PROCESSING REFLEXIVES IN THE SECOND LANGUAGE:

EVIDENCE FROM EYE TRACKING

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DECLARATION OF ORIGINALITY

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ABSTRACT

Processing Reflexives in the Second Language:

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This thesis examines how Turkish learners of English process English reflexives (*himself/herself*). Two eye tracking experiments and a pen-and-paper antecedent identification task were employed to test whether Turkish learners of English were constrained by syntactic requirements associated with English reflexives, or other types of information such as discourse prominence or linear proximity influenced their antecedent retrieval behavior for the reflexives. The experimental materials in the two eye tracking experiments were adapted from Sturt (2003) and the materials in the antecedent identification task were largely based on those. Data were collected from 95 advanced learners of English. The results indicated that Turkish learners of English used structural constraints associated with the binding of English reflexives, but they were slower in their use of structural information compared to the native speakers in Sturt's (2003) study. The use of structural information by Turkish learners of English was evident only in the eye tracking measures reflecting later stages of processing. There was no sign of use of non-structural cues such as discourse prominence and linear proximity in the eye tracking experiments, but their ultimate interpretations in the antecedent identification task were influenced by discourse-related information (although they chose the local noun as the antecedent for the reflexive > 79% of the time). The findings contradict the assumption that non-native speakers rely more on non-structural cues (discourse prominence or linear proximity) than structural cues (syntactic constraints governing the binding of reflexives) during real-time sentence processing (Clahsen & Felser, 2006).

ÖZET

İkinci Dilde Dönüşlülük Zamirini İşlemleme:

Göz İzlemeden Kanıt

Bu çalışma, İngilizce öğrenen Türklerin İngilizce'deki dönüşlülük zamirlerini (*himself/herself*) nasıl işlemlediklerini incelemektedir. İngilizce öğrenenlerin dönüşlülük zamirleri için öncül geri alma davranışlarında sözdizimsel gereksinimleri veya söylemin önceliği ya da doğrusal yakınlık gibi diğer bilgi türlerini kullanıp kullanmadıklarını test etmek için iki göz izleme deneyi ve bir kalem-kâğıt öncül tanımlama görevi kullanılmıştır. İki göz izleme deneyindeki deney materyalleri, Sturt (2003) 'ten alınmıştır.Veriler 95 adet ileri düzeyde İngilizce bilen kişilerden toplanmıştır. Sonuçlar, İngilizce öğrenen Türklerin anadil konuşmacılarına benzer şekilde dönüşlülük zamiri için öncül alma işlemi sırasında dönüşlülük zamirlerinin bağlanması gereklilikleri ile ilişkili yapısal kısıtlamaları kullanabildiklerini ama yapısal bilginin kullanımı konusunda daha yavaş olduklarını göstermiştir. İngilizce öğrenen Türkler'deki yapısal bilginin kullanımı sadece daha sonraki işlemleme aşamalarını yansıtan göz izleme ölçümleri için gözlemlenmiştir. İki göz izleme deneyinde, söylemin belirginliği ve doğrusal yakınlık gibi yapısal olmayan ipuçlarının kullanımına rastlanmamıştır, ama öncül tanımlama görevinde söylemle ilgili bilgilerden yararlandıkları görülmüştür (ama yerel olan ismin dönüşlülük zamiri için öncül olarak seçilmesi yüzde 79'tur). Bu sonuçlar ana dili olmayan konuşmacıların gerçek zamanlı cümle işlemleme sırasında yapısal ipuçlarına (dönüşlülük zamirinin bağlanması ile ilgili sözdizimsel kısıtlamalar) göre yapısal olmayan ipuçlarına (söylemin önceliği veya doğrusal yakınlık) daha fazla güvendiği varsayımına karşıdır (Clahsen & Felser, 2006).

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ABBREVIATIONS

1	first person
3	third person
ABL	ablative case
ACC	accusative case
DAT	dative case
GEN	genitive case
LOC	locative case
NEG	negation
NMLZ	nominalization
NOM	nominative case
PAST	past tense
PL	plural
PRF	perfect
POSS	possessive
PROG	progressive
SG	singular

CHAPTER 1

INTRODUCTION

1.1 Introduction

This study investigates antecedent preferences of Turkish-speaking learners of English in complex sentences such as *Gordon realized that Richard had explained himself after arriving late for work.* The Binding Principle A (BP-A) of Chomsky's Binding Theory (BT) (1981) states that the reflexive *himself* must be bound by the local antecedent *Richard* but not by the non-local antecedent *Gordon*. Although this observation seems to be mainly true for English, certain reflexives such as Turkish *kendi/kendisi* do not appear to abide by BP-A and allow for local and non-local binding of reflexives (Enç, 1989; Kornfilt, 1984; Meral, 2010; Palaz, 2013).

Previous research on first language (L1) processing has provided inconclusive evidence on syntactic biases in real-time antecedent retrieval search for reflexives. Some studies found that native speakers' antecedent preference is syntactically constrained, confirming the assumptions of BP-A (Clackson, Felser & Clahsen, 2011; Cunnings & Felser, 2013; Dillon, Mishler, Sloggett & Phillips, 2013; Nicol & Swinney, 1989) and some studies found that native speaker can use both syntactic and non-syntactic information in their processing of reflexive with the primacy of syntactic information (Sturt, 2003; Xiang Dillon & Philips, 2009). However, other studies found that if the non-local antecedent has the same phi-features (i.e., person, number and gender) with the reflexive and if the non-local antecedent is highly prominent in the discourse, native speakers consider this antecedent as a possible referent for the reflexive, as well (Badecker & Straub, 2002; Clackson & Heyer, 2014; Patil, Vasishth & Lewis, 2016).

Even though processing of reflexives in the first language have been much studied, research examining processing of reflexives in the second language (L2) has been limited. Studies investigating L2 processing of reflexives showed that unlike native speakers, L2 learners' initial antecedent preference is not syntactically constrained but it is influenced by discourse-related or pragmatic factors (Felser & Cunnings, 2012; Felser, Sato & Bertenshaw, 2009). In these studies, although native speakers' antecedent retrieval was mainly influence by syntactic constraints L2 learners considered the syntactically inaccessible but semantically plausible antecedent at early stages of processing. These findings were reported for learners whose L1 differed from English with respect to its tolerance for non-local binding of the reflexive (Japanese-speaking learners of English in Felser et al., 2009; German-speaking learners of English in Felser and Cunnings, 2012). These findings were taken as evidence for the argument that first and second language speakers do not follow the same processing routines in retrieving antecedents for reflexives. Even though structural information is more dominant in L1 processing, non-structural cues such as discourse prominence, semantic and pragmatic information are influential in L2 processing. Thus, they were compatible with the Shallow Structure Hypothesis (SSH) which suggests that L2 learners' syntactic configurations are considered to be "less detailed and shallower than those of native speakers" (Clahsen and Felser, 2006, p. 32). Even though native speakers are highly competent in integrating different sources of information such as syntax, semantics, pragmatics and discourse, non-native speakers are claimed to rely more on non-structural cues during online processing (Clahsen & Felser, 2006).

1.2 Aims of the study

This study aims to shed further light onto how reflexives in English will be processed by Turkish-speaking learners of English. The main motivation to test Turkish-learners of English on their processing of reflexives in English comes from the cross-linguistic difference between these two languages in their binding of reflexives. English allows only for local binding of reflexives; but in Turkish both local and non-local binding of reflexives is possible (Enç, 1989; Gračanin-Yuksek, Lago, Şafak, Demir & Kırkıcı, 2017; Kornfilt, 1984; Meral, 2010; Özbek & Kahraman, 2016; Palaz, 2013; Sezer, 1979). This cross-linguistic difference between English and Turkish allows us to test whether Turkish learners of English will transfer the non-local binding property of Turkish reflexives while they are processing English reflexives, or they will be sensitive to syntactic constraints associated with English reflexives. In addition, sensitivity to non-structural information such as discourse prominence or linear proximity will be investigated.

Two eye tracking experiments (Experiments 1 and 2) test (i) whether Turkish-speaking learners of English will use structural and non-structural information similar to the native speakers of English do (Sturt, 2003) (ii) or they will rely on non-structural cues and will be influenced by factors such as discourse prominence or linear proximity during antecedent retrieval for reflexives similar to the L2 learners in the previous studies (Felser et al, 2009; Felser & Cunnings, 2012). A pen-and-paper antecedent identification task will test the L2 learners' final interpretation for the antecedent of the reflexive.

1.3 Organization of the thesis

The rest of the thesis is organized around the following five chapters. Chapter 2 provides information about syntactic constraints in reflexive binding in English and Turkish and it also reports on a Turkish experiment investigating native speakers' antecedent preferences for reflexives. Chapter 3 presents a detailed summary of how reflexives are processed in the first and second languages. Chapter 4 overviews theoretical models of non-native language processing. Chapter 5 presents the present study and reports on the two eye tracking experiments and one pen-and-paper antecedent identification task. Finally, Chapter 6 provides a discussion on the findings of the experiments and their relation to the theoretical models proposed for non-native language processing.

CHAPTER 2

SYNTACTIC CONSTRAINTS ON BINDING OF REFLEXIVES IN ENGLISH AND TURKISH

2.1 Binding Theory and binding of reflexives in English

The Government and Binding model of Chomsky (1981) proposes several grammatical constraints for the binding of different types of noun phrases (NPs). Binding Theory (BT) consists of three principles, each of which controls a specific NP's distributional features as defined in (1):

(1) The Binding Principles:

a. Principle A: An anaphor must be bound in its governing category.

b. Principle B: A pronominal must be free in its governing category.

c. Principle C: An R-expression is always free.

(Chomsky, 1981)

The governing category is defined as:

(2) α is the governing category for β if and only if α is the minimal category containing β and a governor of β, where α=NP or S.

(Chomsky, 1981, p. 188)

And the binding is defined as:

(3) α is X-bound by β if and only if α and β are coindexed, β c-commands α, and β is in an X-position.

(Chomsky, 1981, p. 184)

In Chomsky's (1981) BT, BP-A suggests that the reflexive and its antecedent must agree in their phi-features which are the semantic features of person, number and gender as exemplified in (4):

(4) John$_i$ introduced himself$_i$.

The sentence in (4) is a simple sentence in English. In this example, *John* has the same phi-features with *himself* (3rd person, singular, male). The governing category for the reflexive in (4) is the whole sentence. In the sentence, there is a governor, *introduced* and an antecedent, *John* for the reflexive and both the antecedent, *John* and the reflexive, *himself* occur in the same governing category; therefore, *himself* is co-indexed with *John*. Thus, all requirements regarding BP-A are met and *himself* is locally bound by *John*.

The governing category in the original definition of binding (Chomsky, 1981) was replaced with local domain (Chomsky, 1986). According to Chomsky (1986), local domain is defined as the minimal clause (inflectional phrase (IP)) that includes the antecedent of a reflexive. The sentence in (5) exemplifies how the local domain determines reflexive-antecedent relations in complex sentences in English:

(5) John$_i$ thinks Bob$_j$ killed himself$_{*i/j}$.

In (5), the minimal clause (IP) containing the antecedent of the reflexive is the embedded clause, *Bob killed himself*. The reflexive, *himself* is bound within its own local domain, so the antecedent of the reflexive is the subject of the embedded clause, *Bob*. In addition, *Bob* and *himself* share the same person (3rd person), number (singular) and gender (male) features. Therefore, both *Bob* and *himself* shares the same co-indexation. Even though the subject of the sentence, *John* shares the same person (3rd person), number (singular) and gender (male) features with *himself*, it is

not the structurally-governed antecedent for *himself* as *John* does not occur within the same local domain with *himself*.

The reflexive must also be co-indexed with a c-commanding antecedent. C-commanding is defined as:

(6) Node A c(onstituent)-commands node B iff the first branching node α_1 dominating A either dominates B or is immediately dominated by a node α_2 which dominates B, and α_2 is of the same category type as α_1.

(Reinhart, 1976, p. 148)

Given these definitions, (BP-A), the syntactic constraints that concern us in this study maintain that a reflexive should be bound by a c-commanding antecedent in its local domain or its governing category. The antecedent and the reflexive should also share the same phi-features (person, number and gender). The sentences in (7) exemplify how these syntactic constraints operate:

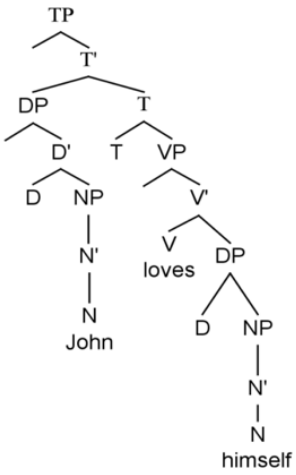
(7)

a. John$_i$ loves himself$_i$.

b. [John's$_i$ father]$_j$ loves himself$_{*i/j}$.

