."

(Frazier & Rayner, 1982)

The italic words are ambiguous because unless the rest of the sentence is read, these words can be both objects as in (5b) or subjects as in (5a). It is important to notice that there are two types of ambiguous sentences: The first one is the local ambiguity (unthawed as soon as the parser hears the whole sentence), and the second one is the global ambiguity (unresolved even after the whole sentence is heard). Local ambiguity is the main basis of Garden-Path sentences. The following example was provided in order to clarify the two types of ambiguities;

(6a) The old train….

(6b) I know more handsome men than Ben Affleck.

The example in (6a) is the locally ambiguous sentence because "*train*" can be a noun (e.g., the old train arrived at 11:00) or a verb (e.g., the old train the rich about being helpful); however, the example in (6b) is globally ambiguous because no matter how many times the sentence is read, it has two interpretation: The first one is "I know men more handsome than Ben Affleck," and the second one is "I know more handsome men that Ben Affleck does." The sentences containing local ambiguities have been exploited by psycholinguists for decades (Ferreira & Henderson, 1990; Frazier & Rayner, 1982) as a way to reveal the mechanisms of language comprehension (Slattery, Sturt, Christianson, Yoshida, & Ferreira, 2013). As mentioned earlier, according to this account, the readers treat the structural ambiguity by applying completely to one of the two possible ambiguous sites. At the second stage of the processing, the former reading may be opposite to the revision which is not involved in the first place. Remarkably, this theory suggests that the initial preference is made from the syntactic account alone perspective. On the other

hand, the revision in the second phase may be from the aspect of different sources of information including verb-thematic information (Ehrlich & Rayner, 1983), discourse context (Ferreira & Clifton, 1986), and various other sources of information (e.g., Frazier, 1990; Mitchell, 1994). However, a central assumption in this study is that sentence interpretation is derived from a complete structural representation built up by using varying sources of information. Only recently, there have been studies (e.g., Christianson, Hollingworth, Halliwell & Ferreira, 2001; Christianson, Williams, Zacks & Ferreira, 2006; Ferreira, Christianson & Hollingworth, 2001; Ferreira, 2002; Swets, Desmet, Clifton & Ferreira, 2008, Slattery et al., 2013) examining the reanalysis that the comprehenders build for the locally ambiguous sentences. Christianson et al. (2001, 2006) showed in a number of experiments, however, that syntactic manipulations of the Garden-Path, including clause order, disambiguation, and length of ambiguous region, affected accuracy rates on follow-up comprehension questions. Therefore, it is not wrong to say that the syntactic information can lead to misinterpretations by other factors. Nonetheless, in order to increase the reliability of this study, both offline and online tasks were used for the data collection. Another aspect of the two-stage models is that in the previous studies (e.g., Ferreira and Clifton, 1986) some different instruments were used to collect data. Ferreira and Clifton (1986) used eye movement monitoring techniques, and their results showed that the Garden-Path in reading reduced RC analysis. Nevertheless, particularly, in the present study, two offline and a self-paced reading technique were used to determine the preferences from the perspective of comprehension and production of the sentences. Agreeably with the Garden-Path theory, a variety of sources of information are discounted inasmuch as the parser usually tries the syntactic structure, which is easier to interpret (Brysbaert & Mitchell, 1996; Desmet, Brysbaert & De Baecke, 2002; Desmet & Gibson, 2003; De Vincenzi & Job, 1995; Ferreira & Clifton, 1986; Frazier & Rayner, 1982; Frazier, 1987; Gibson & Schütze, 1999; Igoa, Carreiras, & Meseguer, 1998; Konieczny, Hemforth, & Voelker, 1994; Mak, Vonk & Schriefers, 2002; Mitchell, Cuetos, Corley, & Brysbaert, 1995; Mitchell & Brysbaert, 1998; Rayner & Pollatsek, 1989).

2.2.2.3 Late Closure

The Late Closure is a strategy that the latest words are inclined to be attached with the latest processed item rather than with the phrases in the forefront of the sentence. According to the Late Closure principle, the main basis is to take the syntactic information as an initial parsing. The principle was first introduced by Lyn Frazier (1978) and developed by Frazier and Janet Dean Fodor (1978). They also stated that the Late Closure is innate and universal, which means that all languages use the same strategy for the ambiguous sentences. According to the Late Closure, as Frazier (1987) stated "if grammatically permissible, attach new items into the clause or phrase currently being processed" (p. 562). In the complex NP structure, like NP± PP± RC, the reader is suggested to attach to the most recent NP, (i.e., NP2) (De Vincenzi & Job, 1995; Frazier, 1978, 1990; Gibson et al., 1996; Igoa, 1995; Phillips & Gibson, 1997). The main idea is that there is a universal processing strategy that analyzes the grammaticality of the languages without any possible differences, and this idea is adopted by many researchers (e.g., Frazier, 1987; Gorrell, 1995; Inoue & Fodor, 1995; Kimball, 1973, Luhtanen & Crocker, 1992; Pritchett, 1992). Furthermore, some hypothesis attempted to validate the Late Closure such as Fodor's Implicit Prosody Hypothesis (IPH); however, some certain factors can cause an Early Closure preference like prosody in different languages (e.g., Afrikaans, Croatian, Dutch, French, German, Greek, Japanese, Polish, Brazilian Portuguese and Russian) (Bergmann, Armstrong & Maday, 2008; Miyamoto, 2001). In fact, this is a direct threat for the so-called universality of the Late Closure. Repeatedly, some authors (e.g., Bates & MacWhinney, 1987; Cuetos & Mitchell, 1988; Frazier & Rayner, 1988; Just & Carpenter, 1992; Mazuka & Lust, 1990; Mitchell & Cuetos, 1991; Mitchell, 1994) suggested that languages have a lot of different perspectives and differ even from individual to individual.

For the purpose of understanding a sentence, the parser should comprehend a structured array of vocabulary. Thus, if an individual interprets a sentence without delay, s/he must analyze it structurally quicker than the former. The Late Closure simply states that the parser takes the first available analysis, which is ordinarily the one with the lowest deal of structure united at every

selection point (Clifton, 2000). In other words, the Late Closure is a principle that enables the parser to be sure about incoming items because the parser attaches incoming items to the latest items, which already interpreted initially. This statement is further exemplified in (7):

(7) “The doctor said the patient will die yesterday.”

(Fromkin, Rodman & Hyams, 2011)

Fromkin et al., (2011) offers the parsers personally participated in a Garden-Path effect at the end of the sentence because their initial tendency is to understand “yesterday” as modifier of “will die,” which is semantically inconsistent as an example of the Late Closure . A similar example (8) is provided below:

(8) “Tom said that Bill had taken the cleaning out yesterday.”

As in the above example, the adverb “yesterday” can be attached to the main clause (Tom said . . .) or the following qualifier clause (Bill had taken . . .). Frazier and Fodor (1978) argued that readers are inclined to prefer the second interpretation. In the following example (9), the prepositional phrase “in the library” may modify the verb “put” or the gerund verb “reading.” The comprehenders are inclined to prefer attaching the prepositional phrase to the second verb (Frazier & Fodor, 1978).

(9) “Jessie put the book Kathy was reading in the library . . .”

(Frazier and Fodor, 1978)

As Traxler, Pickering, and Clifton (1998) stated, if more than one single analysis of an ambiguous sentence have the same amount of the structure nodes, the Late Closure is applied. It predicts that the parsers attach an ambiguous structure to the latest processed phrase. The Late Closure principle explains the preferred attachments in other kinds of ambiguities. For example, the example in below (10) suggests that the relative clause “that was tasty” favors to attach to the most recent noun phrase “the sauce” rather than to “the steak.”

(10) “The steak with the sauce that was tasty didn't win the prize.”

(Traxler et al., 1998)

In some cases, the Late Closure comes out in a preference for attachment to the most recent phrase in the initial region of the sentence that suggests almost the

same of what the syntax based theories reported (Gibson, 1998; Kimball, 1973; Stevenson, 1993). According to the results obtained from some studies, evidence was provided for the Garden-Path effects estimated by the Minimal Attachment and Late Closure (e.g., Ferreira & Clifton, 1986; Rayner, Carlson & Frazier, 1983; Van Gompel & Pickering, 2007).

(11) The servant of the actress who was standing on the balcony was shot.

The readers may comprehend this as "the actress" (rather than "*the servant*") was standing on the balcony in the example above (11). However, Carreiras and Clifton (1993) showed that readers often do not attend to the rules of the Late Closure. On the other hand, when an equivalent sentence was presented in Spanish, there was an evident choice for predicting that "the servant was standing on the balcony" (early rather than late closure). This is also in opposition to the theoretical estimation (Eysenck & Keane, 2005). As mentioned earlier, the universality of the Late Closure assumes that it is applied equally-well to all languages. However, there are differences between languages with respect to how they are produced and interpreted. Hence, this is a challenge to the concept of universality of the Late Closure. Recently, a great deal of studies have objected to the universality of the Late Closure strategy, the Late Closure was going to remain beyond dispute, until Cuetos and Mitchell (1988) showed that Spanish speakers do not display the same results as English speakers do (i.e., Baltazart & Kister, 1995; Corley, 1996; Cuetos, Mitchell, & Corley, 1996; Mitchell et al., 1995; Mitchell & Brysbaert, 1998). As Cuetos and Mitchell (1988) brought a new perspective to the universality of the Late Closure strategy, there have been a vast amount of studies debating the universality of the Late Closure principle in other languages such as Italian (De Vincenzi & Job, 1993) and in Spanish (Igoa , Carreiras & Meseguer, 1998), French (Mitchell, Cuetos & Zagar, 1990; Zagar, Pynte, & Rativeau 1997; Dutch (Brysbaert & Mitchell, 1996) Russian (Sekerina, 2002), German (Sauerland & Gibson, 1998), Japanese (Kamide & Mitchell, 1997).

2.2.2.4 Minimal Attachment

The Minimal Attachment principle explains the sentence processing that the parsers try to comprehend sentences in terms of the simplest syntactic structure coherent with the data known at the moment. It was firstly proposed by Lyn

Frazier (1978) and Lyn Frazier and Janet Dean Fodor (1978). The obligatory syntactic processes apply at the earliest stages of parsing and interpretation, and one of these syntactic processing strategies is the Minimal Attachment (Marslen-Wilson, Tyler, Warren, Grenier & Lee, 1992). Consider sentences such as (12a & 12b):

(12a) "The girl knew the answer by heart."

(12b) "The girl knew the answer was wrong."

(Rayner & Pollatsek, 1989)

In the examples (12a and 12b), the direct object is "the answer' and the verb is "knew." But this is not valid for the second sentence (Eysenck & Keane, 2000). According to the Minimal Attachment principle, the incoming input is attached to the phrase being structured by using the fewest processes available. It is a strategy of meanness because the parsers use the simplest interpretation that is thought to be the correct one. The Minimal Attachment principle provokes the reader to attach words to the already obtained structure. In the examples (13a and 13b) of Frazier and Clifton (1996), the interpretation becomes more complex in (13b) because an additional phrase for the relative clause has to be inserted before the object phrase is encountered.

(13a) "The teacher told the children the ghost story that she knew would frighten them."

(13b) "The teacher told the children the ghost story had frightened that it wasn't true."

(Frazier and Clifton, 1996)

In the study of Schönefeld (2001), the experimental data showed that the reaction times were statistically shorter for sentences that were compatible with the Minimal Attachment principle than for those allowing the comprehenders to the Garden-Path. In contrast to the Minimal Attachment principle, there are some difficulties (e.g., causing the parsers to adopt the structure) for parsers while reading sentences by using the simplest syntactic structures.

(14) The teacher gave homework to the student was very upset.

When the parser reads "'to the students" the simplest interpretation is that the object of "*gave*" rather than the subject of the derived clause "was very upset", so the parser initially makes this analysis until "was" in (14). As challenged by Frazier and Rayner (1982), the comprehenders are "Garden-Pathed" while reading reduced clauses; however, Holmes, Kennedy, and Murray (1987) argued by showing that the full and reduced clauses present similar issues in consequence of the structural entanglement (Kennedy, Murray, Jennings, & Reid, 1989). On the basis of the currently available evidence, it seems fair to suggest that the sentence processing contains the immediate integration of various types of linguistic information as they become available (Grosjean, 1980; Marslen-Wilson, Tyler, & Seidenberg, 1978; Marslen-Wilson & Tyler, 1980; Swinney, Zurif, & Cutler, 1980; Tyler & Marslen-Wilson, 1981).

(15a) "Karen knew the schedule by heart."

(15b) "Karen knew the schedule was wrong."

The examples above (15a & 15b) are from the eye-movement studies of Frazier and Rayner (1982) and Rayner and Frazier (1987). They concluded that a longer reading time exists during the dissolution of the ambiguity in a non-Minimal Attachment comprehension (15a) than the structure consisting of Minimal Attachment. Therefore, this example can be given as a proof for Minimal Attachment being a psychologically operative parsing model (Marslen-Wilson, et al. 1992). On the contrary, Holmes, Kennedy, and Murray (1987) found in a self-paced reading task that there was no evidence about Minimal Attachment being the default parsing strategy. To clarify, it is important to state that in RC ambiguity sentences such as, "… the secretary [NP1- high] of the lawyer [NP2-low] who is talking on the phone…," the Minimal Attachment principle is uncertain to predict whether low or high NP to be attached because the parser will use the same amount of syntactic structure phrase. However, the Late Closure predicts the RC to be attached to the low NP. Agreeably with the syntax-first theories of ambiguity resolution, various sources of information are discounted inasmuch as the parser usually tries the syntactic structure, which is easier to interpret (Brysbaert & Mitchell, 1996; Clifton et al., 2003; Ferreira & Clifton, 1986; Frazier, 1987; Konieczny, Hemforth, & Voelker, 1994; Mitchell,

Cuetos, Corley, & Brysbaert, 1995, Rayner, Carlson, & Frazier, 1983; Rayner & Pollatsek, 1989; Trueswell, Tanenhaus, & Garnsay, 1994).

2.2.2.5 The Construal Theory

The Garden-Path theory was renamed and improved as the Construal theory by Frazier and Clifton (1996). This theory approves that the RC attachment can be decided by non-structural information as well as structural under certain conditions. According to this new edition, primary and non-primary relations compose the structural or syntactical associations. Primary relations consist of the finite clauses, complements, and obligatory components on contrary to the non-primary relations. As being a radical expansion of the Garden-Path theory, the Construal theory was designed to reformulate the empirical failures of the earlier formulations (Brysbaert & Mitchell, 2010). According to Frazier and Clifton (1996), the Garden-Path only accounts for the "primary relations," which provide the basis for the main clause and the connective components of it. On the other hand, this new ground is basically associated with wider scope (e.g., the whole attachment sites in RC ambiguity sentences). In the primary relations, the parser acts the same as in the Garden-Path that they process only one source of information at a time. Nevertheless, in the non-primary relations, the parser processes the most recent theta assigner such as the complex NPs in the RC ambiguity with the preposition "with" because "with" is a theta assigner for the NP2. The Construal theory interestingly does not claim any view when "*of*" is used in the RC ambiguity sentences because "*of*" does not assign any specific NP (Van Gompel, Pickering & Traxler, 2000). With respect to this view, the disambiguation NP is constituted as the most recent one that involves the widened perspective of theta nominator. Thus, the Construal Theory basically assumes that NP2 dissolves the ambiguity if there are two possible NPs by a thematic nominator preposition like "with." In this study, the results provide a basis for such an interpretation in which the structural preferences can be achieved, as the low attachment preferences are reversed when the thematic form is added into the sentences (in IC conditions).

In summary, the main two-stage sentence processing models (i.e., the Garden-Path, Late Closure, Minimal Attachment, and Construal Theory) have been explained from the perspective of ambiguity of sentences. In the following

pages, some of the opponents of the structure based models (e.g., Referential Theory and Unrestricted Race Model) will be introduced.

2.2.3 Constraint-based sentence processing models

2.2.3.1 Introduction

Evidently, the comprehension of written contexts contains different kinds of linguistic structures such as, syntactic, lexical, discursive or semantic information. However, the debate still continues about how various sources of information are used in the sentence processing.

Constraint-based models are generally one-stage models in which the parser makes one analysis considering the different sources of information simultaneously. Additionally, there is a consensus between researchers that the constraint-based processing models are based on preferring the existing sources of information (McRae, Spivey-Knowlton, & Tanenhaus, 1998; Spivey-Knowlton & Tanenhaus, 1998). The reader provides at least one structural interpretation in the two-stage processing. On the other hand, the reader provides more than one sources of information in the constraint-based processing.

Thus, this research aims to answer whether or not there are some factors effecting the interpretation from single to multi-structural sources of information. Recent studies showed that some other sources of information, in addition to the syntactic information, can affect the attachment preferences in resolving the RC ambiguity by hiding or eliminating it (i.e., Clifton & Duffy, 2001; Rayner & Clifton, 2002). Since the constraint-based sentence processing accounts assert that different factors decide the initial activation instead of using only syntactic information and these factors continue to perform on the accessibility of the interpretation (MacDonald, Pearlmutter & Seidenberg, 1994; Trueswell, Tanenhaus & Garnsey, 1994), many structures can be shared in the reader's representation of the ambiguity (Pearlmutter & Mendelsohn, 1999). On the other hand, it has been observed that the distinctions in the dissolution area may affect the ease or difficulty of reanalysis (Fodor & Inoue, 1994). However, Gibson and Pearltmutter (2000) distinguish between the two-stage and constraint-based parsing and strongly reject the observation that the evidences

do not provide clues on how the ambiguity between the two-stage or constraint-based processing difference is solved.

The difference between the constraint-based and two-stage parsing is to compute all alternative structures at the same time or to compute only a single initial analysis like two-stage (Hopf, Bader, Meng, & Bayer, 2003). Although the constraint-based parsing does not state a particular source of information, there are some ways to measure which one is effective in the ambiguous region. Therefore, in this study, the discourse information is included into the experimental sentences by using IC and non-IC verbs. In the two-stage parsing, the ambiguity starts with reanalysis of a sentence. On the other hand, in the constraint-based parsing, pre-considered sources of information already exist at the point of resolution. Despite studies debating the incremental sentence processing, there are still arguments on the certain extent of the two-stage parsing. As some studies (e.g., Trueswell et al., 1994) illustrated the influential disappearance of syntactic information effect, it has been taken as a potential evidence on contrary to the first stage of syntactical analysis. To support these debates, the present study investigates whether possibility of the discourse information affects the sentence processing or not. There are some initiator new grounds on the improvement of the sentence processing models that utilize in both the work of revealing structures and the work of assessing these structures (e.g., Referential Theory and Unrestricted Race Model).

2.2.3.2 The Unrestricted Race Model

The Unrestricted Race model was developed by Van Gompel, Pickering, and Traxler (2000). According to this model, both the two-stage and constraint-based models are combined together. Therefore, the parser uses more than one source. As it can be understood from the title of the model, there is no restriction about the sources of information. The Unrestricted Race model can be described as a two-stage reanalysis model because an initial analysis is performed at one time, so reanalysis can be demanded if the subsequent information is disconnected. This means that the parser can prefer either syntactic information or other sources of information (i.e., discourse). This model predicts that at the initial stage, the parser prefers both syntactic and discourse information together in sentences including the RC attachment. For

example, some studies show that there is no evidence about only syntactic information being initially analyzed (i.e., Ferreira & Clifton, 1986; Mitchell, Corley, & Garnham, 1992).

(16) "Bill *listened* to the teachers of the second graders who had learned times tables."

(17) "Frank *complimented* the guest of the bride who was sitting in the front row."

(Rohde et al., 2011)

The amount of reanalysis is assumed to create the source about the difficulty of processing. The current study is based more on the discourse than the syntactical information, and the discourse is provided by IC verbs as in (17) and non-IC verbs as in (16). If the reanalysis stems from the discourse information, the parser initially prefers the discourse rather than the syntax. For instance, if the attachment preference is incompatible with the ensuing information as in (17), reanalysis process takes place again and again (because RC pronoun can be attached to both "guest" and the "bride"), and the process becomes difficult. On the other hand, as in (16), there is no need to reanalyze the information because the ensuing information is appropriate (RC pronoun is preferred to be attached to the "second graders", not to the "teachers"), and the process becomes easier. In line with this purpose, the present study argues that the parser reads ambiguous sentences and initially resolves the ambiguity based on the different sources of information and relationships (e.g., discourse). Thus, Unrestricted Race model plays a major role in this study since it asserts that not only syntax but also discourse relationship can affect the parsers' preferences. In other words, the syntactical structure may be of importance in resolving the ambiguity; nevertheless, it does not necessarily override other factors such as the discourse information.

2.2.3.3 The Referential Theory

The Referential Theory was submitted by Crain and Steedman (1985) and developed by Altmann and Steedman (1988). According to this theory, due to the lack of convenient information in the discourse model, the structure requesting minimal additional suppositions is preferred (Spivey-Knowlton &

Tanenhaus, 1998). The theory assumes that the syntactic structure preferences can be affected by proper discourse relation, which was also included in the present study. It means that the resolution of the RC ambiguity by Garden-Path or other syntactic models can be inverted. The Referential Theory (Ni, Crain & Shankweiler, 1996) assumes accession to possible grammatical information at the same time with the usage of referential factors. Recently, it has been argued that some constraint-based models (i.e., Referential Theory) of ambiguity resolution establish convincing framework for rationalizing superficial effects (Spivey-Knowlton, Trueswell, & Tanenhaus, 1994). The claim is that the sentence processing system continuously integrates multiple sources of information to find out certain type of interpretation (Bates & MacWhinney, 1987; MacDonald et al. 1994; McClelland, St. John, & Taraban, 1989; Spivey-Knowlton et al. 1993; Trueswell & Tanenhaus, 1994). Integrating multiple sources of information forms the basis of this study, since the IC verbs are used to relate discourse with syntax for sentences of RC ambiguity.