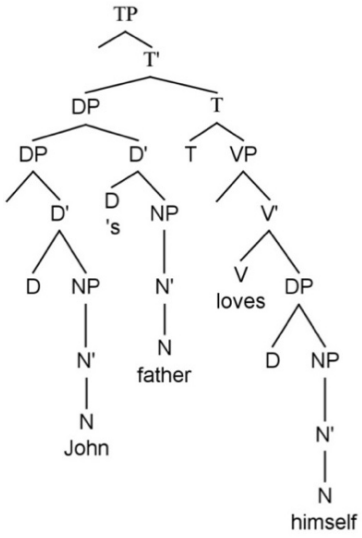
In example (7a), *John* shares the same phi-features with *himself* (3rd person, singular, male) and both *John* and *himself* occur in the same local domain. Therefore, in (7a) *John* and *himself* have the same co-indexation. There is also a c-command relationship between *John* and *himself* as the Determiner Phrase (DP) dominating *John* c-commands the NP dominating *himself* as exemplified in (8):

(8)



In example (7b), however, *John's father*, the whole DP, but not *John,* is the appropriate antecedent for *himself*. The reason is that the DP dominating *John's father* c-commands the NP dominating *himself* as shown in (9) but the NP dominating *John* does not. Even though *John* shares the same phi-features with *himself*, the NP dominating *John* does not c-command the NP dominating *himself*; therefore, *John* and *himself* have different co-indexations.

(9)



In English, a reflexive must also be bound by a c-commanding antecedent within its local domain in non-finite bi-clausal sentences as exemplified in (10):

(10) John$_i$ wanted Bob$_j$ to introduce himself$_{*i/j}$ in the meeting.

In (10), the embedded clause *to introduce himself in the meeting* is a non-finite clause, i.e., the verb in that clause does not bear tense and person markers. The local domain for the reflexive is still the embedded clause, *to introduce himself in the meeting* as it is the minimal IP containing an antecedent for the reflexive. In the local domain, the antecedent, *Bob* c-commands the reflexive, and shares the same phi-features with *himself* (3rd person, singular, male). Even though *John* shares the same phi-features with *himself* and c-commands it, *John* is not within the local domain with *himself*. In other words, even though c-command requirement is met, locality requirement for the antecedent and the reflexive is violated as *John* does not occur within the same local domain with *himself*. Therefore, *John* and *himself* do not have the same co-indexation.

Although English reflexives mostly abide by the original definition of BP-A, there are still some problematic sentences as in (11):

(11) John$_i$ saw Bill$_j$'s picture of himself$_{*i/j}$.

As the only minimal clause in (11) is the whole sentence, both *John* and *Bill* can be possible antecedents for *himself* according to BP-A. Nevertheless, as the co-indexations show only *Bill* can be the antecedent of *himself* in (11). These structures are called Picture Noun Phrases (PNPs) and they pose a challenge to for Chomsky's (1986) definition of local domain as they do not obey the requirements of BP-A.

BT has been revised multiple times due to the problematic definition of the local domain (Chomsky, 1986). Different versions of the BT have been proposed in the literature such as the governing category principle for a specific language

(Wexler & Manzini, 1987), the Reflexivity approach (Reinhart & Reuland, 1993) and a movement analysis for reflexives in the Minimalist program (Hornstein, 2006). However, the original definition of local domain (Chomsky, 1986) will serve for the purposes of this study.

BP-s are considered to be universal constraints for the referentiality of NPs. However, cross-linguistic variation has been reported for binding of anaphors. Turkish is one of those languages whose reflexives *kendi* and *kendisi* challenge the BP-A. The following section examines the binding of Turkish reflexives.

2.2 Binding of reflexives in Turkish

There are two reflexive pronouns in Turkish: *kendi* and *kendisi*. These two reflexives have different distributional properties with consequences on their interpretation. As the previous research seems to agree on the binding of *kendisi*, this section starts with the discussion of *kendisi*.

2.2.1 *Kendisi*

Kendisi is the inflected form *kendi* with third person singular possessive marker (Göksel & Kerslake, 2005). *Kendisi* can take a local antecedent and it can also be bound by a non-local antecedent outside of its local domain as illustrated in (12):

(12) Elif$_i$ [Mehmet$_j$'in *kendi-si-ne*$_{i/j}$ ev al-ma-sı-na şaşır-dı.
Elif Mehmet-GEN self-3 SG POSS-DAT house
buy-NMLZ-POSS-DAT be surprised-PAST
'Elif was surprised when Mehmet bought a house for himself/her.'

In (12), the interpretation of *kendisi* is ambiguous. That is, it can be bound by the local antecedent in its own local domain, so it can refer to the subject of the

embedded clause, *Mehmet*. It can also be bound by the non-local antecedent outside of its local domain, so it can refer to the subject of the matrix clause, *Elif*. As the co-indexations show, both interpretations do not cause ungrammaticality in the sentence.

In addition to a non-local antecedent, *kendisi* can also refer to an antecedent which is not mentioned in the sentence as in (13):

(13) Hasan$_i$ bugün *kendi-si-nden*$_{i/j}$ bahset-ti.
Hasan today self-3 SG POSS-ABL mention-PAST
'Today, Hasan talked about himself/him.'

In (13), the interpretation of *kendisi* is ambiguous between a coreferential and a disjoint reading. That is, it can refer to the subject of the sentence, *Hasan* as well as another person in the context. When *kendisi* is bound by the coreferential subject, *Hasan*, there is no violation of BP-A as *Hasan* and *kendisi* occur within the same local domain. Nevertheless, when it is bound by an external antecedent, it does not obey the assumptions of BP-A but rather it behaves like a pronoun. Although *kendisi* shows similar distributional properties to pronominals, according to Kornfilt (2001) *kendisi* cannot be a pronominal because pronominals abide by BP-B, which prevents them from taking local antecedents (but cf. Gürel, 2002 for an argument for *kendisi* as a pronominal).

Enç (1989) maintains that BP-A is not sufficient to explain the distributional properties of *kendisi*. She states that BP's as defined by Chomsky (1981) do not entail semantic binding, which is necessary for the distribution of anaphors across languages. For semantic binding, two features are needed to account for the distribution of anaphors across languages. These features are binder and licenser. The binder feature [+B] stands for the NPs that need a sentence-internal binder

which semantically binds the anaphor whereas [-B] refers to the NPs that do not require a sentence-internal semantic binder. The licenser feature [+L] stands for the NPs that require a licenser whereas [-L] stands for NPs that do not require a licenser. If an NP has the [+L] feature, this NP must be bound locally by obeying BP-A, so it is an anaphor. According to Enç (1989), if an NP has [+B] and [+L] features, that NP is a true reflexive. On the other hand, *kendisi* has [-B] feature as it does not require only a sentence-internal antecedent and it also has [-L] feature as there is no locality or non-locality condition. Hence, Enç (1989) proposes that *kendisi* is an NP having [-L, -B] features. Consider the example in (14):

(14) Ali$_i$ [Ayşe$_j$-nin *kendi-si-ne*$_{i/j/k}$ kız-ma-sı]-na şaş-tı.
Ali Ayşe-GEN self-3.SG POSS-DAT be angry-POSS-DAT be surprised-PAST
'Ali was surprised that Ayşe was angry at self.'

(Enç, 1989, p. 58)

As the co-indexation in (14) shows, *kendisi* does not require only a sentence-internal and local antecedent; it can be bound by a sentence-external antecedent, as well.

Kornfilt (2001) questions if *kendisi* could be considered a Long-Distance (LD) reflexive in Turkish. It is maintained for LD reflexives that they have two common properties; (i) they are mono-morphemic, (ii) they are subject-oriented (Pica, 1987). *Kendisi* does not have these two properties of LD reflexives as it is multi-morphemic (Göksel & Kerslake, 2005) and is not subject-oriented (Kornfilt, 2001) as exemplified in (15):

(15) Ali$_i$ Ahmet-e$_j$ [Selim-in$_k$ *kendi-si-ni*$_{i/j/k}$ çok beğen-diğ-in]-i söyle-di.
Ali Ahmet-DAT Selim-GEN self–3 SG POSS-ACC very admire-NMLZ-ACC say-PAST

'Ali_i told $Ahmet_j$ that $Selim_k$ admires $him(self)_{i/j/k}$ very much.'

(Kornfilt, 2001, p. 205)

As (15) indicates, *kendisi* can be bound by the subject of the matrix clause, *Ali* and the subject of the embedded clause, *Selim* and the indirect object, *Ahmet*. As it is possible to bind *kendisi* with an indirect object, it does not have the property of being subject-oriented. Thus, Kornfilt (2001) rules out the possibility of *kendisi* being a LD reflexive.

Kornfilt (2001) argues that *kendisi* is actually an Agreement Phrase (AgrP) whose specifier is *pro*. She maintains the idea that the structure of *kendisi* is similar to that of possessive structures in Turkish. Therefore, the AgrP is the binding domain for both *kendisi* and the *pro* as shown in (16) and (17):

(16) *pro* araba-sı

car–3 SG POSS

'[His/her] car'

(Kornfilt, 2001, p. 207)

(17) *pro kendi -si*

self–3 SG POSS

'[His/her] self (i.e. himself/herself)'

(Kornfilt, 2001, p. 207)

According to Kornfilt's (2001) argument, *pro* locally binds *kendisi* in AgrP. However, as *pro* is free within this domain, it can select an antecedent outside the AgrP domain, or even an antecedent in the discourse. *Kendisi* locally conforms to BP-A within the AgrP domain and acts as an anaphor. However *pro*, the pronominal specifier, is obviously free within the AgrP domain; therefore, it acts as a pronominal and conforms to BP-B as shown in (18) and (19):

(18) Ahmet$_i$ bu kitab-ı [pro$_i$ *kendi -si -ne*$_i$] al-dı.

Ahmet this book-ACC self - 3 SG POSS –DAT buy-PAST

'Ahmet bought this book for himself.'

(Kornfilt, 2001, p. 208)

(19) Ahmet$_i$ ayna – da [pro$_j$ *kendi -si -ni*$_j$] gör-dü.

Ahmet mirror-DAT self-3 SG POSS-ACC see-PAST

'Ahmet$_i$ saw him$_j$ (i.e., someone mentioned in the discourse) in the mirror.

(Kornfilt, 2001, p. 209)

As it can be seen from the example (18), *pro* has the same co-indexation with the subject of the matrix clause, *Ahmet*; therefore, *kendisi* can select *Ahmet* as its antecedent. However, in (19), *pro* has a different co-indexation from the subject of the matrix clause and it can be understood that *kendisi* selects an antecedent outside of the sentence which is mentioned in the discourse. (also see Dinçtopal-Deniz (2009) for a similar argument where she suggests that *kendisi* is a doubly-marked possessive NP.)

2.2.2 *Kendi*

Göksel and Kerslake (2005) maintain that *kendi* is the standard form of expressing reflexivity in Turkish and it is the bare form of Turkish reflexive pronoun. *Kendi* is usually bound by an antecedent in its own local domain as illustrated in (20):

(20) Erol [Ziya'nın *kendin-e* bir araba al-dığ-ın]-ı san-ıyor.

Erol Ziya-GEN self-DAT a car buy-NMLZ-3 SG POSS-ACC think-PROG

'Erol thinks Ziya bought a car for himself.'

(Göksel & Kerslake, 2005, p. 236)

In (20), the local domain of *kendi* is the embedded clause, so *kendi* is bound by the subject of the embedded clause, *Ziya*.

Although literature on *kendisi* appears to agree on its non-local (as well as local) binding, there is still some disagreement on the binding of *kendi.* There are researchers who claim that *kendi* does not always conform to the BP-A and allows long-distance binding in certain situations. The discussion on *kendi*'s non-local binding will firstly present the arguments of Sezer (1979), Aissen (1974) and Kornfilt (1997). It will continue with the discussion on whether the nominalization markers on the embedded predicate has an effect on non-local binding of *kendi* in complex sentences in Turkish (Kornfilt, 1984; Meral, 2010, 2013; Palaz, 2013).

Sezer (1979), for instance, states that *kendi* does not need to be in the same local domain with its antecedent. According to him, the speaker's attitude towards the person(s) he is describing in the context governs the reflexivization process in Turkish instead of the syntactic configurations. He illustrates his argument with a literary text in Turkish as shown in (21):

(21) *Lamia,* yüzbaşının elini, kolunu sallayarak bir şeyler anlattığını, binbaşının ara sıra başını çevirip vagona baktığını görüyordu. *Genç kız* onların ne konuştuklarını işitmediği halde *kendinden* bahsettiklerini zannediyor, Makbule'ye söyleyeceği sözleri şaşırıyordu.

Lamia could see that the captain was talking about something waving his arms and hands, and that the major was turning his head every now and then to look at the wagon. *The young girl,* although she could not hear what

they were saying, thought that they were talking about *her* (literally: self), and she did not know what to say to Makbule.

(Sezer, 1979, p. 750)

According to Sezer (1979), the reason for using *kendinden* in (21) is that *kendi* expresses *Lamia*'s own point of view. That is, the context directly explains *Lamia*'s own internal feeling. Sezer (1979) states that if *kendisinden* had been used in (21), the observation of the outsider towards *Lamia*'s feeling would have been expressed in the context.

Aissen (1974) observes that in causative sentences such as (22) *kendi* might be bound by an antecedent which is not in the subject position of the sentence when this antecedent is the only antecedent that shares the same morphological features with *kendi.*

(22) Mehmet kızlar-a aynada *kendileri-ni* göster-di.
Mehmet girls-DAT in the mirror selves-ACC show-PAST
'Mehmet showed the girls themselves in the mirror.'

(Aissen, 1974, p. 342)

The example in (22) shows that *kendi* is bound by the dative object, *kızlara* as *kızlara* and *kendileri* had the same morphological number feature (3rd person plural). However, according to Aissen (1974), if there are two morphologically possible antecedents for *kendi* in causative sentences as in (23), the subject of the sentence is the referent of *kendi*:

(23) Mehmet Ali'ye *kendi-ni* ayna-da göster-di.
Mehmet Ali-DAT self-ACC mirror-DAT show-PAST
'Mehmet showed himself to Ali in the mirror.'

(Aissen, 1974, p. 342)

Even though both *Mehmet* and *Ali* had the same number feature with *kendini* (3rd person singular) in (23); Aissen (1974) maintains that the subject of the sentence, *Mehmet*, should be the antecedent of *kendi* as the sentence is causative.

Kornfilt (1997) argues that *kendi* occurring in an infinitival embedded clause can refer to an antecedent in the matrix clause. In other words, it is possible to bind *kendi* with the subject of the matrix clause if *kendi* occurs in an infinitival embedded clause as exemplified in (24):

(24) Ahmet$_i$ [ø$_i$ *kendin-i$_i$* daha fazla sev-me-ye] çalış-ıyor.
Ahmet ø self-ACC more much like-NMLZ-DAT try -PROG
'Ahmet is trying to like himself more.'

(Kornfilt, 1997, p. 141)

In (24), even though *kendi* occurs in an embedded clause, it is bound by the subject of the matrix clause, *Ahmet*.

There are also others who state that the local or non-local binding of *kendi* depends on the nominalization marker on the predicate of the embedded clause in complex sentences. For instance, Kornfilt (1984) argues that embedded clauses nominalized with *-DIK/-EcEK* are factive nominals and embedded clauses nominalized with *-mA* are action nominals in Turkish. According to her, factive nominals and action nominals differ from each other. Factive nominals have a remainder of tense and agreement; however, action nominals do not contain tense feature. Thus, action nominals are more transparent domains for grammatical operations such as binding whereas factive nominals create more opaque domains. If a nominalized verb in the embedded clause has tense and agreement features such as in factive nominals, this embedded clause serves as a landing site for WH- or Tense operator; therefore, it creates an opaque domain for binding. That is, embedded

clauses create some sort of opaqueness or barrier which prevents the reflexive to see the antecedents beyond them. Therefore, *kendi* can only refer to an antecedent within the same local domain when the clause is marked with *-DIK* and *-EcEK*.

-mA constructions have agreement feature similar to factive nominals, but *-mA* constructions do not have tense feature unlike factive nominals. This means that embedded clauses containing *-mA* nominalization do not have a landing site for a WH- (or Tense) operator. This makes the embedded clause transparent for binding operations, allowing for *kendi* to be bound by both local and non-local antecedents in the sentence. That is, both the subject of the embedded clause (local antecedent) and the subject of the matrix clause (non-local antecedent) can be potential antecedents for *kendi* with complex sentences having *-mA* nominalization on the embedded predicate. Now, consider the examples in (25):

(25)

a. Fatma [Ahmet'in *kendi-ne* araba al-dığ-ı/al-acağ-ı]-nı öğren-di.
   Fatma Ahmet-GEN self-DAT car buy-NMLZ-POSS ACC learn-PAST
   'Fatma learnt that Ahmet would buy a car for himself/her.'

b. Elif [Mehmet'in *kendi-ni* sev-me-si]-ni isti-yor.
   Elif Mehmet-GEN self-POSS love-NMLZ-POSS-ACC want-PROG
   'Elif wants Mehmet to love himself/her.'

According to Kornfilt (1984), as the embedded predicate is nominalized with *–DIK/-EcEK* in (25a), the embedded predicate has tense and agreement features. Therefore, the binding domain of *kendi* becomes opaque and only the local antecedent, *Ahmet* can bind *kendine* in (25a). As the embedded predicate is nominalized with *–mA* in (25b), the embedded predicate does not have tense feature. Therefore, the binding

domain of *kendini* becomes transparent and both the local antecedent, *Mehmet* and the non-local antecedent, *Elif* can bind *kendi* in (25b).

Another nominalizer in Turkish is *-mAK*. According to George and Kornfilt (1981), clauses with *-mAK* are considered as control structures in Turkish. According to Kornfilt (2007), these control structures lack both tense and agreement features on the embedded predicate, so they are considered as DPs. Therefore, they create a transparent domain for binding, allowing for binding *kendi* to both local antecedent (the subject of the embedded clause) and non-local antecedent (the subject of the matrix clause) as exemplified in (26):

(26) Ayşe [Ali'ye kendi-ni anlat-mak] isti-yor.
Ayşe Ali-DAT self-POSS tell-NMLZ want-PROG
'Ayşe wants Ali to mention himself/her.'

In (26), as the embedded predicate is nominalized with *-mAK*, there is no tense and agreement on the embedded predicate, so the embedded clause becomes a DP. Thus, *kendi* can be bound by *Ali* (local antecedent) and *Ayşe* (non-local antecedent) and neither interpretation does not create any ungrammaticality.

As opposed to Kornfilt (1984), Palaz (2013) maintains that tense does not determine the binding domain for *kendi* in Turkish but only agreement does. The reason is that nominal agreement is realized under the Complementizer Phrase (CP) projection which is the relevant binding domain for *kendi* because "nominalized clauses with *–DIK /-EcEK* and *–mA* occur as Modality Phrase (ModP) projections which are headed by the modality they have. There is a CP projection above ModP, which is theoretically and empirically accounted for, as well" (Palaz, 2013, p. 93). According to Palaz (2013), embedded clauses nominalized with *–DIK*, *-EcEK* and *–mA* contain agreement feature, so they are considered as CP projections, which

makes them suitable for binding operations. The embedded clauses nominalized with *–DIK*, *-EcEK* or –mA create an opaque domain for binding; therefore, only local binding is permitted for *kendi*. Now, consider the examples in (27):

(27)

a. Ali [Ayşe'nin *kendi-ni* sev-diğ-i/sev-eceğ-i]-ni bil-iyor.
Ali Ayşe-GEN self-ACC love-NMLZ-ACC know-PROG
'Ali knows that Ayşe loves herself/him.'

b. Veli [Zeynep'in *kendi-nden* bahset-me-si]-ni isti-yor.
Veli Zeynep-GEN self-ABL mention-NMLZ-POSS-ACC want-PROG
'Veli wants Zeynep to mention herself/him.'

In (27a, b), as the embedded predicates are nominalized with *–DIK/-EcEK* and *–mA*, they have agreement features. The binding domain of *kendi* becomes opaque in (27a, b), so only the local antecedent, *Ayşe* can bind *kendini* in (27a) and only the local antecedent, *Zeynep* can bind *kendinden* in (27b).

Palaz (2013) also maintains that since embedded clauses with *-mAK* lack agreement feature on the embedded predicate, they do not create an opaque domain for *kendi*; both the subject of the matrix clause and the subject of the embedded clause can be antecedents of *kendi* as in (28):

(28) Ayşe$_i$ [Ali$_j$'ye *kendi-nden*$_{i/j}$ bahset-me] -yi isti-yor.
Ayşe$_i$ Ali$_j$-DAT self-ABL talk-NMLZ-ACC want-PROG
'Ayşe wants to talk about himself/her.'

(Palaz, 2013, p. 106)

In (28), the embedded predicate nominalized with *-mAK* does not have agreement feature. The binding domain of *kendi* is transparent, so both the local antecedent, *Ali* and the non-local antecedent, *Ayşe* can bind *kendi*.

Palaz (2013) also expresses a relationship between adjunct clauses which are marked with nominalization markers such as *-IncA* and binding of *kendi*. Accordingly, the predicate in an adjunct clause does not carry agreement feature, making it transparent for binding. In such sentences, it is possible to bind *kendi* both locally and non-locally. Consider the example (29):

(29) Ayşe$_i$ [öğretmen$_j$ *kendin-e*$_{i/j}$ seslen-ince] uyan-dı.
Ayşe$_i$ teacher$_j$ self-DAT call-when wake-PAST
'Ayşe woke up when the teacher called her.'
(Palaz, 2013, p. 117)

As (29) shows, both the local antecedent, *öğretmen* and the non-local antecedent, *Ayşe* can be potential antecedents for *kendi* when *kendi* occurs in an embeded clause nominalized with *-IncA*.

Contrary to Kornfilt (1984) and Palaz (2013), Meral (2010, 2013) argues that tense and agreement features are not sufficient to explain the binding phenomena in Turkish. He proposes that A-domain (i.e., where the lexical antecedent sits) is not very active in Turkish; hence, grammatical operations such as binding occur in a very active A'- domain in operator-variable chains. According to Meral (2010, 2013), the local antecedent does not play a role in binding of anaphors in these operator-variable chains. This argument suggests that *kendi* is a variable which can only occur when there is an A'-operator, making long-distance binding of *kendi* possible as in (30) and (31).

(30) Ahmet [pro$_m$ *kendin-e*$_i$ bir takım elbise al-ma-m] -ı ist-iyor.

Ahmet$_i$ himself$_i$ a suit buy-NMLZ-1 SG POSS]-ACC want-PROG

'Ahmet$_i$ wants me to buy a suit for him$_i$.'

(31) [C Domain1 OP$_i$ [T Domain1 *Ahmet*$_i$ .... [C Domain2 t$_i$ [T Domain2 [t$_i$+*kendin-e*$_i$]]]

(Meral, 2013, p. 20-21)

As (31) indicates that the empty operator (OP) and *kendi* come together and move to the Intermediate C domain first, then move to the C domain of the matrix clause. In the final position, the subject of the matrix clause, *Ahmet*, binds the reflexive, *kendi*. Due to these cyclic movements in the A'-movement analysis as indicated in (31), non-local binding of *kendi* is available in (30).

Meral (2010, 2013) also states that as the lexical antecedent does not play a role in binding of *kendi*, the antecedent's position is not important in the sentence. Thus, *kendi* can also take a dative-marked indirect object as its antecedent as in (32) (Göksel & Kerslake, 2005; Meral, 2010, 2013):

(32) Sanki ban-a$_i$ *kendi-m-i*$_i$ anlat-ıyor-lar-dı.

As if I-DAT self-1 SG POSS-ACC tell-PROG-3PL-PAST

'[It was] as if they were talking to me about myself.'

(Göksel & Kerslake, 2005, p. 236)

According to Meral (2010, 2013), this example shows that reflexive binding is not limited to the subject position in Turkish as *kendi* is bound by the dative marked dative object, *bana* in (32). Even though the dative marked indirect object, *bana* does not c-command *kendi*, the sentence in (32) does not yield any ungrammaticality.

Now, consider the examples in (33) and (34) based on theoretical assumptions of Kornfilt (1984), Meral (2010, 2013) and Palaz (2013) in terms of binding of *kendi*:

(33) Ayşe [Ali'nin *kendin-e* araba al-dığ-ın] -ı bil-iyor.
Ayşe Ali-GEN self-DAT car buy-NMLZ-POSS-ACC know-PROG
'Ayşe knows that Ali will buy a car to himself/her.'

(34) Fırat [Zeynep'in *kendin-den* bahset-me-si] –ni ist-iyor.
Fırat Zeynep-GEN self-ABL talk-NMLZ-POSS-ACC want-PROG
'Fırat wants Zeynep to talk about herself/him.'

According to Kornfilt (1984) and Palaz (2013), the only possible antecedent for *kendi* in (33) is *Ali* as the predicate in the embedded clause has *-DIK* nominalization. As *-DIK* creates an opaque domain for the binding operation, only local binding of *kendi* is allowed in (33). Therefore, a non-local antecedent, *Ayşe*, cannot be a possible antecedent for *kendi*. However, according to Meral (2010, 2013), *Ayşe* can be possible antecedents for *kendi* in (33) as agreement and tense features do not determine the binding domain for *kendi* in Turkish. He suggests that *kendi* occurs in a very active A'- domain in operator-variable chains, so it can be bound by the long-distance antecedent, *Ayşe* in the sentence.

In (34), according to Kornfilt (1984), both the subject of the matrix clause, *Fırat* and the subject of the embedded clause, *Zeynep* can be antecedents for *kendi* as the predicate in the embedded clause has *-mA* nominalization which does not carry tense feature and creates a transparent domain for *kendi*. However, according to Palaz (2013), the only possible antecedent for *kendi* is *Zeynep* because embedded clause with *-mA* has agreement feature, which makes the binding domain opaque and does not permit *kendi* to be bound by a non-local antecedent, *Fırat*. According to Meral (2010, 2013), the non-local antecedent, *Fırat* can be an antecedent for *kendi* in (34) regardless of tense and agreement features as *kendi* occurs in an A'- operator, it can be bound by the non-local antecedent, *Fırat* as well.

2.3 Antecedent identification task in Turkish

An antecedent identification task was conducted to test whether native Turkish speakers would prefer a long-distance or short-distance antecedent for *kendi* and *kendisi* in pragmatically non-biased sentences and whether or not this preference would be affected by the nominalization markers on the embedded predicates (Kornfilt, 1984, 2007; Palaz, 2013).