(18) "Melissa dislikes the little girl of the neighbor who lives on her right."

According to the syntactic structural models, as showed in example (18), the RC attachment preference is selected for NP2 (low attachment), the "neighbor" (Carrei as & Clifton, 1999; Fernandez, 2003; Frazier & Clifton, 1996; Traxler, Pickering, & Clifton, 1998); however, in the Referential Theory, the discourse relation preference, which was represented by IC verbs, is different from the syntactic models while determining the RC attachment. As seen in (18), the main verb "dislike" is an IC verb, and this preference gives way to high attachment (NP1) to "little girl" in the implicit causality condition (Dutch: Desmet, De Baecke & Brysbaert, 2002; Greek: Papadopoulou & Clahsen, 2006). In accordance with the mentioned studies, this study investigated referential factors (e.g., IC and non-IC verbs) that were used with the activation of the discourse information in the RC attachment ambiguity. Furthermore, some researchers (e.g., Crain & Steedman, 1985; Altmann & Steedman, 1988) have also supported the Constraint-based accounts. Because one of the main assumptions of the present study has been motivated by contrasting submission, it was based upon the discourse information principles. This was done by ignoring new predictions while still updating a discourse model (Crain &

Steedman, 1985). On the other hand, the Referential Theory predicts (Rohde et al., 2011) that similar attachment preferences are affected by the referential status of definite NPs, which were preferred when the NP is referentially ambiguous without a post modifier. Evidences from a variety of languages support this prediction (Dutch: Desmet, De Baecke, & Brysbaert, 2002; French: Zagar et al., 1997; Greek: Papadopoulou & Clahsen, 2006). Papadopoulou and Clahsen (2006) provided evidence on significant effects of a self-paced reading experiment. However, Zagar et al. (1997) and Desmet et al. (2002) discovered no significant effect by using eye-tracking experiments. Furthermore, about the discourse or pragmatic information, it is essential to probe previous studies because the present study uses the IC verbs to construct a relation between syntax and discourse relationships. In such relationship, the adult comprehenders were affected by pragmatic or other contextual factors during sentence comprehension (Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995).

According to the Referential Theory, the attachment preference is seen as being the consequence of disposition with the obvious competition between being universal and language specific. Therefore, instead of presuming that structure based processing strategy (i.e., syntax) generally overrides, the asserted account here is that this opinion is sometimes surpassed by other sources of information (i.e., discourse information). Some supportive studies concluded that the importance of discourse information and lexical factors is apparent in ambiguity resolution with online experiments originated by the Referential Theory (Altmann & Steedman, 1988; Crain & Steedman, 1985; MacDonald et al. 1994; Trueswell & Tanenhaus, 1994). The subsequent studies have found high attachment preferences in the following languages: Dutch (Brysbaert & Mitchell, 1996), French (Zagar, Pynte, & Rativeau, 1997), German (Hemforth, Konieczny, & Scheepers, 2000), Russian (Radach & Kempe, 1993) and Spanish (Cuetos & Mitchell, 1988). On the other hand, apart from English, some other languages were found to have a low preference: Brazilian Portuguese (Miyamoto, 1998) Norwegian, Swedish, and Romanian (Ehrlich et al., 1999), and Arabic (Abdelghany & Fodor, 1999). Moreover, many studies have found some supportive evidences of the Referential Theory from different perspectives

such as the reduced-relative clause ambiguity (Spivey-Knowlton, & Tanenhaus, 1994), the resolution of ambiguity (Altmann, Garnham, & Dennis, 1992), and the prepositional phrase attachment ambiguity (Altmann & Steedman, 1988). Nevertheless, there are studies (e.g., Britt, Perfetti, Garrod & Rayner, 1992) proposing that different factors do not have as much influence on determining the preferences as syntax. In the study of Desmet, De Baecke, and Brysbaert (2002), interestingly, they found that referential context was not effective enough to make the parsers change their preferences. However, accordingly with Zagar et al. (1997) and on contrary with Van Berkum, Brown, & Hagoort (1999), Desmet et al. (2002) noted that it played a major role in later phases of sentence processing in L1 Dutch.

In general, Referential Theory, which was used in this study as a source, discusses that the discourse information has an effective role on the processing of ambiguous sentences at all stages depending on referential status of the NPs (Altmann, Garnham, & Dennis, 1992; Crain & Steedman, 1985; Steedman & Altmann, 1989).

As mentioned earlier, the RC attachment ambiguity has been researched from different points of view with various sources of information on L1 transfer or prepositions. The detailed information about previous L1 studies in different languages explained in the following pages.

The sentence processing theories are based on explaining how the parsers resolve ambiguities. There is a rapidly growing literature against the universal theories that postulate there is an explicit linguistic difference in processing. For instance, in comparison to English, the attachment preferences are found to be more sensitive to pronouns in German which means that the preference is generally attached to the salient one, which is NP1 (Hemforth et al., 1997, 2000). The dualism of subject and object, which was discussed in the study by Hemforth et al. (2000), is another factor confirmed in the sentence processing research. The participants consisted of 48 German native speakers, and the study analyzed the dualism of subject and object NPs followed by relative clauses. The results showed that there is an evidence for attachment NP1. Therefore, they concluded that the RC structure is both anaphoric and syntactic process in German. Prior studies in Spanish language indicated that the syntax-

based theories are not universal, as the L1 Spanish participants preferred NP1 for the attachment site (Bergmann, Armstrong, & Maday, 2008; Cuetos & Mitchell, 1988; Gilboy et al. 1995). For two possible attachment site ambiguities of RC, Cuetos and Mitchell (1988) showed that native speakers of English preferred to attach the NP2 (the low NP) as predicted by Frazier (1987). However, strong evidence against this view was presented by many researchers (e.g., Carreiras & Clifton, 1999; Mitchell, Brysbaert, Grondelaers & Swanepoel, 2000) who firstly showed NP1 bias by L1 Spanish speakers. Likewise, the native speakers of Dutch preferred to attach the RC to the NP1 (Brysbaert & Mitchell, 1996; Desmet, Brysbaert, & De Baecke, 2002; Mitchell, Brysbaert, Grondelaers, & Swanepoel, 2000). Moreover, some researchers (e.g., Chang, 1980; Corbett & Chang, 1983; Duffy & Rayner, 1990; Garnham, Oakhill, & Cain, 1997; Gernsbache & Hargreaves, 1988; Gernsbacher, 1989; Gordon, Grosz, & Gilliom, 1993) reported that NP1 is generally the most preferred one in an event with two or more possible attachment sites are available. From the referential context, researchers (e.g., Desmet, De Baecke, & Brysbaert, 2002; Frenck-Mestre & Pynte, 2000; Zagar, Pynte, & Rativeau, 1997) noted that high attachment was also preferred in a complex NP structure. After providing convincing evidences subverting the universality of the two-stage models, the researchers gained inspiration to examine the RC attachment ambiguity consisting of complex NPs with different factors including lexical-semantic characteristics of the NPs (Desmet, Brysbaert, & De Baecke, 2002; Desmet et al. 2006), the frequency (Brysbaert & Mitchell, 1996; Mitchell, Cuetos, Corley, & Brysbaert, 1995), discourse context (Desmet, De Baecke & Brysbaert, 2002), the prosodic patterns of the sentence (Frazier, Carlson, & Clifton, 2006), verb structures (Spivey-Knowlton & Sedivy, 1995), question-oriented (Altmann, van Nice, Garnham. & Henstra, 1998), and adjunct effects (Britt, 1994).

More explicitly, some researchers have emphasized the lexical information and its effects on the two-stage models (MacDonald, Pearlmutter, & Seidenberg, 1994; Trueswell & Tanenhaus, 1994). Crain and Steedman (1985) were among the first researchers who formed processing strategies by examining mechanisms of sentence processing in order to make connections among them instead of grammatical structures alone. To develop a new direction, it is better

to use more diagnostic test materials or experimental tools. Sedivy (2002) reported that using semantic information increased comprehension of focus and affected structurally ambiguous sentences. As mentioned earlier, different methods (e.g., self-paced reading) have drawn researchers' attention. It is obvious that in such studies, the attachment site was preferred as NP1 (e.g., Carreiras & Clifton, 1993; Cuetos et al. 1996). In this study, both offline (pen-paper tests) and online tests (self-paced reading via E-Prime software) were administered to the participants. From the referential context perspective, Zagar, Pynte, and Rativeau (1997) found out that context has an influence on sentence comprehension at the final phase. In addition, as stated by Gibson and Schütze (1999), the presence or absence of pronoun is an effective component of interpretation of the sentence. Another argument about the resolution of ambiguity is centered from the point of animacy, which is very effective in determining preferences. As Desmet et al. (2006) stated a tendency exists for NP1 when it is animate and vice versa, and when it is inanimate. Being one of the effective factors, the experience has attracted researchers' attention for last two decades in the sentence processing studies (e.g., Altmann, 2002; Crocker & Brants, 2000; Sturt, Costa, Lombardo, & Frasconi, 2003; Rohde, 2002; Sturt & Crocker, 1995).

Although most of the sentence processing studies have mainly focused on investigating sentence comprehension of adults, there are also some studies that examine children's sentence comprehension process. Moreover, the maturity is a different factor for the RC attachment. From the children's point of view, there are many studies on parsing in different ways such as, probe recognition (Mazuka, 1998), word monitoring (Tyler & Marslen-Wilson, 1981), cross-modal priming (Love & Swinney, 1997; McKee, Nicol, & McDaniel, 1993), eye tracking (Hurewitz Brown-Schmidt, Thorpe, Gleitman, & Trueswell, 2000; Trueswell, Sekerina, & Logrip, 1999), self-paced reading or listening (Booth, MacWhinney, & Harasaki, 2000; Traxler, 2002). In general, there was not much difference between adults and children in determining the attachment site (Crain & Thornton, 1998; Crain & Wexler, 1999; Duygu, 2010; Felser, Marinis, & Clahsen, 2003; Fodor, 1998). On the other hand, adult parsers were more affected by the semantic properties and pragmatic or discourse factors than

children (Altmann & Steedman, 1988; Felser et al. 2003; Tanenhaus et al. 1995; Thornton, MacDonald, & Gil, 1999; Traxler et al. 1998). Some of the studies including the children as the participants (e.g., Corrêa, 1995; Fragman & Goodluck, 2000; Goodluck & Tavakolian, 1982; Hamburger & Crain, 1982), are in consensus with the predictions of syntax based theories. Furthermore, there is evidence that the adult parsers apply information faster than children do (Altmann & Steedman, 1988; Tanenhaus et al. 1995). Although there are studies revealing that NP2 is preferred by adults in the RC ambiguity resolution in English (Frazier & Clifton, 1996; Roberts, 2003), NP1 has been discovered in different languages like in Spanish (Gilboy et al. 1995; Mitchell & Cuetos, 1988) and Greek (Papadopoulou & Clahsen, 2003), which were mentioned earlier.

Some studies confirm the importance of Working Memory (WM) as an influential factor for determining the attachment site both in adults and children (Just & Carpenter, 1992; MacDonald et al. 1992; Mendelsohn & Pearlmutter, 1999). For instance, the revealing results showed that L1 Japanese adult speakers preferred different attachment sites (NP1) from that of English speakers in offline tests. The same participants surprisingly displayed similar preferences in on-line experiments (Kamide & Mitchell, 1997; Omaki, 2005). These data supports that the individual differences may have influence on attachment preference, and a complete reanalysis requires more cognitive effort than the parsers with lower working memory capacities (Ferreira et al. 2001; Ferreira & Patson, 2007). Moreover, the prosody was demonstrated as one of the influential factors on sentence processing (Schafer, Speer, Warren, & White, 1996). Besides, in contradiction to Sturt and Crocker (1995) and Kamide and Mitchell (1997), L1 Japanese parsers were possibly but not determinately were sensitive to the discourse information.

Although some researchers (e.g., Altmann & Steedman, 1988; Boland, 1997; Britt, 1994; Clifton & Ferreira, 1989; Ferreira & Clifton, 1986; Mitchell, Corley, & Garnham, 1992; Murray & Liversedge, 1994; Ni, Crain, & Schankweiler, 1996; Rayner, Garrod, & Perfetti, 1992; Spivey-Knowlton, Trueswell, & Tanenhaus, 1993; Spivey- Knowlton & Sedivy, 1995; Tanenhaus, Spivey- Knowlton, Eberhard, & Sedivy, 1995) emphasize the importance of

applying different sources of referential or discursive information at the same stage, the syntax-based theories claim that different sources of information are not applied initially just because it is simple to attach to the most recent NP (De Vincenzi & Job, 1995; Frazier & Rayner, 1982; Frazier, 1987; Rayner & Pollatsek, 1989).

Essentially, the present study investigates the discourse factors (IC and non-IC verbs) in terms of possible influences (i.e., altering the NP preferences from NP2 to NP1). How the elements of influence revealed by the discourse information are used in the resolution of syntactic ambiguity is the main question of this study. A critical argument in the language processing field is the method in which sentence comprehension is affected by the discourse context (Desmet, De Baecke, & Brysbaert, 2002). It is crucial to provide examples from different attitudes (both from the syntax and other sorts of information) for being objective. Some of the experiments on the discourse information yielded weak evidence in general (Spivey-Knowlton & Tanenhaus, 1994), whereas some others had obviously strong effects about the referential context (Altmann & Steedman, 1988; Altmann, Garnham, & Henstra, 1994; Britt, 1994; Clifton & Ferreira, 1989; Mitchell, Corley, & Garnham, 1992; Murray & Liversedge, 1994; Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995; Van Berkum, Hagoort, & Brown, 1998). Nevertheless, according to some contradictory studies, the syntax based theories assert that the initial analysis is directed by the syntactic information. Therefore, other kinds of information are overpassed at this stage (Brysbaert & Mitchell, 1996; Ferreira & Clifton, 1986; Frazier, 1987; Mitchell, Cuetos, Corley, & Brysbaert, 1995). Since the discourse based theories discuss that the initial analysis can be affected by other sources of information (Altmann & Steedman, 1988; Altmann, Garnham & Dennis, 1992; Crain & Steedman, 1985; Ni, Crain & Schankweiler, 1996), the discourse information is examined in this study. As Konieczny (2000) stated and quite successfully hypothesized, attaching a relative pronoun is in fact a dualistic process (Hemforth, Konieczny, & Scheepers, 2000; Hemforth, Konieczny, Seelig, & Walter, 2000; Konieczny & Hemforth, 2000). More explicitly, relative pronoun is both syntactic and anaphoric in nature. Although several strategies of ambiguity resolution have recently been

suggested, none of them is completely capable enough to explain any certain attachment preferences and suggest a satisfactory structure about the accuracy of them. Because one major question that still remains unanswered is how local or non-local ambiguities are processed, this study focuses on the attachment preferences of the Turkish L2 speakers of English, with an attempt to shed light on some of the issues in psycholinguistics. Another critical question is whether the RC attachment interpretation is affected by the two-stage or constraint-based models or both of them. The two-stage models lead to the RC attachment preference to a very frequent selection of the NP2, and so to a rare selection of NP1. Similarly, the constraint-based models lead to a strong support for NP1 and a weak support for NP2 as the attachment preference. Therefore, the discourse information has an impact on sentence processing as much as the syntactic information.

2.3 Theoretical Backgorund: Sentence Processing In The Second Language

2.3.1 Introduction

The studies of L2 acquisition and learning are closely related with L1 research. In this context, the main problem has been the sentence processing strategies used by the learner or speaker. In this chapter, the Shallow Structure Hypothesis will be introduced.

2.3.2 Shallow structure hypothesis

Shallow Structure Hypothesis (SHH) was introduced by Clahsen and Felser (2006). It proposes that the difference between L1 and L2 processing for adult learners is due to they use lexical-semantic domains more than syntactic cues for interpretation, which means that the Turkish L2 speakers process the sentences by shallowing the syntactical structures. Clahsen and Felser (2006b) proposed that in the L1 processing, the syntactic information initiates other sources of information (i.e., lexical-semantic or discourse information). In L2 processing, the shortage of syntactic information causes the other mentioned sources of information to be overrated. As stemmed from the evidence of some of the previous studies (i.e., Bley-Vroman, 1990; Clahsen & Muysken, 1986), L2 learners develop interlanguage grammars that are different from L1

grammars, and the SSH can be said to be a reflection of this vision. According to this view, the syntactic knowledge has a crucial role in processing for L2 learners because of the different parsing strategies in L1 (as over-relying) and L2 (as under-relying). However, depending on the learning differences between L1 and L2, only syntax is not reliable since there are some potential sources apart from the syntax. For instance, non-target-like prosody, "overlearned" or "underlearned" lexical access routines, heteromorphy of semantic fields, and the possibility that RT differences show different computational moments (Dekydspotter, Schwartz & Sprouse, 2006).

Depending on what SSH submits, the L2 speakers establish a bond with the lexical semantics in order to comprehend sentences, and they do not construct an extensive syntactic connection. In other words, in the RC attachment ambiguity sentences, the L2 speakers are going to be unsuccessful in determining a specific RC attachment preference in non-IC verb sentences based on the syntactic information. On the other hand, they are supposed to choose a decisive NP in IC verb sentences because of the discourse factor. Hence, the L2 processing is principally forced by the discourse information, and not by the syntactic information. Thus, being the main basis of this study, SSH estimates that Turkish L2 speakers will not demonstrate the same attachment preferences as monolinguals will.

Some studies provide additional evidence for SSH; the perspective of complex compounds or the way L2 learners comprehend the semantic distinction (Carroll, 2008); and processing D-linked wh-phrases differently from non-D-linked ones (Avrutin, 2000). On the other hand, some other studies approach the SSH critically (e.g., Indefrey, 1999; Frenck-Mestre & Pynte, 1997; Fernández, 2006). As mentioned earlier, SSH states that non-native sentence processing is different from L1 and instead of using the structural information to interpret a sentence, L2 speakers prefer being busy with the lexical, semantic, and pragmatic information. Thus, L2 speakers do not attain structural rules like syntax processing, but they do that with the other sources of information.

There are some other main strategies regarding the resolution of ambiguity explicitly or implicitly in order to make a contribution to the sentence processing. These strategies include the Tuning Hypothesis (Mitchell et al.,

1995), Probabilistic models (e.g., Jurafsky, 1996), Constraint-based models (McRae, Bodenhausen, Milne, Castelli, Schkerschedit, & Greco, 1998), and Interface Hypothesis (Sorace & Filiaci, 2006). These strategies are not going to be discussed in this study because of the irrelevant arguments.

Consequently, the most important goal in this study is not to determine which theory is extremely accurate, but to improve or to contribute to the current theories with more capable ways of testing them.

The next chapter will give the information about previous L2 studies that examine RC attachment ambiguity.

2.3.3 Previous research studies on relative clause attachment ambiguity in the second language

In this section, some of the main L2 studies of RC ambiguity resolution will be introduced from different perspectives (e.g., L1 transferring, prepositions, subject-object asymmetry, working memory, etc). Ambiguity resolution in complex modifier constructions is among the most outstanding cross-linguistic topics in current psycholinguistics. The researchers tested to reveal whether or not it was possible to acquire knowledge beyond the presented one for adults via L1. Hence, different sources of information affect the resolution and processing of ambiguity. In the study by Juffs (1998), 17 Chinese, Korean, Japanese, and Romance L2 learners of English language composed the participants. The results revealed that there was not exact attachment preference for either NP1 or NP2, but L2 learners were more sensitive to different sources of information, which means that various relations can affect the parsing process and one of these relations could include different verb structures like IC verbs.

Wide ranges of studies have examined the L1 transfer on the RC attachment ambiguity. As Papadopoulou and Clahsen (2003) argued, several results have been proposed to explain that there is no evidence for L1 transfer while resolving the ambiguity of the RC attachment. Papadopoulou and Clahsen (2003) investigated L2 learners' parsing with temporarily ambiguous sentences including relative clauses. The participant groups included advanced L2 learners of Greek who were native speakers of Spanish, German, and Russian. L2 preferences were found to be different from those of L1 preferences. The results

showed that native speakers preferred high attachment while L2 learners preferred low attachment. Furthermore, L2 learners depended more on lexical cues and less on structures, which was in agreement with of Felser et al. (2003). Accordingly, Rah (2009) examined the L1 effect in German learners of L2 French for ambiguous RC structures. Two groups of 30 university students participated in the study in which first group's second language was English and third language was French, and the second group's second language was French and third language was English. The results demonstrated that English-dominant group removed the attachment preference from English to French; however, French-dominant group did not transfer this preference. Thus, the dominant language was found to be the determinant for cross-linguistic effect.

There are some studies investigating whether prepositions like "*with*" and "*of*" may have an effect on adults' RC attachment preferences. In accordance with these studies, the RC intends to be attached to a low NP if NP2 is introduced by a preposition "with" (Felser, Marinis, & Clahsen, 2003; Frenck-Mestre & Pynte, 2000; Traxler, Pickering, & Clifton, 1998). However, Fernandez (1999) reported that prepositions did not have any effect on the attachment preferences. Fernandez (1999) analyzed adult Spanish L2 learners of English and found that the low attachment preferences were dominant for native speakers, whereas high attachment preferences outweighed for L2 learners.

As stated in the study by Frenck-Mestre and Pynte (1997), one of the influential effective sources for the attachment ambiguity is the verb structure. Frenck-Mestre and Pynte (1997) conducted a study with two groups of participants, who were advanced learners of second languages. One group included English L2 learners of French and second group included French L2 learners of English. Both L2 learners' and native speakers' preferences were found to be influenced by the verb structures. In this sense, they used transitive and intransitive verbs, but in this present study, IC verbs and non-IC verbs were used to examine the RC attachment ambiguity.

There are also some studies comparing adults and children on the RC attachment ambiguity as well. Little is known about how children process the sentences because the majority of studies focus on investigating adults based on RT analyses. RT procedure is not convenient for younger children (McKee,

1996). Nevertheless, it will be useful to mention some of the recent studies that included both adults and children participants (e.g., Felser et al., 2009). Twenty-nine monolingual children and 37 native adult speakers of English participated in the mentioned study, and the adult group was found to be influenced by two prepositions (with & of). Even though children with high listening span attached to NP1, those with low listening span attached to NP2. Mazuka (1998) found that there is no clear difference in the way of processing between children and adult groups. However, Tyler and Marsten-Wilson (1981) showed that children and adults processed sentences in a similar way both syntactically and semantically, but there was no evidence for discourse relations, which constitute one of the most significant factors of the present study. It is obvious that the adult parsers have quick access to some sources of information and used to unify the next word into an improving representation in L1 (Carlson & Tanenhaus, 1989); however, they may apply new coming words more slowly in L2. Another important finding comes from Rodrigez (2004) who examined the influence of modification on the attachment preferences of both native and Turkish L2 speakers of Spanish. It was pointed out that these findings were seem to be in favor of syntax-based theories by influencing the modifiability as a pragmatic constraint favoring a simpler structure.

The rough sketch of the currently available evidence is that English speakers prefer attaching RC to the most recent site (e.g., NP2 in the study by Cuetos & Mitchell, 1988), whereas speakers of other languages exhibit a preference for attaching RC to NP1 (Brysbaert & Mitchell, 1996; Hemforth et al. 2000; Konieczny & Hemforth, 2000, Zagar, Pynte, & Rativeau, 1997). It appears that the present research on the RC attachment ambiguity needs to satisfy the expectations from various perspectives (e.g., pragmatic or discourse constraints) rather than focusing entirely on the syntax-based factors. Different methodologies (self-paced reading, questionnaire and eye tracking) were used and the participant groups tested in those experiments do not really enable researchers to reach a conclusion related to the influence of L1 on the comprehension processes of L2.

To sum up all the contradicting results presented above in relation to both L1 and L2, these results showed that there is a big gap on the RC attachment

ambiguity field in Turkish. This study contributes to the growing size of L2 processing research by examining the way that adult L2 learners of English process sentences containing the discourse information supported by IC and non-IC verbs.

2.4 Previous Studies in Turkish

It is essential to provide some examples from Turkish. There are very few studies (e.g., Özge, 2010; Yumrutaş, 2009) emphasizing the acquisition of Turkish and English RC structures, but this study is more about the ambiguity resolution in the RC attachment preferences. The sentence structures of both Turkish and English will be briefly explained in section (3). Turkish is a head-final language and has a different syntax (Subject + Object + Verb) similar to Japanese and Korean, but unlikely to English. The word order in NPs is strictly head-final (modifier Noun + modified noun). As mentioned earlier, although such structures have been researched in English, the data obtained from Turkish can shed light on the cross-linguistic effects in the RC attachment field. In the study by Dinçtopal (2007), the RC attachment preferences were investigated in L2 English and compared to monolinguals of Turkish and English using the experimental sentences including a complex genitive NP modified by an RC. The findings showed that the native groups (native speakers of Turkish and native speakers of English) preferred the local NP in online and offline experiments, which approved the bias toward to the two-stage processing. Kırkıcı (2004) reported that Turkish L2 speakers did not show any specific attachment in experimental sentences including two potential NP sites in the genitive condition. In other words, Turkish L2 speakers of English do not seem to prefer a clear attachment site for the local or non-local NPs in L2 English. As an evidence for L1 transferring, Turan (2012) examined the learning of RC by Turkish L2 speakers of English in order to make speakers' transfers emerge from L1 and to observe how they reset the head-final parameter of Turkish into the head-initial parameter of English. The first language transfers were observed in every proficiency groups. On the other hand, a contradictory study by Çele (2010) examined the role of L1 and working memory capacity in online processing of wh-dependencies and found that in the end-state, L2 speakers

achieved native-like processing irrespective of the syntactic properties of their L1. Thus, the literature suggests that Turkish language has been ignored so far in spite of the fact that a variety of languages have been researched within this framework.

In the next section, the linguistic background of English and Turkish will be introduced.

3. LINGUISTIC BACKGROUND

3.1 Introduction

RC structures in English and Turkish languages will be explained in the next pages. Finally, the implicit causality will be introduced before the methodology part.

3.2 Relative Clause Structure in English

Languages differ in describing the components of a sentence; furthermore, they are different in noting subjects and objects with different prefixes, affixes and suffixes. For instance, English is a head initial language and the basic sentence structure for English is Subject Verb Object. Adding the adverbs, adjectives, and prepositional phrases does not change the sentence structure (19).

(19) The black dog with the white leash usually barks loudly.
Subject / preposition / adjective / adverb / verb / adverb.

Generally, the modifier follows the modified element (*barks loudly*) and this form is practical for phrase structures in English; a verb always precedes its objects. However, in NPs, the modifier can be practiced before and after the noun (e.g., black dog, the dog which is black). Prepositional phrases (PPs) headed by prepositions "*with"* or "*of"* can also function as modifiers of an NP.

(20a) the servant *of* the actress

(20b) the servant *with* the actress

As Dinçtopal (2007) states the genitive constructions are used to indicate possession. In English, if the genitive is adding -'*s*, to an NP, it is referred to as Saxon Genitive. However, it is Norman Genitive that needs an NP to take a PP as its complement. The structures of Saxon and Norman Genitives are exemplified in (21a & 21b) respectively.

(21a) the teacher's book

(21b) the book of the teacher

In the present study, Norman Genitives were used as NP2 to modify NP1 with the preposition "*of*" in RC attachment sentences as in the example below (22);

(22) The servant of the actress who was standing on the balcony was shot.

The modifier is NP2 (*the actress*) and the modified one is NP1 (*the servant*). In English, if Norman Genitive indicates the possession, the interpretation may be ambiguous. This means that the participants may attach the RC to either the first or the second NP. The present study is going to be based on the mentioned ambiguity. It is possible to see the processing of NP1 and NP2 separately from the figures below (3.1 & 3.2).

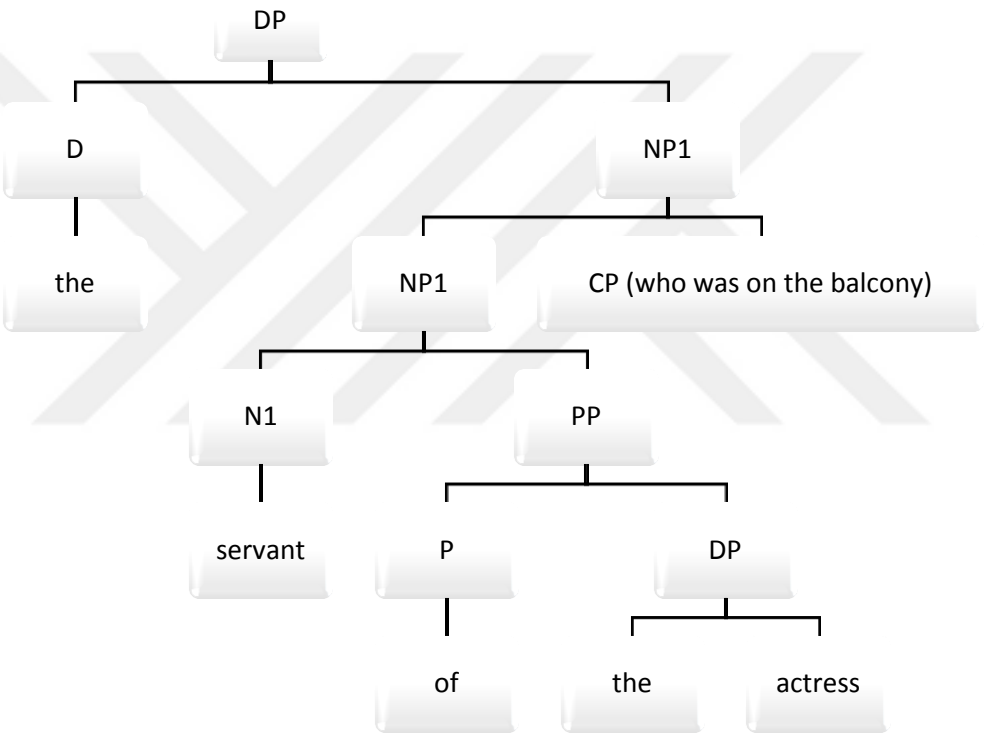


Figure 3.1: NP1 attachment in English

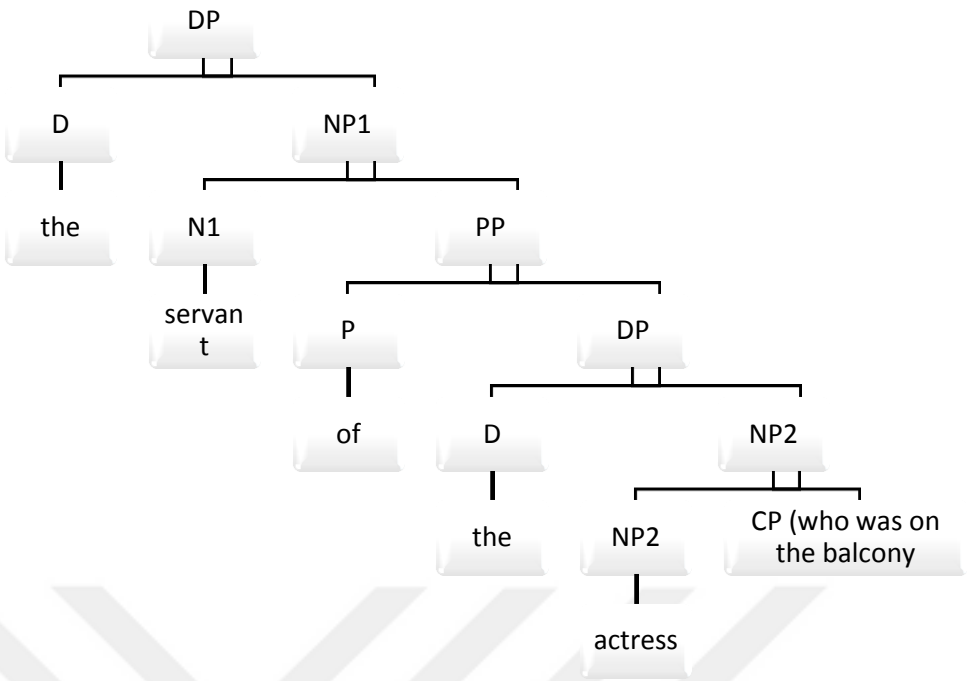


Figure 3.2: NP2 Attachment in English

(adapted by Felser, Marisinis & Clahsen, 2003)

3.3 Relative Clause Structure in Turkish

There are two RC strategies in Turkish, which is the native language of L2 learners in the present study. In the first strategy, RC modifies the noun phrase and appears before it as in (23).

(23) Kitab-ı oku-YAN çocuk-lar

book-ACC read-PART child-PLR

'The children who are reading the book'

(Yumrutaş, 2009)

RC structure in (23) consists of a non-finite verb (*okuyan*), which expresses none of the tenses, and what is more, there is not any relative pronoun. "*Çocuklar*" is the noun phrase modified by "*kitabı okuyan*", which is also the RC. Hence, RC verb "*okuyan*" does not stand for a definite tense morphologically, so it is neutralized. "*Kitabı okuyan çocuklar*" may mean that the children were/are/ reading the book. It is also called as subject participle RC in Turkish. That type is the topic of this study with a little difference. RC

consists of two noun phrases, i.e., a modifier noun and a modified noun, so it is essential to emphasize the subject participle RC with an example as in (24).

(24) Balkonda duran aktirisin hizmetçisi vuruldu.
Balcony-LOC stand-Part (gerundial) actress-GEN servant-ACC shot-PASSive-Past

According to the second strategy of Turkish RC structure, the head precedes the modifier clause, which means that, a subordinator "*ki*" serves the same purpose with relative pronoun as in (25).

(25) Ali [ki Almanca-yı iyi bil-ir,] cümle-nin kelime-ler-in-i

Ali, ki German-ACC well know-AOR sentence-GEN word-PLR-3rd sg POSS-ACC

anla-ya-ma-dı.

understand-ABIL-NEG-PAST

"Ali, [who knows German well,] could not understand the words of the sentences."

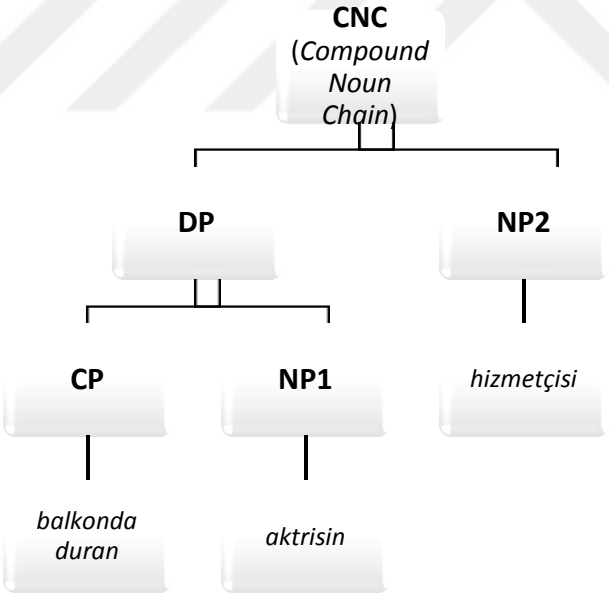


Figure 3.3: NP1 attachment in Turkish

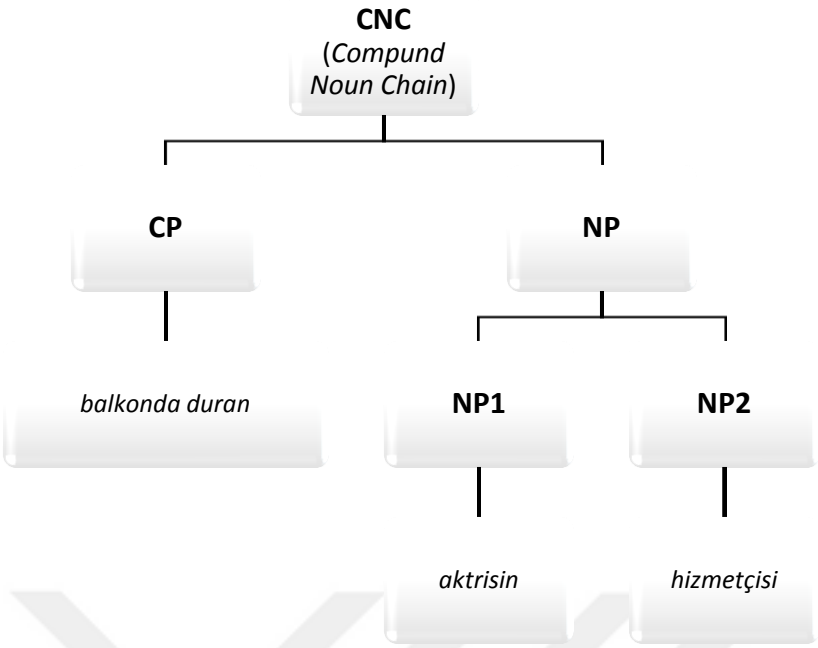


Figure 3.4: NP2 Attachment in Turkish

As seen above (3.3 & 3.4), the compound noun chains involve more than one noun phrases and RC as determiner. The RC modifies NP1 and NP2; NP1 modifies NP2 in the event of both NP1 and NP2 attachment preference. Furthermore, compound noun phrases do not take suffixes other than "genitive suffix –in" to its modifier or definer noun. Generally, compound nouns carry no judgments. In the next section, more information about the compound nouns is provided in Turkish language.

3.3.1 Defined compound noun phrase

Both of the modifier and modified nouns take a suffix, defining the possession between the nouns. NP1 takes the genitive suffix –(n), while NP2 takes –(ı) as the possessive suffix for the third person singular. Moreover, in this type of compound nouns, it is indicated that at item or a qualification or an action belongs to a whole as in (26);

(26) Doktor-un gülüş-ü

Doctor-Gen smile-POSS

3.3.2 Undefined compound noun phrase

In this type of compound noun phrase, only the NP2 takes a suffix, so NP1 is in nominative case, and there is not a special possession relation in (27);

(27) Konser bilet-i
Concert ticket-POSS

3.3.3 Compound noun phrase chain

More than one type of compound nouns or more than one modified nouns form the chain as in (28).

(28) Balkonda duran akrisin hizmetçisi
Modifier NP1 NP2

The RC modifies both NP1 and NP2. NP1 both modifies the NP2 and is modified by RC. NP2 is modified by both RC and NP1, so there is more than one compound noun in this example. "*Dur-an*" seems to be gerundial. Therefore, the modifier RC contains a gerundial and is made up of compound noun phrases (Korkmaz, 2009).

In conclusion, in the present thesis, all experimental sentences consist of Norman Genitives used to define NP1 with the preposition "*of*" in RC in English. The reason why it is necessary to explain the RC structures in Turkish language is that it is the native language of adult L2 speakers of English. Therefore, it is helpful to make some presuppositions the possible differences in resolving the ambiguity and preferring attachment sites.

3.4 Implicit Causality (IC) and NON-Implicit Causality (non-IC)

Assessing the causal relations is an important part of building discourse information in texts. A parser who fails to distinguish the causal relations is not supposed to understand the text fully. When the verbs cause inferences to be attached to the subject, they are usually stated as verbs with biasing toward the NP1 in the clause. Nevertheless, if the cause is referred to the object, the verbs are attached to the NP2. These causal relations included in the semantic information of verbs are called implicit causality. The present thesis tries to shed light on this phenomenon through L2 English. Besides their explicit meanings, implicit causality associated with verbs has a content that helps one make causal attributions. For many studies, the main problem is how these causal relations are computed (Myers & Duffy, 1990; van den Broek & Trabasso, 1986). In the current thesis, the causal relations are submitted with

verb types such as IC verbs and non-IC verbs. Implicit causality can be explained with a cause and effect relation in that a situation presents a single case and may affect the comprehension as a cause (Garnham, Traxler, Oakhill & Gernsbacher, 1996). Implicit causality is an important factor in interpreting discourse, because making inferences is part of parsers' knowledge to comprehend a context (McKoon & Ratcliff, 1988; McKoon, Greene & Ratcliff, 1993).

Some verbs, such as "*detest*" and "*blame*", define a performance or feature of a person who responds to another person inducing. These verbs are called implicit causality verbs and require additional explanation. They have a clear casual effect on meaning and preference, which means that the discourse information can change the preference attachment. How this process is used in Turkish has not been answered yet.

(29) Michell admires Tom because …

This completion sentence (29) is generally implemented with the feature of describing Tom (30a) rather than Michell (30b) such as;

(30a) Michell admires Tom because he is the most hardworking student in the class.

(30b) Michell admires Tom because she is desperate in having friends.

Implicit causality can be considered as a factor that influences the sentence comprehension. Thus, IC verbs can be handled as a constraint, which influences the interpretation of the sentences containing RC attachment ambiguity. "*Admire*" can also be used in RC attachment ambiguity sentences such as;

(31) Jack admires the secretary of the director who…

Relative pronoun "*who*" is assumed to be attached the first NP, which is the "*secretary*". This is one of the aims of the current study as well. In RC sentences, the attachment preferences can vary according to the verbs in the main clause (e.g., "John babysits the children of the musician who…" as including IC verb, and "John detests the children of the musician who…" as including non-IC verb, adapted by Rohde et al., 2011). The IC concept is considered to implicate the coherence about the reason of an event. This study discusses whether the mentioned effect of IC verbs is based on the syntax

structure or another kind of information, i.e., discourse. More explicitly, if you see a table full of delicious meals and a woman near the table with her kitchen apron, you probably think that the woman cooked all these meals, so you make an inference because you do not see who cooked them. What is expected from the participants of this study is to infer from sentences with implicit causality verbs. The participants are adapted to attend scenarios in which they actively seek to establish the coherence of discourses. As in the example (32);

(32) Jack detests his sisters. They like rock music.