2.3.1 Materials

Sentence pairs alternating with *kendi* and *kendisi* including embedded clauses with five different nominalization types (*-DIK*, *-DIK* causative, *-mA*, *-mAK* and *-IncA*) were created. The following examples in (35) illustrate these conditions:

(35)

a. *-DIK*

Ali Ayşe-nin *kendi-ni/kendi-si-ni* bağışla-dığ-ını düşün-üyor.
Ali Ayşe-GEN self-3 SG POSS forgive-NMLZ-ACC think-PROG
'Ali thinks that Ayşe forgave herself/him.'

b. *–DIK* with causative:

İrfan Neşe-ye *kendi-ni/kendi-si-ni* unut-tur-duğ-unu söyle-miş-ti.
İrfan Neşe-DAT self-3 SG POSS forget-CAUS-NMLZ-ACC
tell-PRF-PST
'İrfan told Neşe that she made him forget himself.'

c. *–mA*:

Faruk Ayşen-in kendi-*ni/kendi-si-ni* izle-me-si-nden rahatsız ol-du.
Faruk Ayşen-GEN self-3 SG POSS watch-NMLZ-POSS-ABL
annoy-PST

'Faruk was annoyed at Ayşen's watching herself/him.'

d. *–mAK*:

Süleyman Semra-ya *kendi-ni/kendi-si-ni* sev-dir-mek ist-iyor-muş.
Süleyman Semra-DAT self-3 SG POSS love-CAUS-NMLZ
want-PROG-PRF
'Süleyman wants Semra to love herself/him.'

e. *–IncA*:

Melike Oğuzhan-ın *kendi-ni/kendi-si-ni* gör-ünce şaşır-mış-tı.
Melike Oğuzhan-POSS self-3 SG POSS see-ADV
be surprised-PRF-PST
'Melike was surprised when she saw Oğuzhan.'

According to Kornfilt (1984), since the embedded predicate has tense and agreement features such as in *-DIK* (35a) and the binding domain for *kendi* is opaque, so only the local antecedent can bind the reflexive in (35a). Palaz (2013), in contrast, states that the predicates in the embedded clause in (35a) and (35c) can create an opaque domain for *kendi* as *-DIK and -mA* contain agreement feature. When there is causativization on the verb such as in *-DIK* causative (35b) and *-mAK* (35d) and when there is an adjunct clause such as in *-IncA* condition (35e), the non-local antecedent as well as the local antecedent can bind *kendi*. Meral (2010, 2013) argues that in all sentences in (35), the non-local reading is available for *kendi* regardless of the strength of the agreement and tense features since binding of *kendi* occur in A'-operator in Turkish.

Regarding *kendisi*, there appears to be consensus in the literature that both a local and non-local reading is available in all the sentences (Enç, 1989; Kornfilt, 2001; Meral, 2010, 2013; Palaz, 2013). So, both the subject of the embedded clause

and the matrix clause are predicted to serve as an antecedent for *kendisi* in all sentences in (35).

Thirty target sentence pairs were distributed across two different lists counterbalancing for the reflexive type, *kendi* or *kendisi* (Appendix A). There were also thirty filler sentences.

2.3.2 Participants and procedure

Twenty-six people between 23 and 50 years old (M = 27.73, SD = 6.19) participated in the experiment. They received the list online via e-mails. They were asked to read the sentences and indicate which interpretation (local or long-distance) they considered as the antecedent for the reflexive. An example question is presented in (36). The participants saw them without the glosses.

(36) Fırat Zeynep-in *kendi-ni* sev-diğ-i-ni düşün-üyor.
Fırat Zeynep-GEN self-POSS love-NMLZ-POSS-ACC think-PROG
'Fırat thinks that Zeynep loves herself/him.'
Sevilen kişi kimdir?
a. Fırat b. Zeynep

2.3.3 Results and discussion

Mean percentages of local antecedent preference of *kendi* and *kendisi* were calculated. Table 1 illustrates the mean percentages of local antecedent preference for *kendi* and *kendisi*:

Table 1. Mean Percentages of Local Antecedent Preference for *kendi* and *kendisi*

Nominalization types	*kendi* %	*kendisi* %
-DIK	51.88	16.47
-DIK Causative	44.05	15.25
-mA	30.75	10.32
-mAk	36.12	21.9
-IncA	79.57	81.95

The overall average of local antecedent preference was 48.74%, which suggests that Turkish speakers in general do not appear to have strong preference for local or non-local antecedent for *kendi*. For *kendi* in complex sentences, they seem to entertain both possibilities.

These findings contradict with what Kornfilt (1984) and Palaz (2013) argue as agreement or tense features on the embedded predicate do not seem to have an impact on participants' antecedent preferences. If it were the case, the participants would have chosen only the local antecedent in *-DIK* condition (Kornfilt, 1984; Palaz, 2013) and *-mA* condition (Palaz, 2013) but they show 51.88% local antecedent in *-DIK* condition and 30.75% local antecedent preference in *-mA* condition. The results are in line with the theoretical assumptions of Meral (2010, 2013) and the findings of Özbek and Kahraman (2016) and Gračanin-Yuksek et al. (2017) (see Chapter 3 for Özbek and Kahraman's and Gračanin-Yuksek et al.'s (2017) experimental data).

The overall average of choosing local antecedent for *kendisi* was 29.18%. Although it was reported in the literature for *kendisi* to be bound by both locally and non-locally in complex sentences, the results of the antecedent identification task showed that Turkish speakers in general prefer non-local attachment over local attachment for its binding except for one condition which is the sentences with *-IncA* nominalization. For *-IncA* nominalization, participants preferred local binding (81.95%) over non-local binding. For all other types of nominalizations, there was a

strong non-local binding preference (>78%).

These findings are not in parallel with what was predicted for *kendisi* since theoretical assumptions predicted 50/50 distribution for local and non-local binding preferences. However, the results are parallel to what was observed in Özbek and Kahraman (2016) and Gračanin-Yuksek et al. (2017) who also reported that Turkish native speakers prefer to bind *kendisi* with a non-local antecedent more (Özbek and Kahraman's and Gračanin-Yuksek et al.'s (2017) studies are reviewed in more detail in Chapter 3).

The results showed that in neutral complex sentences in Turkish, native speakers of Turkish have an inclination to bind *kendi*, which is thought to be a true reflexive in Turkish, as well as *kendisi* to a non-local antecedent. As it was mentioned, English is a language that allows only local binding of reflexives (Chomsky, 1981, 1986). This cross-linguistic difference between Turkish and English allows us to test whether Turkish-speaking learners of English might transfer the tolerance for non-local binding of *kendi* and *kendisi* to English reflexives during online processing.

CHAPTER 3

PROCESSING REFLEXIVES IN THE FIRST AND SECOND LANGUAGES

3.1 Introduction

As it was mentioned in Introduction, this thesis explores how Turkish learners of English will process reflexives the target language, English. Chapter 3 presents studies on processing of reflexive in English and Turkish.

"Linking the anaphoric elements such as reflexives with their antecedents during reading and listening is a prerequisite for successful sentence or discourse comprehension" (Felser et al., 2009, p. 485). The reason is that the referents of the anaphoric elements should be determined to have a coherent interpretation of a text or a speech (Sturt, 2003).

The psycholinguistic study of processing of reflexives has traditionally been influenced by the Binding Theory (BT). As it was examined in greater detail in Chapter 2, the BT proposes a predefined set of syntactic constraints on the possible antecedents an anaphoric element can refer to in a given context (Runner, Sussman & Tanenhaus, 2006). However, Nicol and Swinney (2003) argue that the psycholinguistic study of reflexive resolution is different from the formal study of reflexive resolution as using a psycholinguistic method (eye tracking experiments, Event-Related Potential (ERP) experiments, self-paced reading experiments) informs us about real-time processing of different constraints during sentence comprehension.

According to Nicol and Swinney (2003), psycholinguistic research on processing of reflexives investigates whether grammatical and non-grammatical constraints are effective in assigning an appropriate referent for the reflexive during

real-time sentence processing. Grammatical constraints account for the application of the Binding Principle A (BP-A), so they require a parser to show sensitivity only to the c-commanding antecedent that occurs within the same local with the reflexive. Non-grammatical constraints account for using lexical cues and discourse-related features. Therefore, non-structural constraints accounts for a parser can consider a discourse prominent gender-matching binding-inaccessible antecedent as the referent of the reflexive, as well.

Nicol and Swinney (2003) also state that psycholinguistic research on processing of reflexives examines during which stages of online sentence processing these grammatical and non-grammatical constraints are applied. If grammatical constraints have a significant role in antecedent assignment for the reflexive, it is expected to see that a parser shows sensitivity only to the binding-accessible antecedent from the earliest stages of processing and excludes the binding-inaccessible antecedent from the initial antecedent candidate set. If non-grammatical constraints have a significant role in assigning a referent for an anaphoric expression, it is expected to see that the initial candidate set includes both the binding-accessible antecedent and the binding-inaccessible antecedent from the earliest stages of processing. That is, a parser considers the binding-inaccessible antecedent as a potential referent for the reflexive from the earliest stages of processing, as well. Additionally, even though non-grammatical constraints are excluded during the initial stages of processing, they can have an effect on antecedent retrieval process during later stages of processing. That is, a parser can initially benefit from grammatical constraints regarding BP-A, so he/she shows sensitivity to the binding-accessible antecedent. However, these grammatical constraints can be violated during later stages of processing because of the presence of a discourse-prominent

gender-matching inaccessible antecedent in the context; therefore, a parser can show sensitivity to the binding-inaccessible antecedent during later stages of antecedent retrieval search for the reflexive.

Nicol and Swinney's (2003) arguments are related to L1 processing of reflexives, but L2 research also gives valuable insights on processing mechanisms of L2 learners' real-time sentence processing. First of all, psycholinguistic research on L2 processing of reflexive helps us understand whether or not L2 learners behave similar to native speakers when they assign an antecedent during online antecedent retrieval process. We are also informed about whether L2 learners will be affected by the interference of the gender-matching discourse prominent antecedent earlier or later than L1 speakers. We have information about whether L2 learners will transfer their L1's binding properties into the L2. Lastly, we are informed about whether L2 learners' final interpretation to the antecedent of the reflexive indicated by the grammatically judgment tasks or antecedent identification tasks is similar to their online antecedent retrieval process (Felser et al., 2009; Felser & Cunnings, 2012).

The following sections will examine psycholinguistic studies on processing of reflexives in L1 English, L1 Turkish and L2 English.

3.2 Studies on processing reflexives in L1 English

Studies on processing of reflexives in English will be presented in this section. Findings of these studies appear to suggest three different parsing routines associated with first language processing of reflexives. The first group of studies has shown that the requirements of BP-A (i.e., syntactic information) guide antecedent retrieval processes (Clackson et al., 2011; Dillon et al., 2013; Nicol & Swinney, 1989). According to these studies, the initial antecedent candidate set includes only the

binding-accessible antecedents and excludes the binding-inaccessible antecedents. The second group of studies, however, has demonstrated that even though syntactic information initially guides native speakers' online antecedent retrieval search for the reflexive, it can be violated during later stages because of a gender-matching and discourse prominent competitor antecedent (Sturt, 2003; Xiang et al.; 2009). The last group of studies has demonstrated that semantic and discourse-related factors are also initially taken into consideration while choosing an antecedent for reflexives (Badecker & Straub, 2002, Clackson & Heyer, 2014; Cunnings & Felser, 2013; Patil et al., 2016). According to these studies, the initial antecedent set includes both the binding-accessible antecedents and the binding-inaccessible antecedents as long as the binding-inaccessible antecedents are prominent in the discourse and have the same phi-features as the reflexive.

Nicol and Swinney (1989) investigated the role of syntactic constraints on the assignment of antecedents during sentence comprehension. They conducted a cross-modal priming experiment to examine the reactivation patterns of referents in sentences such as (1):

(1) The boxer told the skier that the doctor$_i$ for the team would blame himself$_i$ for the recent injury.

(Nicol & Swinney, 1989, p. 12)

Participants made a lexical decision to a visually presented probe word while they were listening to sentences as in (1). The probe words presented at the reflexive offset was either related or unrelated to the possible antecedents in the sentence (*the boxer, the skier, the docto*r). Lexical decision times showed that facilitation occurred when the probe word was related to the antecedent which was syntactically constrained by BP-A. That is, there was a significant priming preference for the

antecedent *the doctor*, but this effect was not observed for the other antecedents such as *the boxer* and *the skier* as they were not syntactically constrained antecedents for *himself*. According to Nicol and Swinney (1989), there were two explanations of this finding. The first explanation was that reactivation was limited to the binder of the anaphor. Or alternatively, priming occurred due to residual activation of *the doctor* in (1) as *the doctor* was linearly closer to the reflexive than *the boxer* and *the skier*. To check these assumptions, sentences including pronouns as in (2) were analyzed:

(2) The boxer$_i$ told the skier$_i$ that the doctor for the team would blame him$_i$ for the recent injury.

(Nicol & Swinney, 1989, p. 12)

For (2), the results indicated that there was significant priming for *the boxer* and *the skier* but no significant priming effect for *the doctor* after the pronoun offset. According to Nicol and Swinney (1989), the findings of the study indicated that there was a restriction on the reactivation of prior referents. Only the syntactically-constrained antecedent was activated during anaphor resolution. Given the findings of the study Nicol and Swinney (1989) proposed the binding-as-initial-filter hypothesis which assumes that the initial stages of processing (as indicated by the priming effects) are constrained by BP-A or BP-B where only a local antecedent such as *the doctor* is an appropriate antecedent for the reflexive *himself*, but a non-local antecedent such as *the boxer* or *the skier* can be thought as an antecedent for the pronoun, *him*. Nicol and Swinney (1989) also maintained that syntactic information, i.e., binding principles, is applied at the initial stages of processing and guide the following stages of processing, as well.