Although there is no conjunction to express a cause and effect relation, it seems that the readers have a supposition about the coherence between the two sentences. We assume that IC verbs like "*detest*" give more information about the causality of the event. There is no syntactical structure to connect the two sentences. However, when readers read the sentences irrespectively, they see coherence. They think, for instance, why John detests his sisters is because of their sympathy to rock music. It is probable that John does not like rock music as well. The readers are thought to add extra assumptions about the coherence of sentences. IC verbs require an additional explanation. In other words, if the cue in the sentence affects the reader, then the reader starts to infer, and this influences the syntactic process. Thus, discourse inference can affect the syntactic process especially on resolution of RC attachment ambiguity. The verbs like "*detest*" (IC verb) seem to impress the participants to ask the reason in a way that verbs like "*babysit*" (non-IC verb) do not. Levin (1993) divided implicit causality verbs into two categories. The first one is psych and the other is the judgment verbs. The former describes non-eventive states like "*detest*" or "*adore*", while the latter is related to a judgment or opinion like "*scold*" or "*praise*". Both of them can make someone react to something. In the present study, both psych and judgment verbs were used as IC verbs. Recent studies by Rohde, Kehler and Elman (2006, 2007) and Kehler et al. (2008) conclude that parsers do not produce presuppositions relating the current text, and any successful principles essentially must combine those expectations.

In order to clarify discourse relations via implicit causality, it is necessary to give some examples about how IC verbs can affect the sentence comprehension. In this thesis, attachment ambiguities of relative clauses with IC and non-IC

verbs have been investigated in English. The verbs, which initiate an action or evoke a response, are called implicit causality verbs (McKoon, Greene & Ratcliff, 1993). According to Garvey & Caramazza (1974), implicit causality is part of the semantics because some implicit causality verbs are attached to NP1 but the others to NP2. Regarding this issue about IC verbs, McKoon, Greene and Ratcliff (1993) argued that the effect of the pioneer causes a reaction by the reactor; this can be an emotion (e.g., *admire*) or a perception (e.g., *notice*), or it may include an action (e.g., *thank*). As stated by Koornneef and Van Berkum (2006), it is presumed that implicit causality can be used as an initiator to estimate about the next topic.

Some researchers examined the implicit causality from different aspects like the linguistic one by Garvey and Caramazza (1974). The more related part they argued is whether the implicit causality verbs are determinant in attaching to the either NPs. The social aspect discusses that the state verbs refer the reason to the either NPs, while the action verbs refer the reason to the NP1. Actually, in this thesis, the primary focus is not to determine which perspective about implicit causality is correct, but to determine its offline and online effect during comprehension. There are strong evidences of its effectiveness in offline experiments (Garvey, Caramazza & Yates, 1975; Grober, Beardsley & Caramazza, 1978; Rohde et al. 2011). However, in online experiments, the picture is complicated. In self-paced reading tasks, Vonk (1985) found that there is a clear effect of IC verbs; however, Garnham, Oakhill and Johnson-Laird (1982) illustrated less clear effects.

It is essential to mention in literature that the syntax-based estimations stand in opposition to the models that estimate the participation of a new kind of information to the previous ones. It is also useful to point out that, when the participants read a range of predictions related to verb types, they can make a certain prediction based upon the previous ones, possibly, by integrating the same class of verb (Kamide, Attmann & Haywood, 2000). Another crucial point is that the discourse information is elaborated as being not explicit in the text, but derived inferentially (Glenberg & Mathew, 1992; McKoon & Ratcliff, 1992).

When we talk about verb-based implicit causality information, it is fundamental to mention two comparative accounts: Immediate Focusing Account and Clausal Integration Account. According to Immediate Focusing Account, if the context is included in IC information, the parser's interpretation is generally affected in a more rapid way (e.g., Long & De Ley, 2000; McKoon, Greene & Ratcliff, 1993). Some studies provided evidence for Focusing Account (Koornneef & Van Berkum, 2006). They searched for reading delays, which is evidence that IC information affects the pronoun interpretation, as it rapidly appears especially in mid-sentences, and this provide proof for the Immediate Focusing Account. Nevertheless, according to the Clausal Integration Account (e.g., Garnham, Traxler, Oakhill & Gernsbacher, 1996; Stewart, Pickering & Sanford, 2000), IC information causes posterior interpretation. To give an example for these two accounts;

(33) David praised Linda because…

Parsers choose Linda as a subject of the clause, since the verb "*praised*" is an IC verb in (33) and requires extra information for Linda, not for David (Arnold, 1998). Thus, as soon as the parser reads "*because*", s/he will contact the most centred one which is "*Linda*". Nevertheless, those two accounts are not taken into consideration in the current study because none of the eye-tracking tasks were included, so immediate or later comprehension cannot be analyzed.

Making connection between syntax and discourse information in Turkish is supposed as important evidence. The present study aimed to investigate whether implicit causality verbs yield any bias toward NP1 or NP2. Before discussing RC attachment preference affected by discourse, it is better to note some specific studies about the impact of discourse on sentence comprehension. There are some studies in which implicit information was used to widen discourse relation (Garnham, 1992, McKoon & Ratcliff, 1992). For example, in the study by Garnham, Traxler, Oakhill and Gernsbacher (1996), whether the interpretation of a sentence is affected by the site of implicit causality was examined and it was found out that the implicit causality defined in the main clause may affect the comprehension of causality in the subordinate clause, which means that implicit causality can affect the interpretation of the sentence. On contrary to syntax-based majority, discourse information is recently seen as

the most influential factor (Gibson, 1998; Spivey-Knowlton & Tanenhaus, 1998) and discourse information prevails over the other kinds of factors (e.g., Altmann & Steedman, 1988; Altmann, Garnham & Dennis, 1992; Crain & Steedman, 1985).

Another previous study (Sedivy, 2002) showed that the resolution of ambiguity is affected by discourse information. Four self-paced reading experiments with adults were carried out with reduced relative clause sentences. The results were against the Garden-Path model which estimates an initial syntactic effect on resolution. For more examples focusing on reduced relative clause to investigate the effect of discourse information over the syntax, one should read the study of Spivey-Knowlton and Tanenhaus (1994). Departing from other studies which used discourse information, Simner and Pickering (2005) investigated the discourse information effects on the cause and effect relation in production by using the readers' resumption to discourse information and resulted that the comprehenders try to fill the gaps in their discourse principles, and use the properties of contextual and temporal recency to connect their productions. Researchers like Clifton and Duffy (2001), Lee and Mitchell (1994) found that non-grammatical factors can influence the interpretation of a sentence.

To sum up, it is clearly indicated that the discourse information, particularly the causality information, affects the real time interpretation of attachment preference in the resolution of RC ambiguity in the L1. However, there has been very little research which examines whether the discourse information affects the L2 speakers' preference in the resolution of RC ambiguity in the same way as the monolinguals of English. This thesis aims to examine this question with a group of Turkish L2 speakers of English. The following chapter provides the details of the current study.

4. THE STUDY/METHODOLOGY

This chapter gives information about the methodology of this thesis; the research questions, the participants, the instruments, procedure and the design.

4.1 Research Questions

This section is formed with an experiment to examine the online and offline RC attachment preferences of adult Turkish L2 speakers and the monolinguals of English. In order to examine whether implicit causality verbs such as "*fear*" as in (34a &b), affects the L2 speakers' preference in RC attachment ambiguity in L2 English, the experiment was conducted in two offline tasks comprising sentence completions and multiple choice tests, as well as an online self-paced word-by-word reading task.

In order to explain it more clearly, the sentences including IC verbs (34a & 34b) and non-IC verbs (34c & 34d) and the sentence structures (35) are as in the following;

(34)

a. "Sarah fears the uncle of the toddlers who is often heard yelling and screaming.
b. Sarah fears the uncle of the toddlers who are often heard yelling and screaming.
c. Sarah jogs with the uncle of the toddlers who is often heard yelling and screaming.
d. Sarah jogs with the uncle of the toddlers who are often heard yelling and screaming."

(Rohde et al., 2011)

(35)

a. IC verb + NP1 single + NP2 plural + who + finite embedded verb (singular)
b. IC verb + NP1 single + NP2 plural + who + finite embedded verb (plural)
c. non-IC verb + NP1 single + NP2 plural + who + finite embedded verb (singular)

d. non-IC verb + NP1 single + NP2 plural + who + finite embedded verb (plural)

The question how ambiguous sentences including RC attachment with different verb types such as implicit causality and non-implicit causality verbs are processed is the general aim to test whether discourse information affects the syntactic processing or not. IC verbs require an additional explanation that is to say; IC verbs make the parsers choose a certain NP (like NP1). With respect to causal effect of IC verbs, two types of verb types were used: 1) Sentences with RC attachment ambiguity utilizing IC verbs; 2) Sentences with RC attachment ambiguity utilizing non-IC verbs, and in both types, relative clauses are followed by complex NPs containing postpositional phrases [[NP1 P] PP+NP2] such as "*the uncle of the toddlers*" (the preposition is always "*of*", as in (34a & 34b)).

Within this perspective, the research questions of the thesis are formed as follows;

1.a. Do monolinguals of English prefer high-attachment site (NP1, "*the uncle")* in the sentences with RC attachment ambiguity in implicit causality condition?

1.b. Do monolinguals of English prefer low-attachment site (NP2, "*the toddlers")* in the sentences with RC attachment ambiguity in non-implicit causality condition?

2.a. Do Turkish L2 speakers of English prefer high-attachment site (NP1, "*the uncle")* in the sentences with RC attachment ambiguity in implicit causality condition in the same way as the monolinguals?

2.b. Do Turkish L2 speakers of English prefer low-attachment site (NP2, "*the toddlers")* in the sentences with RC attachment ambiguity in non-implicit causality condition in the same way as the monolinguals?

Within the context of Late Closure, the expected results for (1a & 1b) is that the discourse information does not affect the processing of RC ambiguity sentences, so the syntactic information is used in the initial parsing in IC or non-IC condition. Thus, the monolinguals of English would prefer low attachment (local NP) in two conditions, and this will be provided with short RTs on

critical regions (finite verb, spillover region 1 and spillover region 2, such as ; "*are", "often", "heard"* of mentioned low attachment site (local NP) in two conditions as in (34b & 34d)).

According to the Referential Theory, which predicts that the discourse information affects the initial comprehension of the sentences in IC condition, Turkish L2 speakers of English would prefer high attachment (non-local NP) in RC ambiguity sentences with IC condition in the same way as the monolinguals of English, and they would prefer low attachment (local NP) in non-IC condition as an expected result for research question (2a & 2b). This will be evidence with short RTs on critical regions mentioned high attachment site (finite verb, spillover region 1 and spillover region 2, such as ; "*is", "often", "heard"*, as in (34a)) in IC condition and low attachment site (finite verb, spillover region 1 and spillover region 2, such as ; "*are", "often", "heard"*, as in (34d)) in non-IC condition. If L2 speakers do not use discourse information, they would prefer low attachment in two conditions. Therefore, the experiment of this thesis aims to demonstrate the interconnection between the discursive and syntactic information and to show that discourse information is more influential for parsers to choose RC attachment preference than syntactic information is in L2 English as well as in L1 (i.e., Rohde et al., 2011). IC verbs are used to provide this relationship. In this context, the Referential Theory predicts that syntactic information can be affected by the other sources of information like discourse or pragmatics. More specifically, in this study, it is predicted that discourse information promoted by IC verbs is more effective than syntax when it comes to RC attachment preference for readers. On the other hand, the SSH predicts that the monolinguals use syntactic information while L2 speakers do not use it in the initial interpretation of the RC attachment ambiguity sentences. Thus, the L2 speakers use the lexical-semantic information in the initial parsing. While the monolinguals of English would prefer the low attachment in non-IC condition, L2 speakers of English would prefer high attachment in both conditions because of using lexical-semantic information. If adult L2 learners of English make inferences from the sentences with IC verbs, learners will prefer high attachment (NP1) in IC condition. That is, L2 learners demonstrate the same processing like monolinguals, and this will be the

evidence of IC verbs influencing RC attachment preference in both L1 and L2 English sentence processing. It will be interesting to substantiate Turkish L2 speakers of English group prefer the same attachment as the monolinguals, because their native language is a head final language and it has a different sentence structure from English. Notwithstanding that, if the learner group prefers NP1 (high attachment) for the RC pronoun to be attached like English group, this will widen horizons that IC verbs always yield extra information and make readers choose a certain NP group whether in a head final language or not.

At the same time, the results will give us a chance to examine the role of L1 in L2 sentence processing, which means that it will be useful to see whether there is L1 transfer effect on processing L2 English sentences or not because L2 speakers of English whose native language structure is highly different from the monolinguals'. Another important aim of the experiment is to explore the relationship (if any) between the accuracy scores of the monolinguals and the L2 speakers in online task and their resolution in processing RC attachment ambiguity. More specifically, the accuracy scores should strongly correlate with the reliability of the results, since the participants with high accurate scores are predicted to answer the comprehension questions carefully and stay focused. Also, it is interesting to find out whether there is any difference in preferring a specific NP between the high accurate and low accurate participants'.

The preferences of the participants will be clear in offline experiments because the finite verbs that they would choose will show us their preferences; however, in online experiment the situation becomes a little confusing. The readers are believed to make an initial analysis using both discursive and syntactic information. Moreover, they understand whether their selection is correct or not, during reading the full sentence, because the finite embedded verb modifies only one of the NPs. If their first interpretation is correct, then RT will be short. Yet, if it is incorrect, their RT will be longer. The participants encounter the wrong disambiguating site when they read the finite embedded verb just after the RC pronoun. The finite embedded verb and the adverbs after it are the critical areas, since the ambiguity is resolved in these parts. Generally, the parsers are anticipated to choose only one of the construction of this ambiguous sentence (this is a kind of bias toward interpreting the sentence in a particular

way, thus they will not comprehend the sentence as ambiguous if they read the rest of the sentence in direct proportion to their preference). In short, when the finite embedded verb is referred to NP1 as RC favors, the participants are expected to show shorter RTs in critical areas in IC condition. If the participants use two-stage processing, they are expected to choose NP2 which is a low attachment and to show shorter RTs in non-IC condition.

The details of the participants will be explained in the next pages.

4.2 The Participants

30 adult Turkish L2 speakers of English and 30 monolinguals of English participated in the experiment. Before they took online and offline tests, they were told to fulfil the language background questionnaire which was adapted from Gürel (2004) (see Appendix A). Then, at the same day, L2 speakers were asked to take Oxford Proficiency test, because the L2 speakers' proficiency in English requires being upper-intermediate level at least. As seen in Table 4.1, the Turkish L2 speakers' mean age was 35 and the English group's mean age was 36. All of them had bachelor's degree. All of the Turkish participants were working as academicians at different universities, namely Boğaziçi University, Bülent Ecevit University, İstanbul Aydın University and İstanbul Özyeğin University. On the other hand, most (26) of the monolinguals were English teachers from different foreign language courses like English Time, British Time, Just English in İstanbul. The rest of them were academicians at the universities as mentioned before. All participants had normal vision and actively used computers. Furthermore, the mean age of exposure to English was 12 in L2 learners group, and they did not know a third language other than English. Besides, the participants in the control group were not bilinguals and did not know any other language apart from their native language. The participants were not instructed about the ultimate goal of the experiment.

Table 4.1: L2 Learners' and the Monolinguals' Background Information.

	Sex		Age			
Group	Male	Female	Mean age of first exposure to L2 English	Mean age at time of testing	Age range	Any other language
Turkish L2 speakers n=30	18	12	12	35	25-42	None
Monolinguals n=30	21	9	From birth	36	30-54	None

4.3 Instruments

4.3.1 Language background information task

It was determined to acquire the background information through this task, which confirmed that the participants had similar language backgrounds. Before the participants took the online and offline tests, they were asked to fill the background questionnaire, adapted from Gürel (2004) (see Appendix A).

4.3.2 English proficiency test

Oxford English Proficiency Test was given to only adult Turkish L2 speakers of English, the experimental group, because the scores were going to indicate whether they were capable enough to understand and answer the questions fast and correctly. They were supposed to be able to use RC subject efficiently, as the results are important from this perspective. The test took 50-60 min. and included 80 questions.

4.3.3 The multiple choice tests

The involved 78 questions; 19 of them were IC and 19 of them were non-IC verb sentences (e.g., 36a, 36b), and the rest were fillers. The test (see Appendix B) took about 30-35 min. because it was easy to pick one of the two options as a response after reading the comprehension question.

(36a) [IC PROMPT]

Melissa blamed the son of the florist who has recurrently ruined expensive orchids.

Who has ruined the expensive orchids?

a. the florist b. the son

(36b) [non-IC PROMPT]

Melissa waited with the son of the florist who has recurrently ruined expensive orchids.

Who has ruined the expensive orchids?

a. the florist b. the son

IC and non-IC sentences and the number of words of these sentences were equal in the offline tests. All sentences were designed with complex NP construction, RC clause, IC or non-IC verbs. The subjects and objects of the main sentence were +animate.

4.3.4 The self-paced reading task

The Self-Paced reading task (see Appendix D) comprised 154 sentences in total, including 10 practice, 48 experimental, and 96 filler sentences. The experimental sentences included unambiguous versions of the sentences via IC and non-IC verbs. The online experiment took about 40-45 min, depending on how much break the participants chose to take during the session.

The experimental sentences included a proper name, a verb (IC or non-IC verb), a complex NP in direct object position, and an RC with the pronoun "*who*". For every experimental sentence, the NP consisted of two NPs, one of them is singular and the other is plural. RC verb, the embedded verb, is either "be" or "have", because of being influential for subject-verb agreement. The parsers read experimental items in sentences including either IC or non-IC verbs. The experimental items were adapted with some minor changes from Rohde et al. (2011). Since the experimental sentences were disambiguated using the different verb types (e.g., IC verbs) that were available in the main verb region, the finite embedded verb region was the critical area after the RC pronoun. The number and the sequence of singular and plural NPs in the matrix clause were balanced so that the participants could not develop a bias or answer

the questions automatically through the sentences. Moreover, the length of the experimental sentences and number of words were all the same (12 words for each sentences). The verb types and the height of the attachments were distributed equally, and the fillers had the same sentence structures as experimental sentences.

The experimental sentences are composed of four conditions such as (37):

(37)

a. "Justin hates the cousins of the accountant who is forever telling the same tasteless jokes. (IC verb condition with NP2 referring)

b. Justin hates the cousins of the accountant who are forever telling the same tasteless jokes. (IC verb condition with NP1 referring)

c. Justin carpools with the cousins of the accountant who is forever telling the same tasteless jokes. (non-IC verb condition with NP2 referring)

d. Justin carpools with the cousins of the accountant who are forever telling the same tasteless jokes. (non-IC verb condition with NP1 referring)"

After every sentence, the participants were asked Yes/No question for assessment of the accuracy and the level of comprehension of the experiment, such as (38);

(38) Is the accountant/Are the cousins likeable?

On the keyboard of the personal computer, "y" button was painted in green, and "n" button in red before beginning the experiment, so the participants were instructed to press the green button for "yes", and the red button for "no".

The point for the RC attachment height in (37) is the finite verb in RC clause, which agrees in number with only one of the two NPs. The participants' reading time (RT) was evaluated in the critical/spillover regions. The critical region is just after the RC pronoun and generally it is an auxiliary verb for ensuring the participants' attachment preference on plural or singular nouns. Therefore, the differences in RT can occur because of the participants' expectation of more explanation, and not the previous one. Sentences were seen in a moving-window self-paced reading task, using E-Prime software (Schneider, Eschman & Zuccolotto, 2002). The words were presented in dark letters on a white

background, and one word at a time, but multi-words appeared in short phrases like "*run into*" etc. Previous words were exchanged with dashes when the next one was on screen.

The participants were informed to read the sentences carefully and to answer the comprehension questions as quickly as possible by pressing on the green or red buttons when they were ready to receive the next part. Then, they got feedback if they answered incorrectly, guaranteeing that they understood the sentences correctly. This means that they paid attention, thus we examined both the percentage of the correct answers and the reaction time results.

The reasons to use E-Prime software for this research are; it is a useful application to fill the requests of computerized trials, and it was used by approximately 15,000 experiments in the different research fields. Furthermore, E-Prime states a clear and easy online environment for collecting the data and analysis. It is possible to prepare millisecond determination timing to guarantee the accuracy, and finally, E-Prime's usability to constitute from various simple experiments to complex ones is excellent for the users from different levels (Schneider et al., 2002).

4.3.5 The sentence completion task

The offline sentence completion task (see Appendix C) investigated the RC attachment preferences being impressible to the participants' expectation about the next clause in coherence-biasing IC contexts (Rohde et al., 2011). The entire experiment took roughly 30-35 minutes and included 15 IC and 15 non-IC experimental sentences and 60 fillers which involved the same forms of different grammatical structures such as tenses, modals, conjunctions and etc. They were included as test items in order to prevent the participants from discovering experimental sentences and improving any mechanical answering strategies (this is the basic strategy for all fillers in different tasks). The ambiguous experimental sentences were presented in the form of NP–V–[NP1–P–NP2]–RC in which V stands for the verb, and P for the preposition. The participants were asked to write a natural sentence completion covering the first completion that came to their mind and avoiding humor with using only finite verbs (e.g., was/were, have/has, is/are etc.) The experimental sentences of the

study were adapted from Rohde et al. (2011). After taking the multiple question tests, the sentence completions were carried out in order to see the production of the participants (i.e. 39a & 39b).

For example;

(39a) "[non-IC PROMPT] John babysits the children of the musician who. . ."

(39b) "[IC PROMPT] John detests the children of the musician who. . ."