Clackson et al. (2011) investigated processing of reflexives in English. The specific question was whether native speakers' processing of structurally accessible

and inaccessible antecedents for reflexives would be influenced by competition between the gender-matching discourse prominent inaccessible antecedent and structurally-governed accessible antecedent for the reflexive. To answer this question, they conducted two experiments.

Experiment 1 was a sentence-picture judgment task. In this task, two conditions were created by manipulating the gender of the inaccessible antecedent as in (3). Participants saw a picture that either matched the question asked by experimenter or did not match the contents of the question.

(3)

a. Double-match: This is Christopher Robin, this is Pooh Bear. Is Pooh Bear scratching himself?

   Picture stimuli requiring: (i) yes response (ii) no response

b. Single-match: This is Christopher Robin, this is Kanga. Is Christopher Robin scratching himself?

   Picture stimuli requiring: (i) yes response (ii) no response

(Clackson et al., 2011, p. 130 – 131)

In double-match condition (3a), both the accessible antecedent (*Pooh Bear*) and the inaccessible antecedent (*Christopher Robin*) were male characters, so they both had the same gender feature with the reflexive, *himself*. In single-match condition (3b), the accessible antecedent (*Christopher Robin*) was a male character and the inaccessible antecedent (*Kanga*) was a female character, so only the accessible antecedent had the same gender feature with the reflexive, *himself*. The results of Experiment 1 showed that native speakers gave 100% correct answers in double-match and single-match conditions; that is, they knew that they needed to bind the reflexives to the local antecedent even in the double-match condition as there were

two gender-matching antecedents and their decisions were not affected by gender-matching binding-inaccessible antecedent for reflexives.

Experiment 2 in this study was an eye tracking experiment in which participants listened to two-sentence paragraphs and looked at pictures including potential referents for reflexives and pronouns. While participants were listening to the sentences, their eye-movements were recorded. Double-match and single-match conditions as in Experiment 1 were created in this experiment. In double-match conditions, both the accessible antecedent and the inaccessible antecedent had the same gender feature with the reflexive as in (4a). In single-match conditions, only the accessible antecedent had the same feature with the reflexive as in (4b):

(4)

a. Double-match: Peter was waiting outside the corner shop. He watched as Mr. Jones bought a huge box of popcorn for himself over the counter.

b. Single-match: Susan was waiting outside the corner shop. She watched as Mr. Jones bought a huge box of popcorn for himself over the counter.

(Clackson et al., 2011, p. 132)

The inaccessible antecedent (*Peter/Susan*) had a strong discourse prominence as it was the first-mentioned character and it was the subject of both main clauses. The accessible antecedent (*Mr. Jones*) was less salient in the discourse as it was the subject of the embedded clause. After reading each sentence, a yes/no comprehension question which did not refer to the antecedent of the reflexive such as 'Did Mr. Jones buy some popcorn?' was asked to the participants.

The results indicated that the early effects of the accessible antecedent were observed for participants in the single-match condition and in the double-match condition; that is, their looks were fixated only to the accessible antecedent during the initial stages of processing in both conditions. Clackson et al. (2011) argue that native speakers did not have difficulty in ruling out a highly-prominent inaccessible antecedent especially in the double-match condition (4a) in which there was a gender-matching binding-inaccessible competitor. Based on the results, Clackson et al. (2011) conclude that native speakers were not distracted by the inaccessible antecedent in their online decisions even when there was a gender-matching discourse prominent competitor that was not structurally-governed antecedent, so their interpretation of reflexives is purely constrained by BP-A; discourse-level information does not have influence on their processing of reflexives.

In another study, Dillon et al. (2013) investigated whether native speakers of English would make use of morphological number agreement feature as a cue during antecedent retrieval process for reflexives. They specifically examined whether or not a binding-inaccessible antecedent with the same number feature with the reflexive would create an illusion of grammaticality effect. Dillon et al. (2013) hypothesized that ungrammatical sentences with a feature-matched inaccessible antecedent would be read faster than ungrammatical sentences without a feature-matched inaccessible antecedent. To check these predictions, they carried out two eye tracking experiments. In the first experiment, four conditions were created in which grammaticality and the intrusion effect of the inaccessible antecedent were manipulated as in (5):

(5)

a. Grammatical, intrusion: The new executive who oversaw the middle manager apparently doubted himself on most major decisions.
b. Grammatical, no intrusion: The new executive who oversaw the middle managers apparently doubted himself on most major decisions.
c. Ungrammatical, no intrusion: The new executive who oversaw the middle manager apparently doubted themselves on most major decisions.
d. Ungrammatical, intrusion: The new executive who oversaw the middle managers apparently doubted themselves on most major decisions.

(Dillon et al., 2013, p. 89)

In (5a-d), the accessible antecedent (*the new executive*) was always singular. In intrusion conditions (5a, d), the inaccessible antecedent matched with the reflexive in number, but in no intrusion conditions (5b, c), the inaccessible antecedent mismatched with the reflexive in number. First-pass reading times, the probability of regression and the total time for the reflexive region and the spill-over region (four words following the reflexive) were measured. The results indicated that only grammaticality had an influence on the participants' eye-movements. In other words, the reflexive in the grammatical sentences (5a) and (5b) were read faster than the reflexive in the ungrammatical sentences (5c) and (5d) across all three measures. That is, participants showed sensitivity only to the structurally-governed antecedent. It was also observed that the intrusion of the inaccessible antecedent did not create a significant effect on any three measures; that is, the ungrammatical-intrusion

condition (5d) did not yield shorter reading times than ungrammatical-no intrusion condition (5c).

In Experiment 2, four new conditions were added to the conditions used in Experiment 1. In these new four conditions, the accessible antecedent was plural (*the new executives*) as in (6):

(6)

a. Plural head, singular interferer, ungrammatical: The new executives who oversaw the middle manager apparently doubted himself on most major decisions.
b. Plural head, plural interferer, ungrammatical: The new executives who oversaw the middle managers apparently doubted himself on most major decisions.
c. Plural head, singular interferer, grammatical: The new executives who oversaw the middle manager apparently doubted themselves on most major decisions.
d. Plural head, plural interferer, grammatical: The new executives who oversaw the middle managers apparently doubted themselves on most major decisions.

(Dillon et al., 2013, p. 94)

The reason of using a plural antecedent as the referent of the reflexive was to test whether the same findings of Experiment 1 were observed when the reflexive was bound by a plural accessible antecedent. The results were similar to those in Experiment 1; the morphological number marking was not used as a retrieval cue by the participants. Participants showed sensitivity only to the grammaticality; so grammatical conditions (6c, d) where the accessible antecedent had the same number

feature with the reflexive were read faster than ungrammatical conditions (6a, b) where the number feature of the accessible antecedent and the reflexive was different. The intrusion effect of the inaccessible antecedent was not observed in any condition. Dillon et al. (2013) conclude that processing of reflexives is influenced only by syntactic information during online sentence processing.

Sturt (2003) also examined the time-course of BP-A in reference resolution. In his study, he investigated whether or not binding-inaccessible antecedents would be considered during online reference resolution. He also investigated whether or not BP-A would act as a filter during antecedent retrieval process for the reflexives. Sturt's (2003) study included two eye tracking experiments. In Experiment 1, participants were given short texts that consisted of one lead-in sentence, one critical sentence including the reflexive and one wrap-up sentence to make the discourse cohesive. Examples in (7) illustrate the conditions in Experiment 1. There were two possible antecedents for the reflexive. The binding-accessible antecedent was *the surgeon* and the binding-inaccessible antecedent was *Jonathan/Jennifer*. Both of the antecedents c-commanded the reflexive in Experiment 1. Stereotypical gender manipulation was done on the accessible antecedent and inaccessible antecedent and four different conditions were created as in (7):

(7)

a. Accessible-match/inaccessible-match: Jonathan was pretty worried at the City Hospital. He remembered that the surgeon had pricked himself with a used syringe needle. There should be an investigation soon.

b. Accessible-match/inaccessible-mismatch: Jennifer was pretty worried at the City Hospital. She remembered that the surgeon had pricked

himself with a used syringe needle. There should be an investigation soon.

c. Accessible-mismatch/inaccessible-match: Jennifer was pretty worried at the City Hospital. She remembered that the surgeon had pricked herself with a used syringe needle. There should be an investigation soon.

d. Accessible-mismatch/inaccessible-mismatch: Jonathan was pretty worried at the City Hospital. He remembered that the surgeon had pricked herself with a used syringe needle. There should be an investigation soon.

(Sturt, 2003, p. 546)

The results of Experiment 1 indicated there was an early effect of the binding-accessible antecedent, *the surgeon*. Specifically, first fixation and first-pass reading times showed that sentences were read faster when there was a gender match between the accessible antecedent (*the surgeon*) and the reflexive as in (7a) and (7b) compared to when there was not as in (7c) and (7d). The early effect was an indication of how binding constraints were applied during the initial reading of a reflexive. However, second-pass reading times showed reliable effects of the inaccessible antecedent, as well. When there was a gender match between the inaccessible antecedent and the reflexive as in (7a) and (7c), shorter reading times were observed in the second-pass reading times compared to (7b) and (7d) in which the gender of the inaccessible antecedent mismatched that of the reflexive. These findings were taken as evidence that even though binding-inaccessible antecedents were ruled out during the initial stages of processing and did not affect earlier

antecedent retrieval processes, they could have an effect on the interpretation of reflexives during later stages as indicated by second-pass reading times.

Sturt (2003) conducted a follow-up sentence by sentence self-paced reading experiment to investigate native speakers' final antecedent interpretation of reflexive. In this experiment, participants were presented with sentences such as (8) and their task was to assign an appropriate antecedent for the reflexive:

(8)

(Display 1:) Jonathan was pretty worried at the City Hospital.

(Display 2:) He remembered that the surgeon had pricked himself with a used syringe needle.

(Display 3:) Who had been pricked with a used needle?

Jonathan/The surgeon

(Sturt, 2003, p. 553)

The results of this experiment showed that in their final interpretations of these sentences, the participants had a preference to the binding-inaccessible antecedent (*Jonathan*) over the binding-accessible antecedent (*the surgeon*) when there was a match between the binding-inaccessible antecedent and the reflexive (*Jonathan…himself*). Based on this result, Sturt (2003) argued that although BP-A influences initial stages of processing of reflexives, it does not act as an absolute filter on the final interpretation of reflexives.

Experiment 2 in Sturt's (2003) study was conducted to test whether linear proximity of binding-inaccessible antecedent would have an effect on participants' eye-movements. Even though the inaccessible antecedent was linearly closer to the reflexive than the accessible antecedent, it did not c-command the reflexive in this experiment. The linear positions of binding-accessible and binding-inaccessible

antecedents were reversed; however, the antecedents' accessibility to the reflexive with respect to BP-A was kept constant as in (9):

(9)

a. Accessible-match/inaccessible-match: Jonathan was pretty worried at the City Hospital. The surgeon who treated Jonathan had pricked himself with a used syringe needle. There should be an investigation soon.

b. Accessible-match/inaccessible-mismatch: Jennifer was pretty worried at the City Hospital. The surgeon who treated Jennifer had pricked himself with a used syringe needle. There should be an investigation soon.

c. Accessible-mismatch/inaccessible-match: Jennifer was pretty worried at the City Hospital. The surgeon who treated Jennifer had pricked herself with a used syringe needle. There should be an investigation soon.

d. Accessible-mismatch/inaccessible-mismatch: Jonathan was pretty worried at the City Hospital. The surgeon who treated Jonathan had pricked herself with a used syringe needle. There should be an investigation soon.

(Sturt, 2003, p. 555)

If linear proximity could determine the assignment of an antecedent, the inaccessible antecedent would be considered as a potential referent for the reflexive even at the earliest stages of processing. However, if syntactic constraints were more powerful than linear distance of the potential antecedents, the inaccessible antecedent would not be considered as a potential antecedent despite its linear proximity to the

reflexive. The earlier measures (first-fixation duration and first-pass times) and later measures (regression path duration and second-pass reading times) showed that there was facilitation when there was a match between the stereotypical gender of the accessible antecedent and the gender of the reflexive such as in (9a) and (9b), which was also the case in Experiment 1. Contrary to Experiment 1, no effects of the binding-inaccessible antecedent were observed, even in measures reflecting later stages of processing. According to Sturt (2003), there are several reasons for this observation. One of the reasons is that in Experiment 2 the binding-inaccessible antecedent did not c-command the reflexive. Alternatively, the position of the binding-inaccessible antecedent may have affected the outcome. In Experiment 1, the binding-inaccessible antecedent was in the subject position, but in Experiment 2 it was in the object position. This could have resulted in the binding-inaccessible antecedent to have less focus in the discourse. All in all, Sturt (2003) concludes that the syntactic constraints associated with BP-A act as an early but defeasible filter during reference resolution. Even though the effects of binding-accessible antecedent are observed in early stages of processing, the discourse-focused binding-inaccessible antecedent could also influence later processing stages. That is, although binding constraints guide the initial stages of processing, they can be violated during later stages if there is a binding-inaccessible antecedent that is highly focused in the discourse.

Another study investigating online reference resolution was carried out by Xiang et al. (2009) who examined whether native speakers of English would be influenced by binding-inaccessible antecedents in their interpretation of reflexives. Their study employed an Event-Related Potential (ERP) experiment. There were three experimental conditions which had either an inaccessible antecedent that was

congruent with the reflexive as in (10a), an intrusive antecedent as in (10b) or an incongruent antecedent as in (10c) below:

(10)

a. Congruent: The tough soldier that Fred treated in the military hospital introduced himself to all the nurses.
b. Intrusive: The tough soldier that Katie treated in the military hospital introduced herself to all the nurses.
c. Incongruent: The tough soldier that Fred treated in the military hospital introduced herself to all the nurses.

(Xiang et al., 2009, p. 44)

As in Sturt (2003), gender stereotypical nouns such as *soldier* were used as the accessible antecedent. The inaccessible antecedent (*Fred/Katie*) was the subject of the relative clause and was linearly closer to the reflexive than the accessible antecedent (*the tough soldier*). In (10a), both the accessible antecedent (*the tough soldier*) and the inaccessible antecedent (*Fred*) matched the reflexive in gender. In (10b), the inaccessible antecedent (*Katie*) matched the gender of the reflexive (*herself*) whereas there was a gender mismatch between the grammatically accessible antecedent (*the tough soldier*) and the reflexive. In (10c), the gender of the accessible antecedent (*the tough soldier*) and the gender of the inaccessible antecedent (*Fred*) mismatched the reflexive.

The participants read the sentences and answered a question about a given sentence. The results showed that when there was not an appropriate antecedent for the reflexives as in the intrusive condition (10b) and the incongruent condition (10c), a P600 effect, indicating detection of syntactic or morphological anomaly (Friederic, Pfeifer, & Hahne, 1993; Hagort, Brown, & Groouthuse, 1993) was observed. No

such effect was observed for the congruent condition, (10a). This indicated that participants initially showed sensitivity to the gender of the accessible antecedent and they were aware of the incongruence between the reflexive and the binding-accessible antecedent in sentences such as (10b) and (10c). Xiang et al. (2009) also suggested that the effects of inaccessible antecedent such as in (10b) were not observed during the initial stages of reflexive binding. In other words, only structurally-constrained antecedent, binding-accessible antecedent (*the tough soldier*), was considered as the referent of the reflexive during the initial stages of processing as found by Nicol and Swinney (1989) and Sturt (2003). However, the inaccessible antecedent affected antecedent retrieval process for reflexive at the later stages of processing, which indicated late intrusion effect as found by Sturt (2003)'s Experiment 1.

In the literature, both the binding as initial-filter hypothesis (Nicol & Swinney, 1989) and binding as defeasible filter hypothesis (Sturt, 2003) maintain that early stages of reflexive antecedent retrieval is affected by syntactic constraints. The binding as defeasible filter hypothesis differs from the binding as initial-filter hypothesis in that in later stages of processing other factors such as discourse prominence of a c-commanding inaccessible antecedent can affect antecedent preferences for reflexives. Badecker and Straub (2002) differ from these two hypotheses in that they argue for factors other than syntax being influential in both early and later stages of antecedent retrieval for reflexives. According to Badecker and Straub (2002), when there are binding inaccessible antecedents which match the reflexive in person, number and gender features, these antecedents act as competitors. Badecker and Straub (2002) call this interactive-parallel-constraint

model and they argue that it explains the antecedent retrieval processes not only for reflexives but also for pronouns.

To investigate how morphosyntactic agreement, focus status and syntactic factors interact during online processing of reflexives and pronouns, Badecker and Straub (2002) conducted six word-by-word-self-paced reading experiments. Here, only the experiments (four in total - Experiments 1, 3, 5 & 6) on reflexives and pronouns are reported.

Experiment 1 consisted of sentences including pronouns in four conditions manipulating the gender of the inaccessible antecedent as in (11):

(11)

a. Multiple Match: John thought that Bill owed him another chance to solve the problem.
b. Accessible Match: John thought that Beth owed him another chance to solve the problem.
c. Inaccessible Match: Jane thought that Bill owed him another chance to solve the problem.
d. No Match: Jane thought that Beth owed him another chance to solve the problem.

(Badecker & Straub, 2002, p. 751)

It was predicted that fastest reading times of the pronoun region and the spill-over region (two words following the pronoun) would be observed for accessible match condition (11b) as there was only one grammatically accessible antecedent for the pronoun*, him* in that condition. The binding as initial-filter hypothesis would make the same prediction. For the multiple match condition (11a), though, the initial-filter hypothesis and the interactive-parallel-constraint model differ in their predictions.

Whereas the initial-filter hypothesis does not predict an effect of inaccessible antecedent on processing the pronoun (*him*) in (11a), the interactive-parallel-constraint model predicts longer reading times for it due to the increase induced by the gender-matching competitor antecedent in the processing load. Results showed longer reading times for the spill-over region in the multiple match condition (11a) than for the spill-over region in the accessible match condition (11b). The researchers conclude that the data contradict the initial-filter hypothesis as the inaccessible antecedent was not ruled out while processing pronouns.

In Experiment 3, Badecker and Straub (2002) examined whether or not participants would be affected by the inaccessible antecedent in sentences that included pronouns as well as reflexives. Thus, in addition to the pronoun conditions in (11), they prepared multiple match and accessible match conditions for reflexives, as well. In the single match condition, only the accessible antecedent had the same gender feature with the reflexive as in (12a). In the multiple match condition, both the accessible antecedent and the inaccessible antecedent that had the same gender feature with the reflexive as in (12b):

(12) Reflexive conditions:

a. Single Match: Jane thought that Bill owed himself another opportunity to solve the problem.

b. Multiple Match: John thought that Bill owed himself another opportunity to solve the problem.

(Badecker & Straub, 2002, p. 758)

Results showed a similar pattern to those in Experiment 1 for pronouns and reflexives; that is, the reading times for spill-over region in multiple match condition (12b) was longer than reading times for spill-over region in single match condition

(12a). Badecker and Straub (2002) argue that multiple match effect for a structurally inaccessible antecedent is not dependent on whether the referential expression is a reflexive or a pronoun: it is observed for both pronouns and reflexives when the inaccessible antecedent is highly focused in the discourse and its morphosyntactic features match the reflexive and the pronoun.

In Experiment 5, Badecker and Straub (2002) explored the effect of grammatically non-salient antecedents, genitives, on reflexive and pronoun processing to test whether the initial antecedent candidate set would also include all gender-matching antecedents including the genitives. As in Experiment 3, the experimental sentences in this experiment included both pronouns and reflexives. However, binding-inaccessible antecedents, genitives, had less discourse-prominence than those in previous experiments as they did not get their thematic role from any verb in the sentence (13) and (14) exemplify the conditions:

(13) Reflexive sentences

a. Multiple Match: Jane thought that Bill's brother owed himself another opportunity to solve the problem.

b. Accessible Match: Jane thought that Beth's brother owed himself another opportunity to solve the problem.

(14) Pronoun sentences

a. Multiple Match: Jane thought that Bill's brother owed him another opportunity to solve the problem.

b. Accessible Match: Jane thought that Beth's brother owed him another opportunity to solve the problem.

(Badecker & Straub, 2002, p. 761)

It was predicted that the genitive NP (*Bill or Beth*) would not be prominent to be a member of initial candidate set in multiple match conditions (13a & 14a) since the genitive NP did not get its thematic role in the sentence. Results showed for both reflexives and pronouns that there was no significant time difference between multiple match and single match conditions despite the availability of the inaccessible antecedent in multiple match condition. The reason is that the inaccessible antecedent in the genitive construction (*Bill's brother*) did not have a discourse prominence as the inaccessible antecedent (*Bill*) that were used in previous experiments (Experiment 1 and 3) in this experiment.

In Experiment 6, Badecker and Straub (2002) used sentences including reflexives. Even though inaccessible antecedent did not receive any thematic role from any verb in the sentence in Experiment 5, it received thematic role from the predicate of the main clause as shown in (15):

(15)

a. Multiple Match: It appeared to John that Bill owed himself another opportunity to solve the problem.
b. Accessible Match: It appeared to Jane that Bill owed himself another opportunity to solve the problem.

(Badecker & Straub, 2002, p. 762)

It was hypothesized that if thematic argument structure helped to be selected as a potential antecedent in initial candidate set, longer reading times would be observed in multiple match condition (15a) than accessible match condition (15b) as the inaccessible antecedent, *John* had also had same person, number and gender feature with the reflexive. However, if prominence in the discourse determined to be selected as a potential antecedent in initial candidate set, no reading time difference

would be observed between multiple match (15a) and accessible match conditions (15b) as the inaccessible antecedent, *John* or *Jane*, was not prominent in the discourse. The results supported the second hypothesis since no significant reading time difference was observed between two conditions.

All in all, Badecker and Straub (2002) suggest that BP-A does not function as the initial-filter during anaphora resolution as claimed by Nicol and Swinney (1989). Therefore, they propose interactive-parallel-constraint model is a better option to explain the findings observed in this study. According to this model, the initial candidate set includes the antecedents which are focused discourse entities and have the same person, number, gender feature with the reflexive or the pronoun. It is not important to be syntactically accessible or inaccessible to a reflexive or a pronoun. In other words, if an antecedent is prominent in the discourse and has the same gender and number specification with a reflexive or a pronoun, this antecedent is also included in the initial candidate set and has an influence on processing even at the earliest stages of processing.

Cunnings and Felser (2013) investigated whether Working Memory (WM) capacity would have an influence on reflexive resolution of native speakers of English. They specifically examined whether or not prominence of a potential antecedent in the discourse would have differential effects on different WM groups' antecedent preferences for a reflexive. Two eye tracking experiments were conducted for this study. As in the previous studies (Felser & Cunnings, 2012; Sturt, 2003; Xiang et al., 2009), gender feature was used to manipulate congruency between the reflexive and the potential antecedents. (16) illustrates the experimental items used in Experiment 1:

(16)

a. Accessible Match / Inaccessible Match: James has worked at the army hospital for years. He noticed that the soldier had wounded himself while on duty in the Far East. Life must be difficult when you are in the army.
b. Accessible Match / Inaccessible Mismatch: Helen has worked at the army hospital for years. She noticed that the soldier had wounded himself while on duty in the Far East. Life must be difficult when you are in the army.
c. Accessible Mismatch / Inaccessible Match: Helen has worked at the army hospital for years. She noticed that the soldier had wounded herself while on duty in the Far East. Life must be difficult when you are in the army.
d. Accessible Mismatch / Inaccessible Mismatch: James has worked at the army hospital for years. He noticed that the soldier had wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

(Cunnings & Felser, 2013, p. 194)

The binding-accessible antecedent in all four conditions is *the soldier*; however, the binding-inaccessible antecedents (*James and Helen*) were introduced as a named character in the lead-in sentence, and this character was also referred as a pronoun (*he/she*) in the critical sentence. Therefore, the inaccessible antecedent was highly focused in the discourse.

Participants were divided into two different WM groups; high WM group and low WM group. Cunnings and Felser (2013) predicted that only high WM span

group were expected to keep anaphoric dependencies longer, as well. Therefore, they would show sensitivity to the binding-inaccessible antecedent because the memory decay would only affect the decisions of the participants in higher WM span group as the inaccessible antecedent was linearly more distant to the reflexive than the accessible antecedent in Experiment 1. Cunnings and Felser (2013) also predicted that low WM span group would choose to keep reflexive-antecedent dependencies shorter compared to high WM span group. Thus, as the accessible antecedent was linearly closer to the reflexive than the inaccessible antecedent in Experiment 1, low WM span group would show sensitivity only to the accessible antecedent.

The results of Experiment 1 indicated that both high and low WM groups were sensitive to the binding-accessible antecedent (*the soldier*) only. It was found that when there was a gender match between the reflexive and the accessible antecedent as in (16a) and (16b), the reflexive region and the spill-over region (two words following the reflexive) were read faster (as indicated by first-fixation, first-pass, regression path and rereading times) compared to when there was a gender mismatch between the reflexive and the accessible antecedent as in (16c) and (16d).

In Experiment 2, the binding-inaccessible antecedent (*he/she*), co-referential with the discourse prominent subject *(James/Helen*), did not c-command the reflexive and it was linearly closer to the reflexive as in (17):

(17)

a. Accessible Match / Inaccessible Match: James has worked at the army hospital for years. The soldier that he treated on the ward wounded himself while on duty in the Far East. Life must be difficult when you are in the army.

b. Accessible Match / Inaccessible Mismatch: Helen has worked at the army hospital for years. The soldier that she treated on the ward wounded himself while on duty in the Far East. Life must be difficult when you are in the army.

c. Accessible Mismatch / Inaccessible Match: Helen has worked at the army hospital for years. The soldier that she treated on the ward wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

d. Accessible Mismatch / Inaccessible Mismatch: James has worked at the army hospital for years. The soldier that he treated on the ward wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

(Cunnings & Felser, 2013, p. 205)

Cunnings and Felser (2013) predicted that only binding-accessible antecedent would be initially considered as a potential antecedent for the reflexive based on the results of the Experiment 2 of Sturt (2003) and the ERP experiment of Xiang et al. (2009) as the binding-accessible antecedent was the only c-commanding antecedent to the reflexive. Therefore, Cunnings and Felser (2013) predicted that reading times would be shorter in accessible match conditions in which there was a gender match between the reflexive and the binding-accessible antecedent as in (17a) and (17b) compared to accessible mismatch conditions where there was gender mismatch between the reflexive and the binding-accessible antecedent as in (17c) and (17d). However, they also state that if processing-based constraints such as WM had a stronger influence on the participants' antecedent-retrieval decisions, participants with lower WM capacity would keep anaphoric dependencies shorter, so they would show sensitivity

to the binding-inaccessible antecedent that was linearly closer to the reflexive than the binding-accessible antecedent even at the initial stages of processing.