4.4 Procedure and Design

In the offline tasks, firstly the background information was presented to the participants in order to determine whether they were suitable for the experiment or not. After that, Oxford English Proficiency test was administered to the Turkish adult L2 speakers of English, as their scores should have been at least upper-intermediate level and capable enough to realize small differences in RC sentences. At first, the multiple choice test was given to both participant groups in order to see the preference of attachment site in the event of ambiguity in RC. In the multiple choice test, the participants were asked to choose one of the two given options a/b for the sentences. The sentences included two options, one of them referred to the NP1, and the other option referred to the NP2 by using the appropriate versions of "be" and "have" verbs in order to see how the participants resolve the RC attachment ambiguity without any time limit. The offline task including the sentence completions and multiple choice test was presented to the participants as pen-and-paper tests.

The online experiment was designed in E-Prime software as mentioned before. The offline tests were applied as pen-and-paper environment, on the other hand. In the online task, the experimental items were presented in self-paced, word-by-word, non-cumulative moving window fashion in Times New Roman font and in font size of 18. The participants were elucidated that it was a reading comprehension experiment and they were informed about how to move on. They were given 10 trial sentences to practice, and the researcher stayed while they answered the trial sentences, and if they did something wrong, the researcher explained and corrected them. The items were seen in dark letters on a white background, left-justified on a 15 CRT screen. The words appeared by pushing

a space bar button on the keyboard and the words became a series of dashes after reading. As explained in the previous pages, the parser pushed either the letter “y”, painted in green for the answer yes, and “n” painted in red, for the answer no, in order to reply the comprehension questions after each sentence. The participants were asked to read and answer as quickly and attentively as possible. RTs and the answers were recorded for each region in milliseconds. The task took about 40-45 min. depending the participants’ speed, and there were three breaks but the break times depended on the participants, not fixed. Applying the Self-Paced reading task online was not as easy as the offline tests. The integration of the specific task with 154 sentences with three breaks, the 154 Yes/No comprehension questions and the feedbacks after every answer, and the trial sentences, took about 13 months on E-Prime software (with the help of Assoc. Prof. Zeynel Baran). The online task was individually administered on a laptop using E-Prime 2.0 (Schneider, Eschman & Zuccolotto, 2002) in one session with four parts, each of which took about 10-12 minutes. As mentioned earlier, the parsers read the experimental and filler sentences word-by-word by pushing the “spacebar” button on the keyboard, and the RTs in every word was recorded as in the following order. There are twelve words in each sentence, and it is important to note that the sentence in figures (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, and 4.12) is an example of IC-NP2 condition (which means that IC verb “blamed” was used, and the finite verb “has” referred to the NP2).

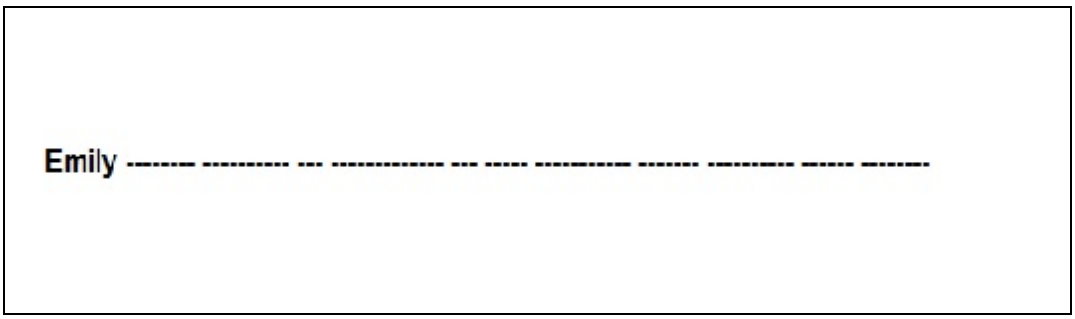


Figure 4.1: The screenshot of the first word during the reading session on E-Prime (a random example, IC-NP2 condition).

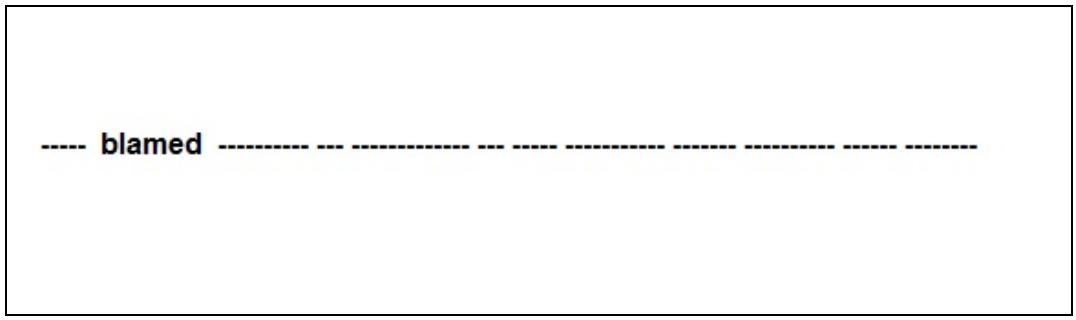


Figure 4.2: The screenshot of the second word during the reading session on E-Prime (a random example, IC-NP2 condition)

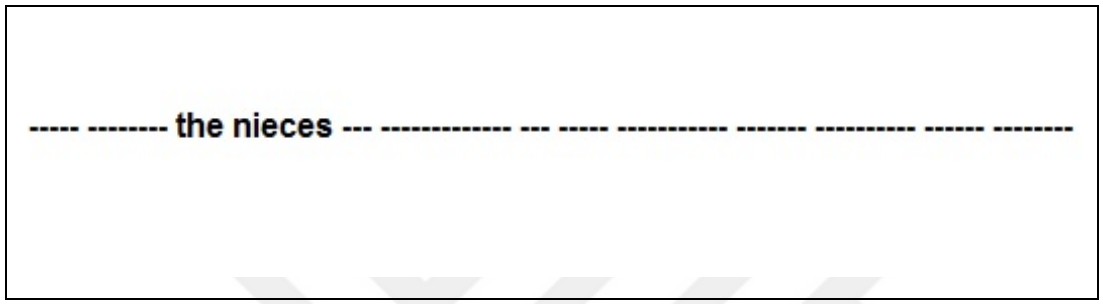


Figure 4.3: The screenshot of the third word during the reading session on E-Prime (a random example, IC-NP2 condition)

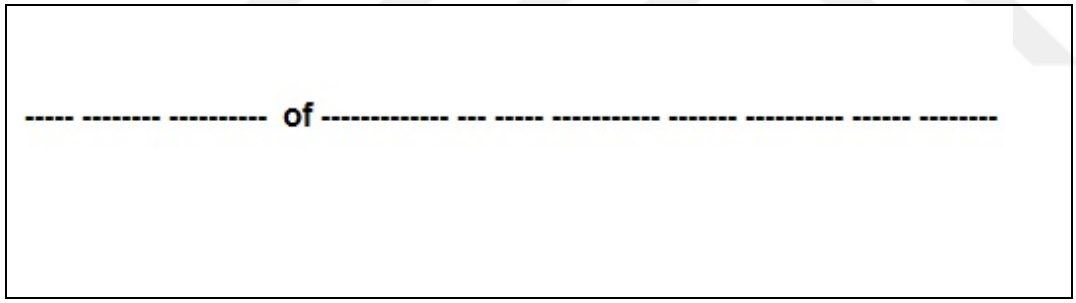


Figure 4.4: The screenshot of the forth word during the reading session on E-Prime (a random example, IC-NP2 condition)

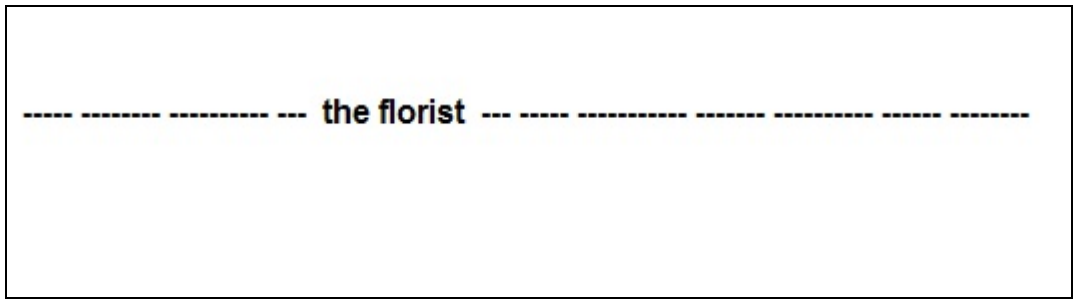


Figure 4.5: The screenshot of the fifth word during the reading session on E-Prime (a random example, IC-NP2 condition)

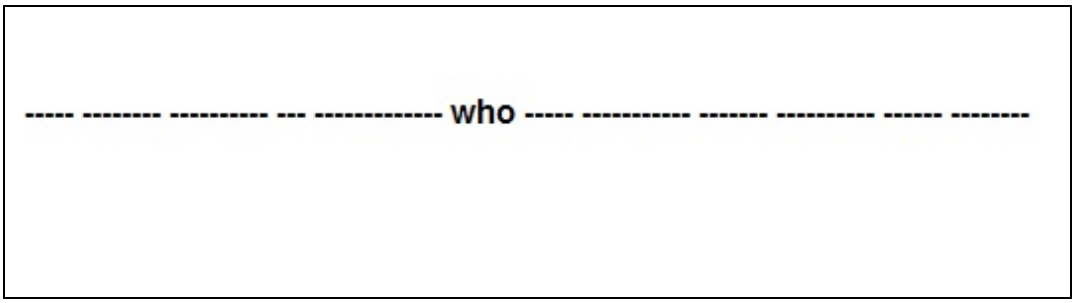


Figure 4.6: The screenshot of the sixth word during the reading session on E-Prime (a random example, IC-NP2 condition)

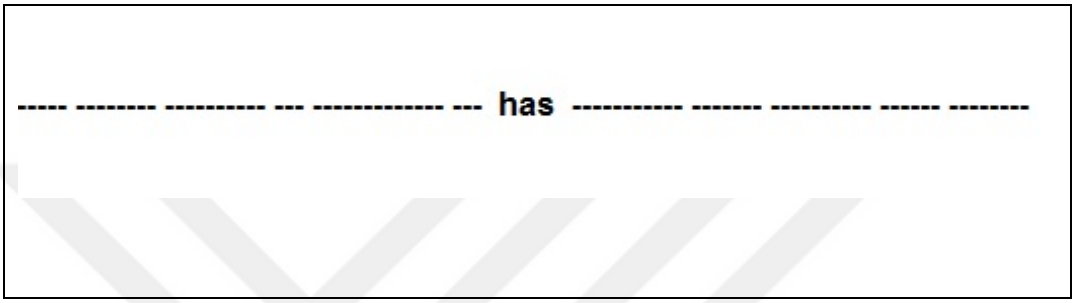


Figure 4.7: The screenshot of the seventh word during the reading session on E-Prime (a random example, IC-NP2 condition)

Figure 4.8: The screenshot of the eighth word during the reading session on E-Prime (a random example, IC-NP2 condition)

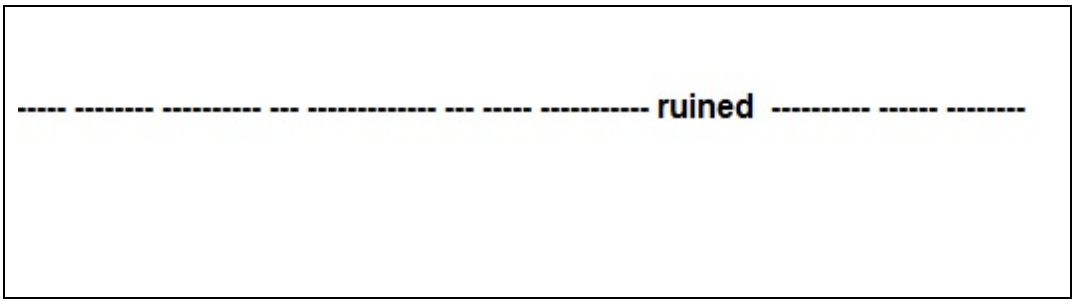


Figure 4.9: The screenshot of the ninth word during the reading session on E-Prime (a random example, IC-NP2 condition)

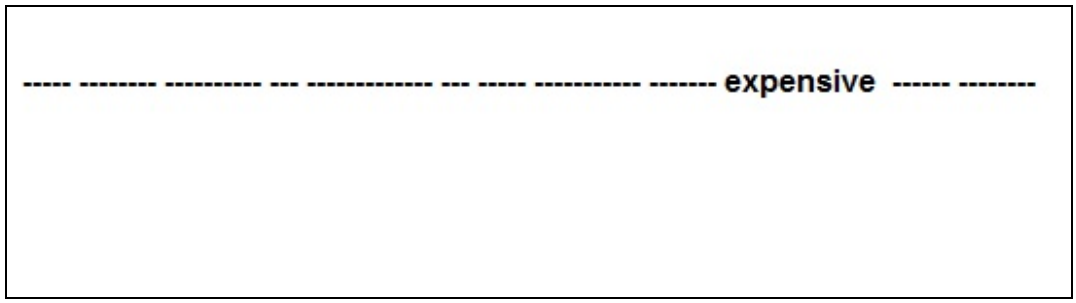


Figure 4.10: The screenshot of the tenth word during the reading session on E-Prime (a random example, IC-NP2 condition)

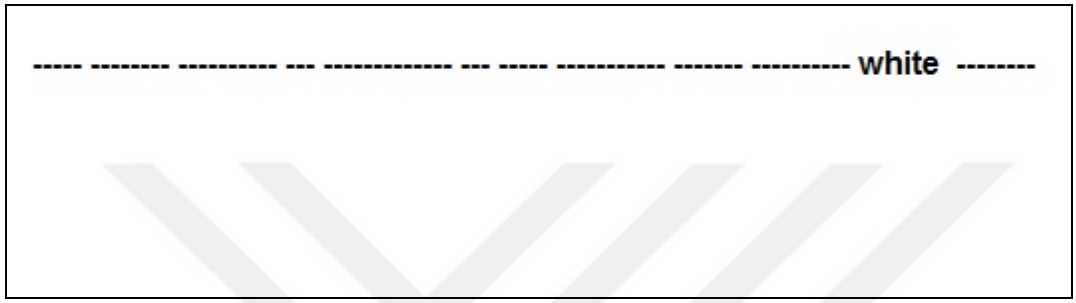


Figure 4.11: The screenshot of the eleventh word during the reading session on E-Prime (a random example, IC-NP2 condition)

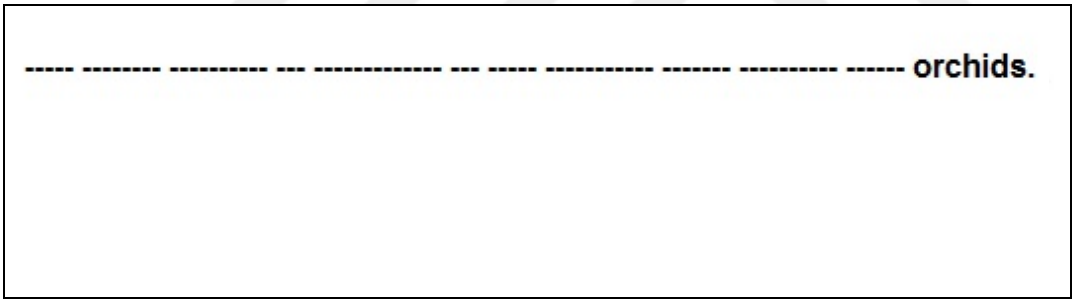


Figure 4.12: The screenshot of the twelfth word during the reading session on E-Prime (a random example, IC-NP2 condition)

After completing the sentences and pushing the spacebar again, the parsers saw the comprehension questions (i.e., 4.13) which could be answered by pushing the green button (*y*) for yes, and the red button (*n*) for no.

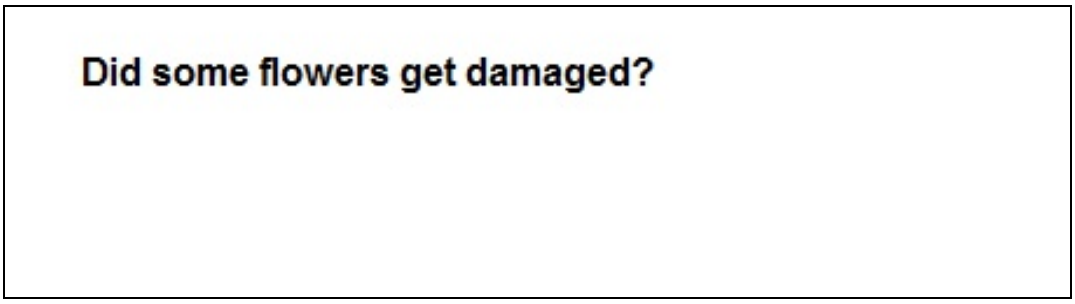


Figure 4.13: An example of the online comprehension questions.

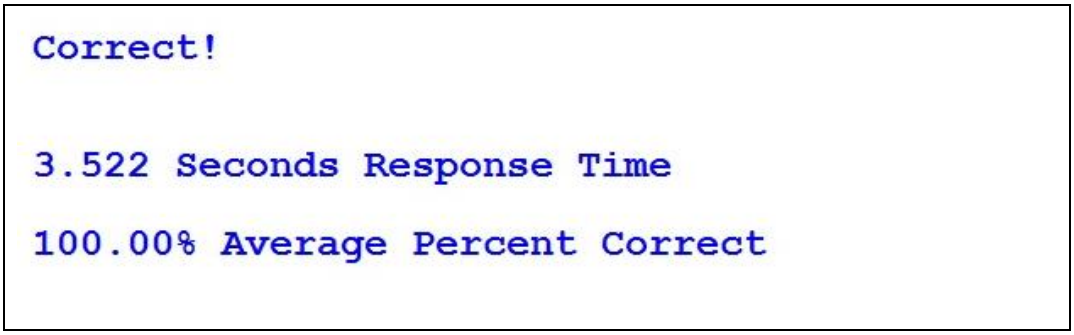


Figure 4.14: An example of the feedback for the correct answer.

The feedback for the correct answer was always in blue, and as in the example (4.14), 3.522 seconds mean the response time after reading the question. On the other hand, in (4.15), it is possible to see the incorrect answer feedback.

Figure 4.15: An example of the feedback for the incorrect answer.

After answering incorrectly, the feedback was seen in red, and also as in the feedback of the correct answer, the response time was presented in milliseconds.

As it becomes essential to see the production of the participants, the sentence completions were given to the participants. They were asked to read the sentences and complete the sentences just after the RC pronoun "who". They were strictly informed that "be" or "have" auxiliary verbs should have been used, since these verbs are influential for the number agreement. Thus, the readers tried to continue the sentences with the forms of "be" or "have" in order to understand which NP was referred. More clearly, as in the example (37b), if the readers complete the sentence with "are", then, it can be concluded that the reader uses discourse information via IC verbs, because s/he referred to "the children", NP1 (high attachment).

4.5 Data Analysis

This part of the thesis presents the analyses of the data collected from the participants in offline and online tasks. The test of normality will be carried out to show the normal distribution of the data obtained from the offline tests (multiple choice questions test and the sentence completions task) and will be identified with descriptive statistical analysis, then the statistical significance of relationships between the monolinguals and Turkish L2 speakers of English will be determined using T-test.

For online self-paced reading task, the accuracy judgment data obtained from the comprehension questions, and the RTs for critical regions (finite verb, spillover region 1, and spillover region 2) of experimental sentences of RC attachment preferences will be checked for normal distribution, missing values, and outliers. The similar experimental sentences are seen on the screen repeatedly for many times, therefore the scores will be analyzed with the 2x2x2 repeated measures ANOVA (for the conditions; IC and non-IC, and for the types of attachment sites; local attachment and non-local attachment, and for the subject variables; the monolinguals and Turkish L2 speakers of English).

5. RESULTS

5.1 Introduction

In this chapter, firstly the results of offline multiple choice questions test, secondly, the results of the online (self-paced word-by-word reading) task, and finally, the results of offline sentence completions of Turkish L2 speakers of English and monolingual English speakers will be reported.

5.2 The Results of Multiple-Choice Questions Test

30 Turkish L2 speakers of English and 30 monolinguals of English participated into the experiment. English monolinguals preferred high attachment (% 81, 6) in IC condition. Likewise, Turkish L2 speakers of English (%85,5) attached to the NP1 in IC condition. Although two participant groups behaved in the same way in IC condition by choosing non-local attachment, in NIC condition, the monolinguals chose different attachment site from L2 learners. In a similar manner with IC condition, Turkish L2 speakers of English preferred to attach NP1 (%81,5), while English monolinguals chose NP2 (% 77,5) in NIC condition. In what follows, Table (5.1) demonstrates the mean attachment preferences of both participant groups in IC and NIC conditions for multiple choice question test.

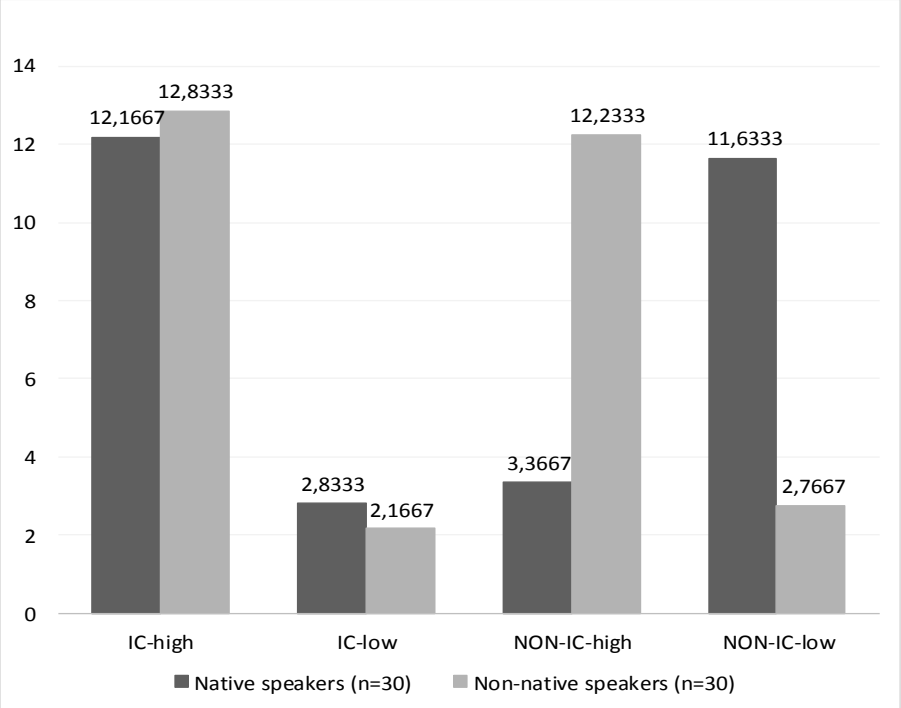
Table 5.1: The Mean Attachment Scores of Multiple Choice Questions Test.

	IC-high		IC-low		non-IC-high		non-IC-low	
	M	SD	M	SD	M	SD	M	SD
The monolinguals of English (n=30)	12,1667	1,48750	2,8333	1,48750	3,3667	1,60781	11,6333	1,60781
Turkish L2 speakers of English (n=30)	12,8333	1,44039	2,1667	1,44039	12,2333	1,33089	2,7667	1,33086

IC-high (IC verb sentences and high attachment forced); IC-low (IC verb sentences with low attachment forced); NIC-high (NIC sentences with high attachment forced); NIC-low (NIC sentences with low attachment forced).

As it can be seen from the Table (5.1) above, the monolinguals preferred high attachment in IC condition similar to Turkish L2 speakers. However, in NIC condition, monolinguals preferred low attachment but Turkish L2 speakers did not. Test of normality was carried out to reveal the normal distribution of the data; for the monolinguals, skewness values were ICNP1(-,238) ICNP2 (,238) NICNP1 (-,062) NICNP2 (,062); and for Turkish L2 speakers skewness were ICNP1(-,207) ICNP2 (,207) NICNP1 (-,742) NICNP2 (,742). For monolinguals' skewness, the kurtosis values were ICNP1(1,103) ICNP2 (1,103) NICNP1 (-1,254) NICNP2 (-1,254); and for Turkish L2 speakers, kurtosis were ICNP1(-,699) ICNP2 (-,699) NICNP1 (-,142) NICNP2 (-,142). Thus the skewness and kurtosis values indicated that the results of multiple choice questions test were normally distributed. Levene's test for equality of variances confirmed both IC (p= 0,666) and NIC (p= 0,121) conditions statistically (as both conditions provide p>.05). To analyze the results, the independent T-test was run for all conditions separately. The results indicated that there was not significant effect for ICNP1 (t_{58} = -1,763; 0,083 > p<.05) and ICNP2 (t_{58} = 1,763; 0,083 > p<.05). In other words, monolinguals and Turkish L2 speakers behaved almost similar preferences in ICNP1 and ICNP2; hence, there was no significant difference between the two participant groups. Nevertheless, there was significant difference in NICNP1 (t_{58} = -23,268; 0,00 < p<.05) and NICNP2 (t_{58} = 23,268; 0,00 < p<.05) statistically. This shows that Turkish L2 speakers of

English and English monolinguals behaved differently for NIC-high and NIC-low conditions. L2 learners of English attached to NP1, on the other hand, the monolinguals preferred to attach to NP2 in NIC condition. Figure (5.1) demonstrates the mean attachment preferences of the both participant groups in IC and NIC conditions for multiple choice question test.



IC-high (IC verb sentences and high attachment forced); IC-low (IC verb sentences with low attachment forced); NIC-high (NIC sentences with high attachment forced); NIC-low (NIC sentences with low attachment forced).

Figure 5.1: Mean preferences of multiple choice questions test

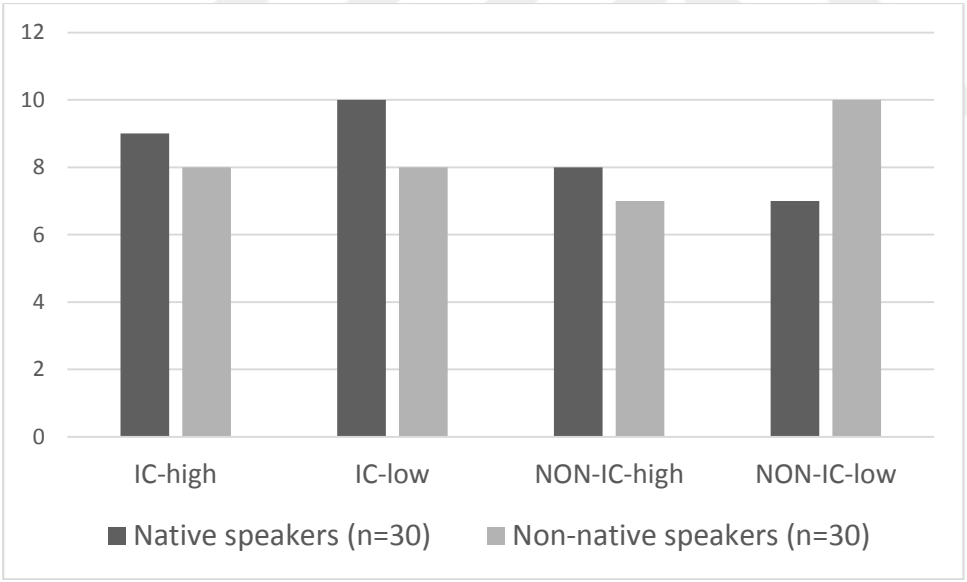
The results of multiple choice question test show that the L2 learners' non-local attachment preferences in the sentences with IC verbs were almost the same as English monolinguals'. On the other hand, the preference results of Turkish L2 speakers of English were significantly different from those of English monolinguals in the sentences containing NIC verbs as in the figure (5.1).

To sum up, as seen from the sentence completion results below, the multiple choice question test results are in the same line with the sentence completion test. It can be said that English monolinguals and L2 speakers preferred the same preferences for two separate offline tests. In detail, the Turkish L2 speakers of English behaved in the same line with English monolinguals in the IC condition during offline tests. On the other hand, in NIC condition which the

sentences include non-IC verbs (no discourse information), the monolinguals preferred to attach the RC pronoun to the NP2 (low attachment), while L2 group still preferred the high attachment. In IC condition in which the sentences contain IC verb as discourse information, both of the participant groups preferred the same attachment of NP1 (high attachment). It seems that discourse information affected the attachment preference of English monolinguals, but there is no difference of attachment preferences for Turkish L2 speakers of English.

5.3 The Results of Online Self-Paced Reading Task

The accuracy judgment data and the RTs for critical regions of experimental sentences, for four types of RC attachment preferences were checked for normal distribution, missing values, and outliers. The data were normally distributed, so the parametric tests were used for the analysis according to the equal number of participants. There were not missing values.



IC high (Implicit Causality verbs attached to NP-high), IC-low (Implicit Causality Verbs attached to NP-low), NIC high (NON-Implicit Causality verbs attached to NP-high), NIC low (NON-Implicit causality verbs attached to NP-low)

Figure 5.2: Mean accuracy scores for four types of monolinguals and Turkish L2 speakers in online reading

The mean accuracy scores (12x4 experimental sentences and 12x4 comprehension questions in each condition) on the figure (5.2) generally show that both Turkish L2 speakers of English and monolinguals of English

performed successfully and had almost similar accuracy judgments. It means that the difference was small between the two participant groups for four types of RC attachment preferences, varying by verb types (IC and non-IC verbs) and attachment sites (local and non-local). Moreover, the sentences with NIC verbs forced to either local or non-local attachment seem to be the main reason of difference for both groups. The mean accuracy scores illustrated that the sentences including IC and NIC verbs were almost identical when non-local attachment was forced. The mean accuracy scores were analysed with the repeated measures ANOVA by conditions (IC and non-IC) and types (local attachment and non-local attachment) as within-subject variables. The statistical analysis did not reveal any effect for condition (F (1, 58) = .484; p>.01). This means that the participants did not behave differently for conditions; however, there was a significant main effect for types (F (1, 58) = 106,657; p<.01). The interaction between condition and type was significant (F (1, 58) = 26,867; p<.01). For different types, the sentences, comprising NIC verbs with non-local attachment, were significantly difficult to answer than the sentences including NIC verbs with local attachment for the Turkish L2 speakers. The sentences with NIC verbs with local attachment were significantly easier to judge for L2 speakers who performed more accurate than other conditions and types. However; the sentences with IC verbs and local attachment were easier to judge for the monolinguals. The English monolinguals' mean accuracy data analysis confirmed the difficulty of NIC verb sentences when local attachment was forced. More detailed, English monolinguals were significantly less accurate in NIC-low type compared to NIC-high type. However, according to the statistical analysis, the difference between IC-high and IC-low conditions was not significant. Still, it can be said that English monolinguals performed better in IC-low condition than IC-high, which means that they have difficulty in judging IC verb sentences when the non-local attachment was forced. In order to recapitulate it, this difference was not significant. Turkish L2 learners of English mean accuracy data analysis verified the difficulty of NIC verb sentences when non-local attachment was forced. More detailed, Turkish L2 speakers were significantly less accurate in NIC-high type in contrast with NIC-low type. Nevertheless, in line with the statistical analysis, the difference between IC-high and IC-low conditions was not significant. Even so, it can be

said that Turkish L2 speakers performed better in IC-low condition than IC-high. Then, it is very hard to come to any inference considering the accuracy data.

To summarize, the results from accuracy judgments in IC conditions in the word-by-word online reading appear to be similar for all groups. L2 speakers were not significantly different from the English monolinguals in their judgments of IC verb sentences with either local or non-local attachment. The L2 group was significantly less accurate than English monolinguals in all types of RC attachment preferences, but not statistically different in both conditions as mentioned before.

It is necessary to note that similar accuracy hierarchy was found in both conditions and types. However, with regard to all mean accuracy, English monolinguals gave more accurate answers (% 79, 1) than Turkish L2 speakers of English (%68, 9). This may not be due to the fact that the discourse information (such as using verb types) had any effect on the participants' judgments. Because, providing that the discourse information had a facilitative effect on judgment, the results would yield more accuracy in IC conditions than NIC types. However, the locality of the attachment site might be said to have an effect on judgment, because there is a significant difference between the two types of NIC sentences in which only the attachment site is different.

After giving the necessary information and the interpretation of the accuracy judgment results, it becomes essential to report RT scores of the participants. Remember that the participants were required to fully read the word-by-word online sentences and to give answers to the comprehension questions by pushing "Yes" or "No" key, for 154 sentences including 48 experimental, 10 practice, 96 fillers. The experimental sentences, based on four main conditions and varied from verb types to attachment height, are as listed below:

40. *a. The sentences include IC verbs with the high attachment*:

"John detests the children of the musician who are generally arrogant and rude". (*IC-high condition-forces non-local attachment)*

b. The sentences include IC verbs with the low attachment:

"John detests the children of the musician who is generally arrogant and rude". (*IC-low condition-forced local attachment)*

c. The sentences include non-IC verbs with the high attachment:

"John babysits the children of the musician who are generally arrogant and rude". (*NONIC-high condition-forced non-local attachment)*

d. The sentences include non-IC verbs with the low attachment:

"John babysits the children of the musician who is generally arrogant and rude". (*NONIC-low condition-forced local attachment)*

The dependent variables are RTs for four conditions in the word-by-word reading moving-sentence condition and RT data obtained from the responses of each participant to the four types of conditions. The data were screened for normal distribution. Then, the mean RTs for four conditions of the RC attachment preferences in both participant groups were controlled and screened for normal distribution and extreme values. There is apparently no outlier. There are two main purposes here: first, to investigate whether there is any significant difference or main effect between Turkish L2 speakers of English and monolingual English speakers based on RTs; second, to examine whether the sentences with longer RTs, are easier to judge, or vice versa. Namely, whether the sentences taking longer RTs prompt less accurate responses or not is tried to be revealed. Mean RTs for critical areas and the mean accuracy scores of monolinguals (table 5.2) and for Turkish L2 speakers (table 5.3) are presented below.

Table 5.2: Mean RTs and the accuracy results of the monolinguals for the online test

	RC Verb		Spillover1		Spillover2		Accuracy	
	M	SD	M	SD	M	SD	M	SD
IC high (n=12)	959,97	237,484	693,13	232,073	756,83	232,361	9,00	1,57568
IC low (n=12)	1221,20	231,670	776,40	234,411	807,00	232,132	10,0000	1,46217
Non-IC high (n=12)	1309,27	234,587	787,60	232,390	818,07	235,135	8,0000	1,68154
Non-IC low (n=12)	628,70	234,630	596,90	232,095	608,80	234,053	7,0000	2,13348

IC high (Implicit Causality verbs attached to NP-high), IC-low (Implicit Causality Verbs attached to NP-low), NIC high (NON-Implicit Causality verbs attached to NP-high), NIC low (NON-Implicit causality verbs attached to NP-low)

Table 5.3: Mean RTs and accuracy results of Turkish L2 speakers for online test

	RC Verb		Spillover1		Spillover2		Accuracy	
	M	SD	M	SD	M	SD	M	SD
IC high (n=12)	959,23	395,387	942,83	397,974	981,33	401,197	7,9667	2,18905
IC low (n=12)	1078,27	409,271	1002,80	404,717	893,30	398,917	8,3333	1,68836
Non-IC high (n=12)	938,30	398,555	1140,67	410,314	963,20	397,137	7,0000	2,13348
Non-IC low (n=12)	1026,80	404,197	1020,63	412,155	939,90	393,010	9,9667	1,09807

IC high (Implicit Causality verbs attached to NP-high), IC-low (Implicit Causality Verbs attached to NP-low), NIC high (NON-Implicit Causality verbs attached to NP-high), NIC low (NON-Implicit causality verbs attached to NP-low)

To investigate the online RC attachment preferences of Turkish L2 speakers of English and monolinguals of English, the RTs and the accuracy of the

comprehension questions were analyzed with a 2X2X2 repeated measures ANOVA by condition (IC and non-IC sentences) and type (local attachment forced, non-local attachment forced) as within-subject variables. As the critical region, the finite embedded verb (i.e., is/are as in 40a, 40b, 40c, 40d), and the two spillover regions after it, were included in the statistical analysis. The spillover regions were always adverbs chosen as non-indicative of attachment height (i.e., *generally, arrogant* (40a, 40b, 40c, 40d)).

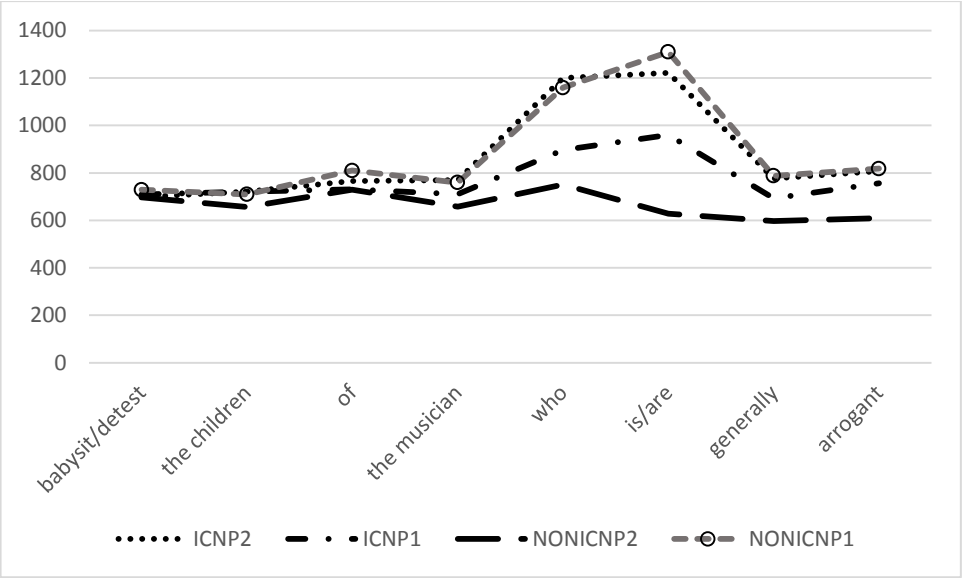
Total mean RTs (in tables 5.2 and 5.3) show that the L2 speakers generally appear to be slower than the monolinguals. For the monolinguals, NIC-high condition triggered the slowest RTs among all types and NIC-low for L2 speakers. This confirms the claim that the sentences including non-IC verbs and forced non-local attachment is the most difficult type to process for the monolinguals and local attachment site for L2 speakers, because the more difficult the structure is, the longer it takes to process.

In the case of IC conditions, both L2 speakers and monolinguals appear relatively slower in IC-low condition (M=869msec, M=999msec respectively) in which the sentences include IC verbs and are forced local attachment, when compared to IC-high condition in which the sentences include IC verbs and are forced non-local attachment. The results presents an overall significant effect (F (1.58) =333,992; p<.01); and a main effect for conditions (F (1, 58) =97,814; p<.01); and a main effect for types (F (1, 58) =324,053; p<.01); which means that differences by type and by condition are statistically significant. The main effect for condition means that the participants achieved different RTs when the RC disambiguated towards the sentences including IC verbs and forced to either local or non-local attachment. Likewise, the main effect for type suggests that the participants behaved differently when the RC disambiguated towards the sentences including non-IC verbs and forced to either local or non-local attachment. The results showed that Turkish L2 speakers of English were generally slower than the monolinguals English in reading four conditions of RC attachment ambiguity. It was very important to see whether it is the syntax that leads the participants' comprehension and preference attachment or there are other factors (i.e., discourse information) to affect the preferences, so the interaction between condition and type was analyzed statistically. The

interaction was significant for condition and type (F (1, 58) =1983, 582; p<.01). This interaction shows us that both discourse information (i.e., verb types such as IC and non-IC verbs) and the syntactical information (i.e., height of the attachment such as local or non-local NPs) affected the RTs of the participants at the critical regions.

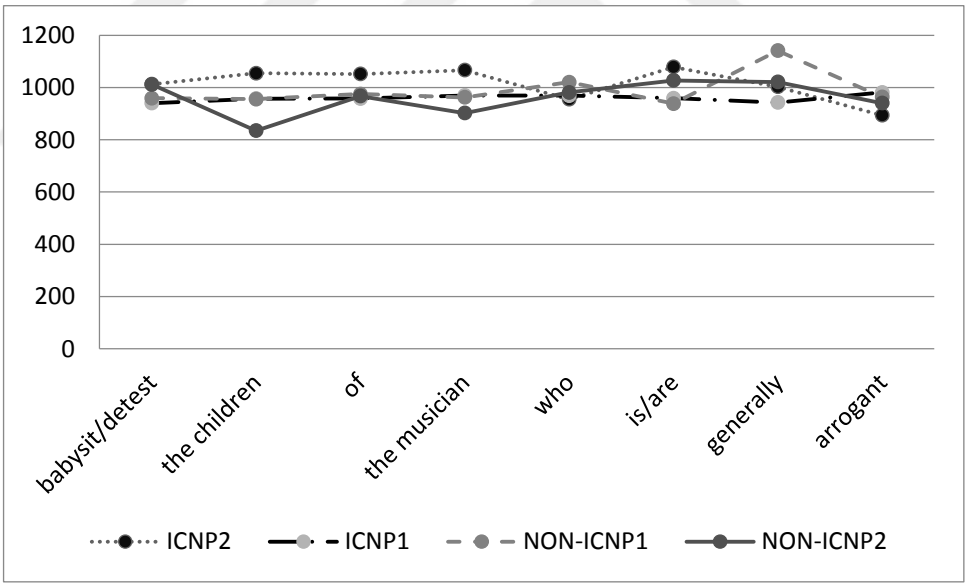
Pairwise comparisons of condition illustrated that Turkish L2 speakers of English spent significantly longer RTs for IC-low condition than for IC-high condition. Moreover, this suggests that Turkish L2 speakers have more processing problems with the RC sentences including IC verbs when local attachment was forced than the other. In other words, Turkish L2 speakers of English have more difficulties in processing IC-low condition compared to IC-high. However, interestingly, according to Pairwise comparisons of type, the statistical analyses showed that Turkish L2 speakers of English spent significantly longer RTs for NIC-low than for NIC-high. This means that, when local-attachment was forced in the sentences consisting of non-IC verbs, the Turkish L2 speakers have difficulties in processing.

The statistical analyses from the repeated measures ANOVA carried out with Turkish L2 speakers‘ mean RTs, indicated a significant main effect for condition (F (1,28) = 79,045 p<.01), which means that there is a significant effect between two kinds of condition, i.e., local or non-local attachment in the sentences containing IC verbs. Additionally, the results of Turkish L2 speakers of English mean RTs for type demonstrated a significant main effect (F (1, 28) = 44,671; p<.01). Hence, between local or non-local attachment sites in the sentences including NIC verbs, there is a statistically significant main effect (see figure 5.3 & 5.4).