The results of Experiment 2 showed that participants in the high WM span group showed sensitivity only to the accessible antecedents both in first fixation duration and first pass time reflecting early stages of processing and in regression path time and rereading time reflecting later processing stages. Therefore, they read the reflexive region and the spill-over region faster in accessible match conditions (17a, b) where the stereotypical gender of the accessible antecedent matched the reflexive compared to accessible mismatch conditions (17c, d) where the stereotypical gender of the accessible antecedent mismatched the reflexive. The participants in the lower WM span group initially showed sensitivity to the linearly closer gender-matching inaccessible antecedent; therefore, they read the reflexive region and the spill-over region faster in conditions where there was a gender match between the inaccessible antecedent and the reflexive as in (17a) and (17c) compared to conditions where there was a gender mismatch between the inaccessible antecedent and the reflexive as in (17b) and (17d). Participants in the lower WM group were also affected by the accessible antecedent but for eye tracking measures (regression path time and rereading time) reflecting later stages of antecedent retrieval process for the reflexive.

All in all, Cunnings and Felser (2013) argue that syntactic constraints guide the online antecedent retrieval process for both high WM span group and low WM span group when the inaccessible antecedent did not linearly intervene between the accessible antecedent and the reflexive as in Experiment 1. However, they also maintain that low WM span group might be initially affected by the interference of the linearly closer inaccessible antecedent as they want to keep anaphoric

dependencies as short as possible as in Experiment 2. However, the interference of the inaccessible antecedent did not have an effect on antecedent retrieval process of high WM span group.

Clackson and Heyer (2014) also investigated the effect of the binding-inaccessible antecedent on native speakers' processing of reflexives. Only one experiment on how reflexives were processed by native speakers of English was employed. In this experiment, participants' eye-movements were recorded while they were listening to the sentences as in (18) which were accompanied with visual displays containing accessible and inaccessible antecedents for reflexives.

(18)

a. Double-match: Peter was waiting outside the corner shop. He watched as Mr. Jones bought a huge box of popcorn for himself over the counter.

b. Single-match: Susan was waiting outside the corner shop. She watched as Mr. Jones bought a huge box of popcorn for himself over the counter.

(Clackson & Heyer, 2014, p. 2)

There were four pictures in the visual displays: an inanimate object (*popcorn*) and three animate characters (*Peter*, *Susan*, *Mr. Jones*). Participants heard two of these animate characters while they were listening to the auditory stimulus. The other animate character served as a distractor. In the double-match condition, both the accessible antecedent (*Mr. Jones*) and the inaccessible antecedent (*Peter*) had the same gender feature with the reflexive. In single-match condition, the accessible antecedent (*Mr. Jones*) had the same gender feature with the reflexive, but the inaccessible antecedent (*Susan*) mismatched the reflexive in gender.

After hearing each sentence, participants were asked a question such as 'Who is it for?' to identify the recipient of the object. The question directly asked the referent of the reflexive in this experiment.

The results showed no significant difference was observed between the double-match condition (18a) and single-match condition (18b) in terms of the percentage of correct responses to the comprehension questions. Clackson and Heyer (2014) suggest that participants' ultimate interpretation for reflexives was constrained by BP-A; therefore, they chose the accessible antecedent (*Mr. Jones*) as the referent of the reflexive in both conditions. The results also showed that participants were sensitive to the gender of the accessible antecedent, so their looks were initially fixated on the accessible antecedent when they heard the reflexive in single-match conditions. However, participants initially showed sensitivity to the gender-matching inaccessible antecedent, so their looks were initially fixated on the inaccessible antecedent when they heard the reflexive in double-match condition. Participants' looks were fixated on the accessible antecedent during later stages of processing in double-match condition.

Even though Clackson and Heyer (2014) used the same materials as in Clackson et al. (2011), Clackson and Heyer's (2014) results did not replicate Clackson et al.'s (2011) results in which the inaccessible antecedent was not initially considered as the referent of the reflexive in double-match conditions. Clackson and Heyer (2014) suggest that the difference between these two studies could be resulted from the fact that the comprehension question directly asked the referent of the reflexive, it brought attention to the interpretation to the sentence in Clackson and Heyer's (2014) study, so the gender-matching inaccessible antecedent was considered as a potential referent for the reflexive at the initial stages of processing

in double-match conditions. However, as the comprehension question did not probe the referent of the reflexive in Clackson et al. (2011), participants did not pay attention to the interpretation of the sentence, so the effects of the inaccessible antecedent were not observed at the initial stages of antecedent retrieval process for the reflexive in double-match conditions.

Patil et al. (2016) investigated the effect of the interference of the inaccessible antecedent on native speakers' online antecedent retrieval search for the reflexive. In this study, there was one eye tracking experiment in which participants were required to read sentences and to answer a question related to that sentence. Stereotypical gender of the accessible antecedent was manipulated, so four conditions were created as in (19):

(19)

a. Accessible-match/inaccessible-match: The tough soldier that Fred treated in the military hospital introduced himself to all the nurses.
b. Accessible-match/inaccessible-mismatch: The tough soldier that Katie treated in the military hospital introduced himself to all the nurses.
c. Accessible-mismatch/inaccessible-match: The tough soldier that Katie treated in the military hospital introduced herself to all the nurses.
d. Accessible-mismatch/inaccessible-mismatch: The tough soldier that Fred treated in the military hospital introduced herself to all the nurses.

(Patil et al., 2016, p. 8)

In (19a-d), the accessible antecedent (*the tough soldier*) was defined by a relative clause (*that Fred treated in the military hospital*) and it was used in the subject position of the sentence. The inaccessible antecedent (*Fred/Katie*) was linearly closer

to the reflexive than the accessible antecedent and it was the subject of the relative clause. However, the inaccessible antecedent did not c-command the reflexive.

The results showed that there was a significant effect of the accessible antecedent on participants' eye-movements in total reading duration and rereading time; that is, the conditions (19a, b) where the stereotypical gender of the accessible antecedent matched the reflexive yielded shorter reading times than conditions (19c, d) where the stereotypical gender of the accessible antecedent mismatched the reflexive. It was also found that there was a significant interference of the inaccessible antecedent on participants' eye-movements in first past regression ratio; that is, the condition (19a) where both the accessible antecedent and the inaccessible antecedent had the same gender feature with the reflexive yielded more regressions than the condition (19b) where only the accessible antecedent had the same gender feature with the reflexive. Additionally, reading times of (19a) were significantly longer when there was an inaccessible antecedent that shared the same gender feature with the reflexive than (19b) where the inaccessible antecedent mismatched the reflexive in gender during the initial stages of processing. Based on the results, Patil et al. (2016) suggest the idea that the online application of BP-A is affected by interference from the inaccessible antecedent during early stages of processing as the results also provide support for the inclusion of agreement features such as gender in the initial candidate set for a reflexive as also observed in Badecker and Straub (2002) and Cunnings and Felser (2013).

In conclusion, previous research on first language processing in English has provided inconclusive evidence on syntactic biases in real-time antecedent retrieval for reflexives. Some studies found that native speakers' antecedent preferences was syntactically constrained, conforming to the assumptions of BP-A (Clackson et al.,

2011; Dillon et al., 2013; Nicol & Swinney, 1989; Sturt, 2003; Xiang et al., 2009); however, others (Badecker & Straub, 2002; Clackson & Heyer, 2014; Cunnings & Felser, 2013; Patil et al., 2016) found that if the non-local antecedent has the same phi-features such as the same person, number and gender features with the reflexive and if this non-local antecedent has highly prominent in the discourse, native speakers consider this antecedent as a potential antecedent for the referent of the reflexive even at the early stages of processing.

The studies that support the primacy of syntax for antecedent choice for reflexives, maintain that native speakers' antecedent preferences conform to BP-A, which means that they prefer a c-commanding accessible antecedent. In this view, the initial antecedent candidate set for a reflexive consists of binding-accessible antecedents only. The binding-inaccessible antecedents are ruled out during the earliest stages of antecedent retrieval search for the reflexive. For instance, Nicol and Swinney (1989) maintain the idea that the candidate set only includes syntactically governed local antecedents and does not include any binding-inaccessible antecedent during processing. However, there are also studies suggesting that native speakers are affected by a c-commanding discourse prominent inaccessible antecedent during later stages of processing, as well. For instance, Sturt (2003) and Xiang et al. (2009) reach the conclusion that although the initial search for an antecedent for a reflexive is influenced by syntactic constraints such as BP-A, a binding-inaccessible antecedent which has the same features with the reflexive and has discourse focus can also be considered as a potential antecedent at later stages of processing.

The studies that do not support the primacy of syntax have reached the conclusion that the initial antecedent candidate set for a reflexive consists of both the accessible and inaccessible antecedent. Native speakers' antecedent retrieval

processes are also determined by whether or not there is a match for the phi-features between the inaccessible antecedent and the reflexive and whether or not the inaccessible antecedent is prominent in the discourse. These factors are argued to be influential both in early and later stages of processing. (Badecker & Straub, 2002; Clackson & Heyer, 2014; Cunnings & Felser, 2013; Patil et al., 2016), suggesting that the inaccessible antecedent start to affect the processing at the very initial stages of antecedent search for a reflexive.

3.3 Studies on processing reflexives in L1 Turkish

Even though there are several studies that investigated processing reflexives in English, studies examining how reflexives in Turkish is processed rather limited. In what follows, I will discuss the two studies that investigated processing reflexives in Turkish.

Özbek and Kahraman (2016) examined how native speakers of Turkish would assign antecedents to reflexives *kendi* and *kendisi* in two forced preference tasks. To investigate the effect of the pragmatic information on the processing of *kendi* and *kendisi* in Turkish, they used pragmatically biased test sentences in Experiment 1 whereas they used pragmatically neutral test sentences in Experiment 2. In both experiments, the subject of the embedded clause was used in the nominative form or in the genitive form to examine the effect of the case marking on processing of *kendi* and *kendisi*.

In Experiment 1, *kendi* and *kendisi* were presented in pragmatically-biased sentences. The pragmatic bias came from the fact that the direct object (*mini etek – mini skirt*) in the embedded clause created a pragmatic bias to the subject of the matrix clause (*Elif/Erkan*) in terms of gender, resulting in four conditions as in (20):

(20)

a. Nom-kendi: Elif Erkan kendin-e mini etek al-dı zanned-iyor.
   Elif-NOM Erkan-NOM self-DAT mini skirt buy-PAST think-PROG

b. Gen-kendi: Elif Erkan-ın kendin-e mini etek al-dığ-ın-ı zanned-iyor.
   Elif-NOM Erkan-GEN self-DAT mini skirt buy-NMLZ-3SG-ACC think-PROG

c. Nom-kendisi: Elif Erkan kendi-sin-e mini etek al-dı zanned-iyor.
   Elif-NOM Erkan self-3SG-DAT mini skirt buy-PAST think-PROG

d. Gen-kendisi: Elif Erkan-ın kendi-sin-e mini etek al-dığ-ın-ı zanned-iyor.
   Elif-NOM Erkan-GEN self-3 SG-DAT mini skirt buy-NMLZ-3 SG-ACC think-PROG

Literally (20a) – (20d): 'Elif$_{female}$ thinks that Erkan$_{male}$ bought a mini skirt for her / himself.'

(Özbek & Kahraman, 2016, p. 78 -79)

Participants' task was to read sentences and to choose a particular antecedent for *kendi* and *kendisi* after reading the sentences.

The results showed that in *Nom-kendi* condition (20a); there was no reliable difference between the local antecedent (the subject of the matrix clause) and non-local antecedent (the subject of the matrix clause). In all other conditions, *Gen-kendi* (20b), *Nom-kendisi* (20c) and *Gen-kendisi* (20d), the non-local antecedent (the subject of the matrix clause) was preferred over the local antecedent (the subject of the embedded clause). Therefore, Özbek and Kahraman (2016) maintain the idea that

Turkish speakers showed equal preference to the local antecedent and the non-local antecedent in *Nom-kendi* (20a) condition. However, they preferred to bind *kendi* and *kendisi* in *Gen-kendi* (20b), *Nom-kendisi* (20c) and *Gen-kendisi* (20d) conditions with the non-local antecedent rather than the local antecedent, but they note this preference might result from pragmatically biased sentences used in the experiment. Özbek and Kahraman (2016) suggest that the non-local antecedent preference in Experiment 1 resulted from the fact that participants benefitted from the pragmatic information as a cue to assign an antecedent for *kendi* and *kendisi* as the direct objects in the embedded clauses had strong pragmatic bias.