IC-NP1 (Implicit Causality verbs attached to NP-high), IC-NP2 (Implicit Causality Verbs attached to NP-low), NIC-NP1 (NON-Implicit Causality verbs attached to NP-high), NIC-NP2 (NON-Implicit causality verbs attached to NP-low)

Figure 5.3: The monolinguals' mean RTs of the online word-by-word sentences



IC-NP1 (Implicit Causality verbs attached to NP-high), IC-NP2 (Implicit Causality Verbs attached to NP-low), NIC-NP1 (NON-Implicit Causality verbs attached to NP-high), NIC-NP2 (NON-Implicit causality verbs attached to NP-low)

Figure 5.4: The Turkish L2 speakers' mean RTs of the online word-by-word sentences

Pairwise comparisons of conditions illustrated that, in the same line with Turkish L2 speakers, monolinguals of English spent shorter RTs for IC-high condition than for IC-low condition. This means that the monolinguals have the

same processing situation in IC condition and they have processing problems with the RC sentences including IC verbs when local attachment was forced. Nevertheless, curiously enough, English monolinguals spent shorter RTs on NIC-low in pairwise comparison of type. In other words, the monolinguals have some processing difficulties with the RC sentences including NIC verbs when non-local attachment was forced. In comparison with Turkish L2 speakers, the statistical analyses of English monolinguals RTs in types showed different behaviors. Thus, it is obvious that both monolinguals and Turkish L2 speakers have similar processing situation for the RC sentences containing IC condition, but different processing strategies in non-IC condition.

The mean RT for the monolinguals was significantly higher when the local attachment was forced in IC sentences; however, RT was significantly longer when non-local attachment was forced in NIC sentences. Apparently, there is a difference between IC and non-IC sentences processing for monolinguals. The statistical analyses from the repeated measures ANOVA carried out with monolinguals‘ mean RTs showed a significant main effect for condition ($F(1,28) = 18, 822$; $p<.01$), which means that there is a significant effect between the two attachment sites of forced local or non-local attachment in the sentences with IC verbs. Additionally, the monolinguals’ results of mean RTs for type illustrated a significant main effect ($F(1, 28) = 1715, 877$; $p<.01$). What is more, there is a main effect between forced local or non-local attachment for English monolinguals.

In brief, the results of RTs on four kinds of RC attachment sentences varied by verb types and attachment sites exhibited that Turkish L2 speakers of English were significantly slower than the monolinguals of English. The L2 learners have more difficulty while processing the online reading sentences than the monolinguals do. It is necessary to state that both participant groups have difficulty in processing IC-low condition in which local attachment was forced in IC verb sentences. In more detail, for IC conditions, the local attachment obtained longer RTs when compared to non-local attachment site. Nevertheless, for non-IC condition the monolinguals of English processed low attachment (spent shorter RTs on NP2), whereas the L2 speakers processed the high

attachment (spent shorter RTs on NP1) in the same condition when considering the RTs.

In conclusion, the results show that English monolinguals' accuracy scores were better than L2 speakers', which means that English monolinguals were better at making accurate judgments than Turkish L2 speakers. Although the monolinguals' accuracy scores provided more correct judgments, they illustrated almost similar behaviors in RTs as the Turkish L2 speakers of English in IC conditions but the processing strategies of L1 and L2 English are quite different in non-IC condition. In this context, the online results of the monolinguals are in parallel with the previous studies which found out that the discourse information affects the resolution of the RC attachment ambiguity as mentioned before, since they preferred local attachment in non-IC condition and non-local attachment in IC condition. The online results of the L2 speakers of English show that they preferred to attach the NP1 (non-local or high attachment site) in IC and non-IC conditions which means that there is not any effect of discourse information while resolving RC attachment ambiguity sentences in L2 English.

In the next pages, the results of sentence completions will be presented.

5.4 The Results of Sentence Completion Task

Both English monolinguals (% 72,5) and Turkish L2 speakers of English (% 71,1) prefer high attachment in IC condition. Interestingly, the monolinguals group prefers to attach NP2 (% 80,5) in NIC condition, whereas the L2 group chooses NP1 (%83) to attach the preference in the same condition. Table (5.4) shows the mean attachment preferences of both groups for IC and NIC conditions.

Table 5.4: The Mean Attachment Scores of Sentence Completion Task.

	IC-high		IC-low		non-IC-high		non-IC-low	
	M	SD	M	SD	M	SD	M	SD
The monolinguals of English (n=30)	17.4000	3.47999	6.6000	3.47999	4.6667	2.26416	19.3333	2.26416
Turkish L2 speakers of English (n=30)	17.0667	3.86793	6.9333	3.86793	19.9333	1.79911	4.0667	1.79911

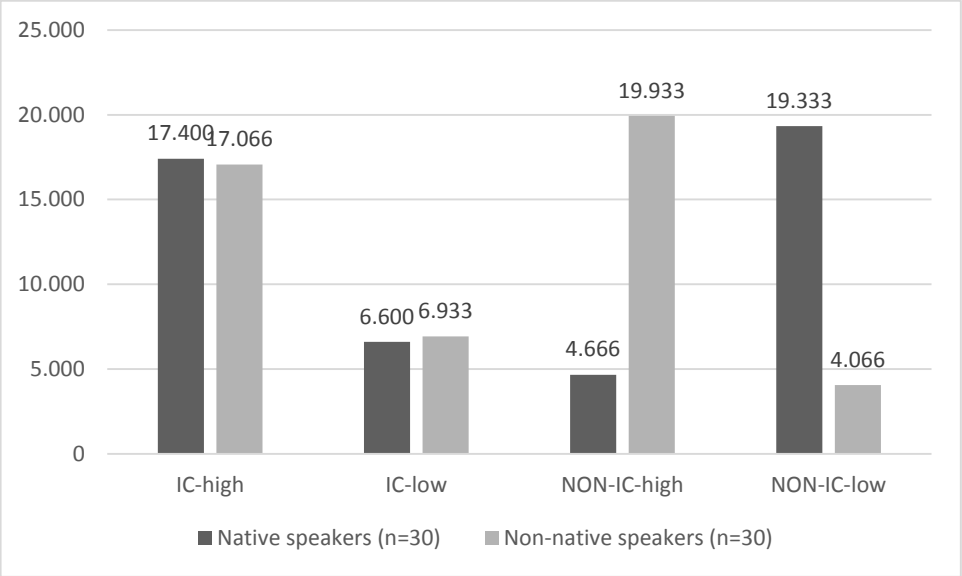
IC-high (IC verb sentences and high attachment forced); IC-low (IC verb sentences with low attachment forced); NIC-high (NIC sentences with high attachment forced); NIC-low (NIC sentences with low attachment forced).

As it can be seen from the table (5.4) above, the monolinguals preferred high attachment in IC condition similar to Turkish L2 speakers. However, in NIC condition, monolinguals preferred low attachment, but Turkish L2 speakers did not.

At first, in order to analyze whether the data revealed normal distribution or not, a test of normality (the statistical values of Kolmogorov-Smirnov) was carried out, and it was clear that IC condition (p=0,34; $p<.05$) and NIC condition (p=0,00; $p<.05$) were normally distributed. Furthermore, the results were analysed in Levene's test for equality of variances, IC condition (p=0.403) and NIC condition (p=0, 79). A significant equality of variances was confirmed (as both conditions provide $p>.05$).

In order to analyse these results statistically, we conducted an independent sample T-test for all conditions separately. There was not significant main effect for the ICNP1 condition (t_{58} = 0,351; $0,727 > p<.05$) and ICNP2 condition (t_{58} = -0,351; $0,727 > p<.05$). This means that IC condition results were not significantly different for monolinguals and Turkish L2 speakers, in other words the two groups behaved similarly in this condition. There was significantly difference for the NICNP1 condition (t_{58} = -28,915; $0,00 < p<.05$) and NICNP1 condition (t_{58} = 28,915; $0,00 < p<.05$). Thus, these analyses demonstrated that Turkish L2 speakers of English and monolinguals of English

behaved differently in NIC-high and NIC-low conditions. L2 learners preferred NP1 for the attachment in NIC condition; however, the monolinguals group attached to NP2 for the same condition (see the figure 5.5).



IC-high (IC verb sentences and high attachment forced); IC-low (IC verb sentences with low attachment forced); NIC-high (NIC sentences with high attachment forced); NIC-low (NIC sentences with low attachment forced).

Figure 5.5: Mean Preferences of Sentence Completion Task

The results of sentence completion test showed that the L2 learners' non-local attachment preferences were almost the same as English monolinguals' in the sentences including IC verbs. In line with the results of IC condition, the preference results of Turkish L2 speakers of English were significantly different from those of English monolinguals in the sentences with NIC verbs. Although Turkish L2 speakers preferred to attach the NP1, English monolinguals chose NP2 for their attachment preference in NIC type. It is important to note that Turkish L2 speakers behaved in the same way for both IC and NIC conditions, whereas English monolinguals differed in attachment preference between IC (NP1) and NIC (NP2) condition.

To sum up, the results of the multiple choice test, sentence completions and the online self-paced reading task are in the same line. It can be said that English monolinguals and L2 speakers preferred the same preferences for offline and online tasks. In detail, Turkish L2 speakers of English behaved in the same line with English monolinguals in IC condition during the experiment. In NIC condition including non-IC verbs (no discourse information), the monolinguals

preferred to attach the RC pronoun to the NP2 (low attachment), while L2 group preferred high attachment. In IC condition in which the sentences contain IC verb as discourse information, both participant groups preferred the same attachment of NP1 (high attachment). It seems that discourse information affected the attachment preference of English monolinguals, but there is no difference of attachment preferences for Turkish L2 speakers of English in any of the given conditions.

6. DISCUSSION

In this thesis, in order to find out whether the discourse information has any effect on RC attachment ambiguity sentence processing in L1 and L2 English with offline and online experiments. Two versions of sentences were used in offline experiments (e.g., the sentences with IC and non-IC verbs) and four versions were used in online experiment (e.g., the sentences with IC or non-IC verbs, and the sentences consisting of the preferences as NP1 or NP2). In offline tests, the participants' preferences are the hallmarks. However, in the online experiment, the longer RTs in critical areas (when the finite verb disambiguates the preferences) mean that the parser is surprised and tries to understand this unexpected attachment site chosen. On the other hand, if the parsers show shorter RTs, it possibly results from the cohesion between the parsers' preferences in mind and the preferences in the disambiguation area on the screen. The experimental design of the study was organized in that it would be possible to examine the mechanisms conducting the parsers' attachment preferences, as well as to test whether it was only the structural information that conducted the participants' preferences or whether the participants used other sources of information such as discourse information. The verbs were presented in two groups showing; the implicit causality and non-implicit causality.

The first research question of this thesis is whether the monolinguals of English prefer high-attachment site in the sentences with RC attachment ambiguity in implicit causality condition and low attachment site in the non-implicit causality condition. The expected result was that the monolinguals of English would use the discourse information, thus they would prefer to attach the local NP in non-IC condition and to non-local NP in IC condition. The actual results showed that the monolinguals of English preferred low attachment in non-IC condition and high attachment in IC condition (as in 41) in multiple choice question offline tests, in online self-paced reading task, and in production of the sentence completions. This provides evidence for discourse information effect on the monolinguals.

The second research question of the thesis is whether the Turkish L2 speakers of English prefer high attachment in RC attachment ambiguity sentences in implicit causality condition and low attachment in non-implicit causality condition. The expected result is that the discourse information affects the sentence processing, so the participants' preferences would be affected by discourse information in IC conditions on contrary to non-IC condition because the discourse information is yielded by verb types such as implicit causality verbs. The findings showed that the L2 speakers processed the RC attachment ambiguity sentences as distinct from the monolinguals. The L2 speakers' preferences were always for the same attachment site (non-local attachment) for both conditions in the offline multiple choice question tests, online self-paced reading task and in offline sentence completions as production, so it is possible to state that there is not any discursive information effect on resolution the RC attachment ambiguity for Turkish L2 speakers of English.

41.

a. ICS Condition (IC verb type and non-local attachment forced)

Sarah [$_{\text{IC verb}}$ fears] [$_{\text{NP1-non-local attachment site}}$ the uncle] of [$_{\text{NP2-local attachment site}}$ the toddlers] [$_{\text{RC}}$ who [$_{\text{finite verb}}$ is] often heard yelling and screaming].

b. ICP Condition (IC verb type and local attachment forced)

Sarah [$_{\text{IC verb}}$ fears] [$_{\text{NP1-non-local attachment site}}$ the uncle] of [$_{\text{NP2-local attachment site}}$ the toddlers] [$_{\text{RC}}$ who [$_{\text{finite verb}}$ are] often heard yelling and screaming].

c. NICS Condition (non-IC verb type and non-local attachment forced)

Sarah [$_{\text{non-IC verb}}$ jogs with] [$_{\text{NP1-non-local attachment site}}$ the uncle] of [$_{\text{NP2-local attachment}}$ site the toddlers] [$_{\text{RC}}$ who [$_{\text{finite verb}}$ is] often heard yelling and screaming].

d. NICP Condition (non-IC verb type and local attachment forced)

Sarah [$_{\text{non-IC verb}}$ jogs with] [$_{\text{NP1-non-local attachment site}}$ the uncle] of [$_{\text{NP2-local attachment site}}$ the toddlers] [$_{\text{RC}}$ who [$_{\text{finite verb}}$ are] often heard yelling and screaming].

If the participants used two-stage processing, the RTs would not show any difference between IC and non-IC conditions and the preferred attachment site

would be the NP2. Hence, if there were any significant difference between conditions, it was strongly because of the effect of IC verbs and it becomes essential to state that the parsers go through the constraint-based sentence processing models. It was evident from the statistical analyses that both the monolinguals of English and the L2 speakers of English insisted on the same attachment site in offline and online tests, which means that the preferences did not change according to the offline or online experiments and it is obvious that the participants have a specific preference in their mind. The results of the monolinguals provide evidence for discourse information effect on the monolinguals but there is not any effect of discourse information on L2 speakers of English.

Making inferences related to the independent meaningful relationships between propositions is a crucial factor of discourse comprehension. The previous studies, as mentioned before, expressed that discourse coherence relations can influence the syntactic processing, particularly on the resolution of RC attachment ambiguity. Those studies reported that effects of discourse information are driven by the parsers' expectation, because the inference in a discourse affects the readers' views about the next coherence relations, and those views can change the readers' syntactic processing. Especially, the online results showed that the effect of expectation arises before reading the full sentence; expectations about discourse information occur gradually and can have word-by-word influence on syntactic resolution. In detail, the results indicate that the parsers sense that IC verbs yield more explanation to the direct object, IC verbs will be followed by a reason, and RC can be used to reflect explanations, and finally, they know how to concentrate this information in order to affect the attachment site preferences. In accordance with the earlier studies like those by Crain and Steedman (1985), Altman and Steedman (1988), Ni et al. (1996), Sedivy (2002), as well as the postulations of the Referential Theory, this thesis argues that processing discourse information can affect the online and offline syntactic resolution of RC attachment ambiguity. Although the previous studies claimed that RC can be used for setting a certain NP entailment as a single attachment site, they did not answer if the influences were by the reason of a syntactical requirement related to a certain determiner which

applies to referential unicity, or if the influences could be caught by a wider construction in which the parsers' anticipation about the role of discourse information with regard to the following clause can affect the syntactic processing. If it is presumed that the parsers predict the next clauses unintentionally, but rather to depend on definite ways to prior lexical information, the effect shown in mentioned studies which sided with the reference limitation, suggests a special situation of what is discussed in this study, is a piece of the parsers' questioning regarding the way the discourse information agrees. The results of this thesis disclose the biases, which make the parsers to infer from discourse information in referential contexts. With regard to RC attachment ambiguity resolution, this study examined some of the same variables that previous studies have suggested to consider (Bulut, 2011; Dinçtopal, 2007; Juffs, 1998; Kırkıcı, 2004; Omaki, 2005): the complex NPs, the properties of the nouns, subject-verb agreement, and referential context. Nonetheless, the difference is the verb type of the main clause which stimulates more explanation (Rohde et al. 2011). The monolinguals of English in this study seem to be critical to inferences in the mid-sentence, which shows the importance of establishing a preference by using discourse information. The experimental effects show up in the spillover regions and the data could still be explained by a modular account in which different sources of information are consulted in an ordered fashion, particularly with syntactic biases being primary and discourse biases contributing shortly thereafter but still before the end of the clause (Rohde et al. 2011). The results of this study draw attention to recommend that the discourse information has already affected the sentence processing while syntactic processing is continuing. The fact that longer RTs are expected for NIC-high condition (for NP1) and shorter RTs for NIC-low condition (for NP2) according to a modular account is not valid for this thesis because the preferences come out in the spillover regions, and the discourse information has no role in NIC conditions. As the critical region is too short to indicate a judgment such as "was/were" or "is/are", the effects of the spillover regions are very important to attribute any support. Thus, it can be said that the results of this study promote incremental construction in which the relevant or irrelevant sources of information are used at the same time by word-by-word reading.

At the core of the RC attachment discussion, the effects arising from different sources of information other than syntax have been examined by researchers, i.e., Trueswell et al. (1994), Just and Carpenter (1992), Clifton et al. (2003). They conclude that the thematic form can challenge the role of structural biases, as in the results of L1 English in the current study. Furthermore, it is crucial to state that the Garden-Path Theory, newly named and improved as the Construal Theory (Frazier & Clifton, 1996), approved that under certain conditions RC attachment can be decided depending on non-structural information as well as structural one (chapter 2). The results of this thesis provide a basis for such an interpretation that the structural preferences can be achieved because the low attachment preferences are counted as a strong sign for structural choice are reversed when the thematic form is added into the sentences (in IC conditions). Moreover, the offline and online results of the monolinguals are in accordance with the claims of Late Closure in non-IC conditions.

For the native language of L2 speakers; the syntax and word order is generally approved as SOV, but the phrases and elements in a Turkish sentence can be replaced in the head, middle or end of the sentence (Lewis 2000). In Turkish, the definer noun comes before the defined one and interchangeable, but in this study, the locality of the noun phrases is fixed as in (42);

42. Balkon-da dur-an aktris-in hizmetçi-si…

Balcony-LOC stand-PART actress-GEN servant-POSS

The servant of the actress who is standing on the balcony….

The free order of noun phrases may have caused the tendency of Turkish participants to prefer NP1 (non-local attachment) in both IC and non-IC conditions, but the previous studies by Dinçtopal (2007) and Kırkıcı (2004) showed that Turkish participants preferred local attachment site in their native language (which means that the Turkish participants chose “actress” for the attachment site in Turkish L1 language). Thus, the L2 speakers of English do not process the RC attachment ambiguity sentences in the same way as in their native language. It is clear that there is not L1 transfer effect on processing of L2 English. This is compatible with some other previous studies which did not find any transfer effect of L1 (e.g., Clahsen & Felser 2006; Dussias 2003; Felser

et al. 2003; Fernandez 2002; Papadopoulou & Clahsen 2003). The results of L2 speakers of this thesis could be explained by SSH. SSH provided evidence for L2 speakers that the inadequate syntax information caused them to overrate the other sources of information like discourse. In non-IC condition, the L2 speakers did not demonstrate any sufficient syntax information, as they did not perform the same NP preference as the monolinguals who are supposed to be sufficient in syntax. Furthermore, the Turkish L2 speakers decisively prefer to attach the RC to the same preference regardless of the conditions, which means that they are not susceptible to the discourse information. Therefore, the evidences from the L2 speakers of English, obviously, support the SSH in this thesis.

It is fundamental to assert that the findings of this thesis can be explained by various models provided that they have a kind of system in which the readers choose the preferences incrementally, and they let the different sources of information (i.e., discourse) interact with each other. These models include the Competition Model (Bates &MacWhinney, 1987; MacWhinney, 1987), Constraint-Satisfaction Model (Altman et al. 1998; Demestre & Garcia-Albea, 2004; Desmet & Gibson, 2003; McClelland & Rumelhart, 1981), the Tuning Hypothesis proposed by Mitchell and colleagues (Brysbaert & Mitchell, 1996; Cuetos et al. 1996; Mitchell, Cuetos, Corley & Brysbaert, 1995). However, any of the mentioned models have extensively included the discourse information as the main factor; their construction permits different sources of information melt in the same pot, so it becomes apparent that the discourse factors can be sleekly incorporate with any of them. If the construction of a definite source of information is mishandled, the default is inevitable. The results of this thesis embody the discourse information with others, which must be noted.

7. CONCLUSION

In this study, I have tested the Turkish L2 speakers of English and the monolinguals of English on RC attachment ambiguity resolution in two conditions in offline tests: IC and non-IC conditions, and in four conditions in online self-paced reading task: IC, non-IC, NP1 forced and NP2 forced conditions. The main aim is to find out whether the Turkish and English speakers are similar in the way they process RC attachment ambiguity in L1 and L2 English. Related to this question, I have examined the influence of discourse information in online and offline experiments. Both participant groups exhibit the same preference in IC conditions (with the discourse information), on the other hand, the English monolinguals indicate a great sensitivity when they read sentences including IC verbs as distinct from the Turkish L2 speakers since they have not showed any difference between the IC and non-IC conditions. I have also researched whether RC attachment preferences are affected by the discourse information, and whether IC verbs play a role in determining the RC attachment preference. Findings reveal huge differences between the sentences consisting of syntax and discourse information for monolinguals, but L2 participants do not seem to be affected by discourse information, as there is not any difference between the IC and non-IC sentences. The processing models should be incorporated with the syntactic and discourse information organized for parsers to use inferences. Most of the researchers would agree that discourse coherence and inference influence the sentence processing. In this study, it is easier to evaluate the participants' inference process, because the contexts are measurable and not abstract in both offline and online tests.

As a final note, this thesis is an attempt to contribute the famous and complicated phenomenon of L2 sentence processing in reference to syntax and discourse effect on RC attachment preferences. For my knowledge, this is the first study that provides data for L2 English resolution of RC attachment ambiguity by discourse information supported by verb types such as IC and non-IC. In that sense, I believe it will be an important contribution to the field.

Nevertheless, there are few studies having researched the L2 English attachment preference with Turkish participants, and what is more, there is only limited amount of studies in Turkish L1, so further research should try to explore these factors playing a major role in sentence processing.

8. LIMITATIONS AND SUGGESTIONS

As for possible implications of this study for L2 RC attachment ambiguity, we can suggest that more complicated studies are needed with offline and online experiments so as to ground the attachment preference of Turkish L2 speakers clearly since it will be to connect the results within or without the perspective of L1 transfer. In addition, the findings suggest that even near-native speakers prefer different attachment site from the monolinguals.

There are limitations; for instance, there are few studies having researched the L2 English attachment preference with Turkish participants, and what is more, there is only limited amount of studies in Turkish L1, so further research should try to explore these factors playing a major role in sentence processing.

9. IMPLICATIONS

The findings of this study have some implications for comprehending the preferences of the monolinguals and Turkish L2 speakers of English on RC attachment ambiguity sentences. This study might address the discourse information and the influence of it on the monolingual participants in dissolving the RC attachment ambiguity, as the results indicate approaching to the ambiguity problem with various sources of information (i.e., discourse information) is beneficial to see whether the discourse information affects the sentence processing or not. However, in the light of the preferences of Turkish L2 speakers of English, it is possible to state that L2 English sentence processing do not seem to be affected by discourse or syntax information in the present study.

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APPENDICES

APPENDIX A: Background Questionnaire

APPENDIX B: Multiple Choice Questions Test

APPENDIX C: Sentence Completions

APPENDIX D: Self-Paced Online Reading Task

APPENDIX A

Background Questionnaire for the monolinguals 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:

Primary:_____ 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!

Background Questionnaire for Turkish L2 speakers of 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:

Primary:_____ 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: _____

Thank you very much for your contribution!

APPENDIX B

Experimental Items

IC Experimental Items

1. Amanda scolded the chef of the aristocrat who was routinely letting food go to waste

Who was routinely letting food go to waste?

   a. The chef
   b. The aristocrat

2. Sam stared at the advisor of the second grader who was definitely smartest in the school.

Who was definitely smartest in the school?

   a. The advisor
   b. The second grader

3. Morgan assisted the maids of the managers who were consistently late to work.

Who were consistently late to work?

   a. the maids
   b. the managers

4. Jack trusted the captain of the sailor who has constantly weathered big storms.

Who has constantly weathered big storms?

   a. the sailor
   b. the captain

5. Carter corrected the secretaries of the judges who have frequently made small mistakes.

Who have frequently made small mistakes?

   a. the secretaries
   b. the judges

6. Steve comforted the leader of the protester who was profoundly disappointed by the court's decision.

Who was profoundly disappointed by the court's decision?

   a. the leader

b. the protester

7. Ted envies the managers of the salesmen who have hopingly received a big raise.

Who have hopingly received a big raise?

a. the salesmen
b. the managers

8. Michael valued the cashier of the shopkeeper who was continually willing to spot him a few dollars.

Who was continually willing to spot him a few dollars?

a. The cashier
b. The shopkeeper

9. Suzan fears with the aunts of the pupils who are often heard yelling and screaming.

Who are often heard yelling and screaming?

a. the aunts
b. the pupils

10. Tom praised the gardener of the celebrity who has lately installed a solar powered sprinkler.

Who has lately installed a solar powered sprinkler?

a. the gardener
b. the celebrity

11. James hates the friends of the hosts who are endlessly telling the same tasteless jokes.

Who are endlessly telling the same tasteless jokes?

a. the friends
b. the hosts

12. Melissa blamed the son of the florist who has recurrently ruined expensive orchids.

Who has recurrently ruined expensive orchids?

a. the florist
b. the son

13. Joey helped the sisters of the footballers who are perpetually failing English class.

Who are perpetually failing English class?

a. the sisters
b. the footballers

14. Jess reproached the doctor of the rock star who was persistently in favor of plastic surgery.

Who was persistently in favor of plastic surgery?

a. the rock star
b. the doctor

15. Bill pacified the partners of the businessmen who were almost bankrupted by the new tax policy.

Who were almost bankrupted by the new tax policy?

a. the partners
b. the businessmen

16. Melinda detests the child of the stewardess who is normally arrogant and rude.

Who is normally arrogant and rude?

a. the stewardess
b. the child

17. Bob thanked to the waiters of the administrators who have regularly been helping the poor.

Who have regularly been helping the poor?

a. the waiters
b. the administrators

18. Tracy congratulated the bodyguard of the artist who was occasionally fighting off the paparazzi.

Who was occasionally fighting off the paparazzi?

a. the artist
b. the bodyguard

19. Kevin mocked the guitarists of the singers who were always stagediving and getting hurt.

Who were always stagediving and getting hurt?

a. the singers
b. the guitarists

non-IC Experimental Items

1. Amanda studied with the chef of the aristocrat who was routinely letting food go to waste

Who was routinely letting food go to waste?

a. The chef
b. The aristocrats

2. Sam lived next to the advisor of the second grader who was definitely smartest in the school.

Who was definitely smartest in the school?

a. The advisor
b. The second grader

3. Morgan joked with the maids of the managers who were consistently late to work.

Who were consistently late to work?

a. the maids
b. the managers

4. Jack stood near the captain of the sailor who has constantly weathered big storms.

Who has constantly weathered big storms?

a. the sailor
b. the captain

5. Carter gossiped with the secretaries of the judges who have frequently made small mistakes.

Who have frequently made small mistakes?

a. the secretaries
b. the judges

6. Steve greeted the leader of the protester who was profoundly disappointed by the court's decision.

Who was profoundly disappointed by the court's decision?

a. the leader
b. the protester

7. Ted knows the managers of the salesmen who have hopingly received a big raise.

Who have hopingly received a big raise?

a. the salesmen
b. the managers

8. Michael recognized the cashier of the shopkeeper who was continually willing to spot him a few dollars.

Who was continually willing to spot him a few dollars?

a. The cashier
b. The shopkeeper

9. Suzan jogs with the aunts of the pupils who are often heard yelling and screaming.

Who are often heard yelling and screaming?

a. the aunts
b. the pupils

10. Tom met the gardener of the celebrity who has lately installed a solar powered sprinkler.

Who has lately installed a solar powered sprinkler?

a. the gardener
b. the celebrity

11. James carpools with the friends of the hosts who are endlessly telling the same tasteless jokes.

Who are endlessly telling the same tasteless jokes?

a. the friends
b. the hosts

12. Melissa waited with the son of the florist who has recurrently ruined expensive orchids.

Who has recurrently ruined expensive orchids?

a. the florist
b. the son

13. Joey ran into the sisters of the footballers who are perpetually failing English class.

Who are perpetually failing English class?

a. the sisters
b. the footballers

14. Jess worked with the doctor of the rock star who was persistently in favor of plastic surgery.

Who was persistently in favor of plastic surgery?

a. the rock star
b. the doctor

15. Bill visited the partners of the businessmen who were almost bankrupted by the new tax policy.

Who were almost bankrupted by the new tax policy?

a. the partners
b. the businessmen

16. Melinda babysits the child of the stewardess who is normally arrogant and rude.

Who is normally arrogant and rude?

a. the stewardess
b. the child

17. Bob talked to the waiters of the administrators who have regularly been helping the poor.

Who have regularly been helping the poor?

a. the waiters
b. the administrators

18. Tracy chatted with the bodyguard of the artist who was occasionally fighting off the paparazzi.

Who was occasionally fighting off the paparazzi?

a. the artist
b. the bodyguard

19. Kevin counted the guitarists of the singers who were always stagediving and getting hurt.

Who were always stagediving and getting hurt?

a. the singers
b. the guitarists

APPENDIX C

EXPERIMENTAL ITEMS

IC Experimental Items

1. Alfred admires the agent of the supermodels who. . .
2. David adores the secretaries of the accountant who. . .
3. Bill blamed the friends of the swimmer who. . .
4. James complimented the guests of the groom who. . .
5. George congratulated the coach of the basket ballers who. . .
6. Elizabeth criticized the spokesman of the activists who. . .
7. Cristina despises the children of the brain doctor who. . .
8. Kate detests the mother of the students who. . .
9. Melinda dislikes the relatives of the neighbour who. . .
10. Selma insulted the maids of the millionaire who. . .
11. Reynold likes the captain of the sailors who. . .
12. Jasper pities the assistants of the celebrity who. .
13. Kevin praised the advisors of the President who. . .
14. Isabel punished the accountant of the tradesmen who. . .
15. Tom resents the doctors of the patient who. . .

non-IC Experimental Items

1. Alfred works with the agent of the supermodels who. . .
2. David smiles at the secretaries of the accountant who. . .
3. Bill noticed the friends of the swimmer who. . .
4. James met the guests of the groom who. . .
5. George visited the coach of the basket ballers who. . .
6. Elizabeth talked to the spokesman of the activists who. . .
7. Cristina babysits the children of the brain doctor who. . .
8. Kate looks like the mother of the students who.
9. Melinda watches the relatives of the neighbour who. . .

10. Selma chatted with the maids of the millionaire who. . .
11. Reynold resembles the captain of the sailors who. . .
12. Jasper hires the assistants of the celebrity who. . .
13. Kevin videotaped the advisors of the President who. . .
14. Isabel saw the accountant of the tradesmen who. . .
15. Tom knows the doctors of the patient who. . .

APPENDIX D

Self-Paced Online Reading Task Experimental Items

IC-High Promoted Experimental Items, The Comprehension Questions And The Answers

1. Justin/ hates/ the cousins /of/ the accountant/ who /are/ forever /telling/ the same/ tasteless /jokes.

Comp. Quest.: Is the accountant likeable?

Ans.: Yes

2. Anna/ scolded /the chef/ of/ the aristocrats /who/ was /routinely /letting/ food /go to/ waste.

Comp. Quest.: Did food go to waste?

Ans.: Yes

3. Emily/ blamed/ the nieces/ of/ the florist /who/ have/ repeatedly/ ruined /expensive/white /orchids.

Comp. Quest.: Did some flowers get damaged?

Ans.: Yes

4. Jenny /assisted/ the maid /of/ the executives/ who/ was/ regularly/ late/ to/ new / work.

Comp. Quest.: Were the executives late to work?

Ans.: No

5. Nick/ trusted /the captain/ of/ the sailors/ who/ has/ consistently/ weathered/ big/and severe/ storms.

Comp. Quest.: Did the captain have Nick's confidence?

Ans.: Yes.

6. Joe /helped/ the brothers/ of/ the athlete /who /are/ perpetually/ failing/in/ the math/ class.

Comp. Quest.: Is the athlete failing math?

Ans.: No.

7. Angela/ corrected/ the secretary/ of/ the lawyers/ who /has /occasionally/ made /small/ and spontaneous / mistakes.

Comp. Quest.: Have there been occasional errors?

Ans.: Yes

8. Jessica/ reproached/ the doctors/ of/ the supermodel /who/ were/ adamantly/ in /favor of /plastic /surgery.

Comp. Quest.: Did the supermodel advocate plastic surgery?

Ans.: Yes.

9. Laura/ envies/ the manager/ of/ the cashiers/ who /has/ supposedly/ received /a /huge/ raise.

Comp. Quest.: Did the manager get a huge raise?

Ans.:Yes.

10. Sarah/ fears/ the uncle/ of/ the toddlers/ who/ is/ often /heard/ yelling/ and /screaming.

Comp. Quest.: Are toddlers known for being well behaved?

Ans.:No.

11. Brian /pacified/ the associates/ of/ the businessman/ who/ were /nearly/ bankrupted/ by/ the new /policy.

Comp. Quest.: Did the new tax policy benefit businesses?

Ans.:No.

12. Tina/ praised/ the gardeners/ of/ the millionaire /who/ have/ recently/ installed /the solar/ powered/ sprinkler.

Comp. Quest.: Have the gardeners put in a new solar system?

Ans.:Yes

IC-Low Promoted Experimental Items, The Comprehension Questions And The Answers

1. Justin/ hates/ the cousins /of/ the accountant/ who /is/ forever /telling/ the same/ tasteless /jokes.

Comp. Quest.: Is the accountant likeable?

Ans.: Yes

2. Anna/ scolded /the chef/ of/ the aristocrats /who/ were /routinely /letting/ food /go to/ waste.

Comp. Quest.: Did food go to waste?

Ans.: Yes

3. Emily/ blamed/ the nieces/ of/ the florist /who/ has/ repeatedly/ ruined /expensive/white /orchids.

Comp. Quest.: Did some flowers get damaged?

Ans.: Yes

4. Jenny /assisted/ the maid /of/ the executives/ who/ were/ regularly/ late/ to/ new / work.

Comp. Quest.: Were the executives late to work?

Ans.: No

5. Nick/ trusted /the captain/ of/ the sailors/ who/ have/ consistently/ weathered/ big/and severe/ storms.

Comp. Quest.: Did the captain have Nick's confidence?

Ans.: Yes.

6. Joe /helped/ the brothers/ of/ the athlete /who /is/ perpetually/ failing/in/ the math/ class.

Comp. Quest.: Is the athlete failing math?

Ans.: No.

7. Angela/ corrected/ the secretary/ of/ the lawyers/ who /have /occasionally/ made /small/ and spontaneous / mistakes.

Comp. Quest.: Have there been occasional errors?

Ans.: Yes

8. Jessica/ reproached/ the doctors/ of/ the supermodel /who/ was/ adamantly/ in /favor of /plastic /surgery.

Comp. Quest.: Did the supermodel advocate plastic surgery?

Ans.: Yes.

9. Laura/ envies/ the manager/ of/ the cashiers/ who /have/ supposedly/ received /a /huge/ raise.

Comp. Quest.: Did the manager get a huge raise?

Ans.:Yes.

10. Sarah/ fears/ the uncle/ of/ the toddlers/ who/ are/ often /heard/ yelling/ and /screaming.

Comp. Quest.: Are toddlers known for being well behaved?

Ans.:No.

11. Brian /pacified/ the associates/ of/ the businessman/ who/ was /nearly/ bankrupted/ by/ the new /policy.

Comp. Quest.: Did the new tax policy benefit businesses?

Ans.:No.

12. Tina/ praised/ the gardeners/ of/ the millionaire /who/ has/ recently/ installed /the solar/ powered/ sprinkler.

Comp. Quest.: Have the gardeners put in a new solar system?

Ans.:Yes

Non-IC High Promoted Experimental Items, the Comprehension Questions And The Answers

1. Justin/ carpools with/ the cousins /of/ the accountant/ who /are/ forever /telling/ the same/ tasteless /jokes.

Comp. Quest.: Is the accountant likeable?

Ans.: Yes

2. Anna/ studies with /the chef/ of/ the aristocrats /who/ was /routinely /letting/ food /go to/ waste.

Comp. Quest.: Did food go to waste?

Ans.: Yes

3. Emily/ waited with/ the nieces/ of/ the florist /who/ have/ repeatedly/ ruined /expensive/white /orchids.

Comp. Quest.: Did some flowers get damaged?

Ans.: Yes

4. Jenny /joked with/ the maid /of/ the executives/ who/ was/ regularly/ late/ to/ new / work.

Comp. Quest.: Were the executives late to work?

Ans.: No

5. Nick/ stood near /the captain/ of/ the sailors/ who/ has/ consistently/ weathered/ big/and severe/ storms.

Comp. Quest.: Did the captain have Nick's confidence?

Ans.: Yes.

6. Joe /ran into/ the brothers/ of/ the athlete /who /are/ perpetually/ failing/in/ the math/ class.

Comp. Quest.: Is the athlete failing math?

Ans.: No.

7. Angela/ gossiped with/ the secretary/ of/ the lawyers/ who /has /occasionally/ made /small/ and spontaneous / mistakes.

Comp. Quest.: Have there been occasional errors?

Ans.: Yes

8. Jessica/ worked with/ the doctors/ of/ the supermodel /who/ were/ adamantly/ in /favor of /plastic /surgery.

Comp. Quest.: Did the supermodel advocate plastic surgery?

Ans.: Yes.

9. Laura/ knows/ the manager/ of/ the cashiers/ who /has/ supposedly/ received /a /huge/ raise.

Comp. Quest.: Did the manager get a huge raise?

Ans.:Yes.

10. Sarah/ jogs with/ the uncle/ of/ the toddlers/ who/ is/ often /heard/ yelling/ and /screaming.

Comp. Quest.: Are toddlers known for being well behaved?

Ans.:No.

11. Brian /visited/ the associates/ of/ the businessman/ who/ were /nearly/ bankrupted/ by/ the new /policy.

Comp. Quest.: Did the new tax policy benefit businesses?

Ans.:No.

12. Tina/ met/ the gardeners/ of/ the millionaire /who/ have/ recently/ installed /the solar/ powered/ sprinkler.

Comp. Quest.: Have the gardeners put in a new solar system?

Ans.:Yes

Non-IC Low Promoted Experimental Items, The Comprehension Questions And The Answers

1. Justin/ carpools with/ the cousins /of/ the accountant/ who /is/ forever /telling/ the same/ tasteless /jokes.

Comp. Quest.: Is the accountant likeable?

Ans.: Yes

2. Anna/ studies with /the chef/ of/ the aristocrats /who/ were /routinely /letting/ food /go to/ waste.

Comp. Quest.: Did food go to waste?

Ans.: Yes

3. Emily/ waited with/ the nieces/ of/ the florist /who/ has/ repeatedly/ ruined /expensive/white /orchids.

Comp. Quest.: Did some flowers get damaged?

Ans.: Yes

4. Jenny /joked with/ the maid /of/ the executives/ who/ were/ regularly/ late/ to/ new / work.

Comp. Quest.: Were the executives late to work?

Ans.: No

5. Nick/ stood near /the captain/ of/ the sailors/ who/ have/ consistently/ weathered/ big/and severe/ storms.

Comp. Quest.: Did the captain have Nick's confidence?

Ans.: Yes.

6. Joe /ran into/ the brothers/ of/ the athlete /who /is/ perpetually/ failing/in/ the math/ class.

Comp. Quest.: Is the athlete failing math?

Ans.: No.

7. Angela/ gossiped with/ the secretary/ of/ the lawyers/ who /have /occasionally/ made /small/ and spontaneous / mistakes.

Comp. Quest.: Have there been occasional errors?

Ans.: Yes

8. Jessica/ worked with/ the doctors/ of/ the supermodel /who/ was/ adamantly/ in /favor of /plastic /surgery.

Comp. Quest.: Did the supermodel advocate plastic surgery?

Ans.: Yes.

9. Laura/ knows/ the manager/ of/ the cashiers/ who /have/ supposedly/ received /a /huge/ raise.

Comp. Quest.: Did the manager get a huge raise?

Ans.:Yes.

10. Sarah/ jogs with/ the uncle/ of/ the toddlers/ who/ are/ often /heard/ yelling/ and /screaming.

Comp. Quest.: Are toddlers known for being well behaved?

Ans.:No.

11. Brian /visited/ the associates/ of/ the businessman/ who/ is /nearly/ bankrupted/ by/ the new /policy.

Comp. Quest.: Did the new tax policy benefit businesses?

Ans.:No.

12. Tina/ met/ the gardeners/ of/ the millionaire /who/ has/ recently/ installed /the solar/ powered/ sprinkler.

Comp. Quest.: Have the gardeners put in a new solar system?

Ans.:Yes

T.C.
İSTANBUL AYDIN ÜNİVERSİTESİ REKTÖRLÜĞÜ
Sosyal Bilimler Enstitüsü Müdürlüğü

Sayı : 88083623-044-758 22/02/2016
Konu : Etik Kurul Onay

Sayın Tuğba AYDIN YILDIZ

Enstitümüz Y1212.625009 numaralı İngiliz Dili ve Edebiyatı Ana Bilim Dalı İngiliz Dili ve Edebiyatı lisans sonrası doktora programı öğrencilerinden Tuğba AYDIN'ın "RELATIVE CAUSE ATTACHMENT PREFERENCE BY TURKISH YOUNG L2 LEARNERS OF ENGLISH: THE ROLE OF VERB INFORMATION IN AMBIGUITY RESOLUTION" adlı tez çalışması gereği "Completion Sentenses" ve "Multiple Choice Qestions" ile ilgili sorularınız 08.02.2016 tarih ve 2016/03 İstanbul Aydın Üniversitesi Etik Komisyon Kararı ile etik olarak uygun olduğuna karar verilmiştir.

Bilgilerinize rica ederim.

Prof. Dr. Zafer UTLU
Müdür

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