To test whether the observed findings in the first experiment caused by the pragmatic bias or there was a non-local antecedent preference for *kendi* and *kendisi* by native speakers of Turkish, Özbek and Kahraman (2016) used pragmatically non-biased sentences in Experiment 2 as in (21):

(21)

a. Nom-kendi: Ali Veli kendi-ni suçla-dı san-dı.
Ali-NOM Veli-NOM self-ACC blame-PAST think-PAST

b. Gen-kendi: Ali Veli-nin kendi-ni suçla-dığ-ın-ı san-dı.
Ali-NOM Veli-GEN self-ACC blame-NMLZ-3 SG-ACC think-PAST

c. Nom-kendisi: Ali Veli kendi-si-ni suçla-dı san-dı.
Ali-NOM Veli-NOM self-3 SG-ACC blame-PAST think-PAST

d. Gen-kendisi: Ali Veli-nin kendi-si-ni suçla-dığ-ın-ı san-dı.

Ali-NOM Veli-GEN self-3 SG-ACC

blame-NMLZ-3 SG-ACC think-PAST

Literally (21a) - (21d): 'Ali thought that Veli blamed him / himself.'

(Özbek & Kahraman, 2016, p. 81- 82)

As in Experiment 1, participants' task was to read sentences and to choose a particular antecedent for *kendi* and *kendisi* after reading the sentences.

The results of Experiment 2 were similar to those in Experiment 1. There was no significant difference between local and non-local antecedents in *Nom-kendi* condition (21a). However, the participants chose the non-local antecedent, which was the subject of the matrix clause, as the antecedent for the reflexive in *Gen-kendi* (21b), *Nom-kendisi* (21c) and *Gen-kendisi* (21d) conditions. Özbek and Kahraman (2016) conclude that native Turkish speakers' interpretation of *kendi* and *kendisi* do not abide by the theoretical predictions. BP-A would predict for *kendi* to be bound only by the local antecedent, but this was not the case in Özbek and Kahraman's (2016) study. Given the theoretical research on *kendisi* (Enç, 1989; Göksel & Kerslake, 2005; Kornfilt, 2001) Özbek and Kahraman (2016) had predicted for *kendisi* to be bound by both local and non-local antecedents equally, but there was a reliable finding that participants linked *kendisi* with the non-local antecedent more than the local antecedent. Özbek and Kahraman (2016) also note that pragmatic manipulations in their study do not explain the antecedent preferences of Turkish native speakers because in Experiment 2 there was no pragmatic bias, yet the results showed the same pattern as in Experiment 1.

Gračanin-Yuksek et al. (2017) also investigated the effect of contextual and syntactic information on processing *kendi* and *kendisi* by native speakers of Turkish. They specifically examined how these reflexives were processed in isolated

sentences and within larger discourse contexts. They tested whether the antecedent choice for *kendi* and *kendisi* would be affected by syntactic constraints or contextual information, or by both. They had three predictions on the effect of syntactic and contextual information. Firstly, the interpretation of *kendi* and *kendisi* would be fully determined by syntactic constraints. The second one was that contextual information would have a dominant role in interpretation of *kendi* and *kendisi*. Lastly, both syntactic factors and the contextual information would have an influence on the interpretation of *kendi* and *kendisi* in an equal way.

There were two experiments in the study. Experiment 1 was an antecedent choice task which required participants to read contextually non-biasing sentences and to assign possible antecedents for *kendi* and *kendisi* in the sentence. There were 9 experimental sentences in which *kendi* and *kendisi* were used in the embedded direct object position. A question was asked after each sentence. Participants' task was that to choose all possible answers for the question that was asked as in (22):

(22) Emre realized right away that Cem is blaming ANAPHOR.

Who was being blamed?

i. Emre (long-distance antecedent)

ii. Cem (local antecedent)

iii. Someone else (extra-sentential antecedent)

(Gračanin-Yuksek et al., 2017, p. 8)

The results showed for *kendi* that local antecedent was chosen on 94% and long-distance antecedent was chosen on 85% of the trials and the extra-sentential antecedent was chosen on 3% of the trials. Although there was a significant trend in assigning the local antecedent as the referent for *kendi*, there was still high

preference to bind *kendi* with long-distance antecedent. This finding was consistent with what had been found in Özbek and Kahraman (2016)'s study.

For *kendisi*, the local antecedent was chosen on 87% of the trials and long-distance antecedent was chosen on 96% of the trials. The extra-sentential antecedent was chosen in only 8% of the trials. The results demonstrated that participants did not prefer extra-sentential antecedent compared to long-distance antecedent for *kendisi* unlike the theoretical assumptions (Enç, 1989; Göksel & Kerslake, 2005; Kornfilt, 2001) suggested that *kendisi* can also be bound by an extra-sentential antecedent. The researchers suggested that this finding might be resulted from the fact that extra-sentential antecedents only occurred in the response options, which might cause low preference of choosing this antecedent as a referent for *kendisi*.

Experiment 2 was a non-cumulative word-by-word self-paced reading task in which sentences with *kendi* and *kendisi* were preceded by a dialogue that provided a context biasing for the local antecedent, the long-distance antecedent or the extra-sentential antecedent as in (23):

(23)

Context:

Cem: I am so rude! I wish I hadn't hurt my mother.

Emre: These things happen.

Target sentence:

Cem, Emre'nin kendini suçladığını bir anda anladı.

Cem Emre-GEN kendi-ACC blame-NMLZ-3 SG POSS-ACC one moment-LOC realized

'Cem realize at once that Emre is blaming kendi.'

Question: *Kendi* ile kastedilen kişi kimdir? (Who is the person referred to by

kendi?')

Response options:

a. Cem

b. Emre

c. the mother

(Gračanin-Yuksek et al., 2017, p. 15)

Participants' reading times and their responses to the questions at the end of each dialogue were measured. Three words following *kendi* and *kendisi* (the predicate of the embedded clause, the adverb and the predicate of the matrix clause) were the regions of interest. The results indicated that *kendi* and *kendisi* were influenced by the biasing context in different ways. For instance, at the region of the predicate of the embedded clause, participants had difficulty in processing sentences which had extra-sentential biasing context for *kendi*, so extra-sentential biasing context sentences created significantly longer reading times than local biasing and non-local biasing contexts for *kendi*. However, there was no processing difficulty among three different biasing contexts for *kendisi* at any of the regions of interest.

The responses to the end-of-trial questions also showed that participants had an inclination to prefer local and long-distance antecedents for *kendi* and *kendisi* when there was consistency between these antecedents and the context. For example, when the context biased for the local noun, the local antecedent was preferred on 79% of the trials for *kendi*. However, when the context biased for the long-distance noun, the long-distance antecedent was preferred on 68% of the trials for *kendi*. This finding was also consistent with the assumption *kendi* allows both local and long-distance antecedents (Sezer, 1979; Meral, 2010; Özbek and Kahraman, 2016). However, *kendisi* was interpreted as ambiguous since any processing difficulty was

observed in three biasing contexts for *kendisi*, so the researchers suggest that since *kendisi* is not strictly constrained by syntax, contextual information had greater effect on the interpretation of *kendisi* compared to that of *kendi*.

To sum up, both Özbek and Kahraman's (2016) and Gračanin-Yuksek et al.'s (2017) findings show that Turkish native speakers prefer to bind *kendisi* to a non-local antecedent but not to a local or an extra-sentential antecedent contra the theoretical work on *kendisi* which predicts that *kendisi* can be bound by a local, a non-local and an extra-sentential antecedent (Enç, 1989; Göksel & Kerslake, 2005; Kornfilt, 2001).

Regarding *kendi*, which is considered to be the true reflexive in Turkish, again there was consistency between Özbek and Kahraman's (2016) and Gračanin-Yuksek et al.'s (2017) findings. Both studies showed that native Turkish speakers' judgments for *kendi* do not abide by BP-A. BP-A requires *kendi* to be bound by a local antecedent in the sentence but the findings neither in Özbek and Kahraman (2016) nor in Gračanin-Yuksek et al. (2017) confirmed this. Given the recent theoretical work for the binding of *kendi*, these findings were not surprising. As it was mentioned in Chapter 2, the binding of *kendi* in Turkish can be affected by the nominalization markers on the embedded predicate in complex sentences in Turkish (Kornfilt, 1984; Palaz, 2013). Neither Özbek and Kahraman (2016) nor Gračanin-Yuksek et al. (2017) took these factors into consideration in designing their studies. An antecedent identification task investigated this factor in Turkish speakers' antecedent preference for *kendi* and *kendisi* in complex sentences in Turkish. As it was mentioned in detailed Chapter 2, the results showed that native speakers of Turkish preferred to bind *kendi*, which is thought to be the true reflexive in Turkish, as well as *kendisi* to a non-local antecedent irrespective of the nominalization marker

(except for *-IncA* nominalization) on the embedded predicate in the complex sentences.

3.4 Studies on processing reflexives in L2 English

This section focuses on the studies that examine processing of reflexives in the second language. Even though processing of reflexives in the L1 has been investigated in several studies, the number of studies that examine processing of reflexives in the L2 is limited. These L2 studies investigated the antecedent preferences of second language learners of English from different language backgrounds. These studies used both offline and online measures. The offline measures would examine the final antecedent interpretation for the reflexive and the online measures would examine the time-course of the application of binding constraints in reference resolution.

One such study was conducted by Felser et al. (2009) who investigated how Japanese-speaking learners of English processed reflexives in their L2 English through metalinguistic judgment tasks, and an eye tracking experiment. Japanese-speaking learners of English did not have a reflexive similar to its English counterpart in their first language as the reflexive in Japanese allows long-distance binding. They also examined whether the learners could judge sentences in English in ways similar to the native speakers or they would be influenced by the binding-inaccessible antecedent's discourse prominence. They also examined the effect of individual differences such as reading span or processing speed on reflexive resolution.

In Experiment 1A and 1B, Felser et al. (2009) used untimed (1A) and timed (speeded) (1B) grammaticality judgment tasks to test participants' final interpretation

for reflexives. Individual differences were measured via reading span tasks for native speakers (Daneman & Carpenter, 1980) and for L2 learners (Harrington & Sawyer, 1992). The proficiency levels of learners ranged from between mid-intermediate to very-advanced levels.

In Experiment 1A, the participants were asked to evaluate sentences such as (24) on their well-formedness and meaningfulness in English.

(24)

a. Locality Violation: John argued that the professors had criticized himself.
b. C-command Violation: The doctors believed that Mary's son neglected herself.

(Felser et al., 2009, p. 489)

Locality violation in (24a) shows that even though the reflexive, *himself* matched with the non-local antecedent, *John* in terms of person, number and gender features, *himself* did not match with the local antecedent, *the professors* in terms of number feature. C-command violation in (24b) shows that even though the reflexive, *herself* matched with the non-c-commanding antecedent, *Mary* in terms of person, number and gender features, it did not match with the c-commanding antecedent, *Mary's son* in terms of gender feature. The results of this experiment showed that both native speakers and learners of English obeyed BP-A. Overall mean accuracy of native speakers and learners of English was observed in a high percentage (over 96% for both groups). According to Felser et al. (2009), this finding clearly indicated that L2 learners performed in a native-like manner in their antecedent assignment for reflexives in English since they were sensitive to both locality and c-command requirements of reflexive.

In Experiment 1B, materials were structurally similar to those used in Experiment 1A. However, there was both grammatical locality or c-command conditions (25a, c) and ungrammatical locality or c-command conditions (25b, d) in Experiment 1B. The sentences were presented to participants as shown in (25) below:

(25)

a. Locality Condition - Grammatical: Mary believed / that the dancers / had hurt themselves.
b. Locality Condition - Ungrammatical: Mary believed / that the dancers / had hurt herself.
c. C-command Condition - Grammatical: The dancers believed / that Mary's brother / had hurt himself.
d. C-command Condition - Ungrammatical: The dancers believed / that Mary's brother / had hurt herself.

(Felser et al., 2009, p. 490)

Participants' task was to evaluate sentences such as (25a-d) on their well-formedness and meaningfulness after reading the sentences. Results showed that mean accuracy of the conditions in speeded judgment task (Experiment 1B) was in general lower compared to untimed task (Experiment 1A) for both native speakers (86.2%) and L2 learners (68.3%). It was also observed that it took significantly longer time for L2 learners to answer a question compared to native speakers. Learners responded less accurately to sentences including locality requirements (25a) and (25b) than native speakers, however, their ability to judge sentences including c-command requirements (25c) and (25d) was similar to that of native speakers in Experiment 1B.

Felser et al. (2009) also considered the possibility of individual differences on reflexive resolution, so they looked at the effects of working memory and response speed on judgment accuracy. However, no significant effects of the working memory or response speed were found for native speakers and L2 learners. Therefore, Felser et al. (2009) suggested that learners' performance was similar to native speakers in untimed task (Experiment 1A); however, they had more difficulty in responding questions in speeded judgment task (Experiment 1B) compared to native speakers.

Experiment 2A examined the final interepretation of native speakers and L2 learners on antecedent assigniment on reflexive and pronouns in an offline task. Experiment 2B investigated native speakers and L2 learners' sensitivity to locality and c-command requirements for reflexives via an eye tracking experiment. The specific question for the eye tracking experiment was whether or not the participants would consider a binding-inaccessible antecedent, which is the non-local/non-commanding antecedent as the referent of the reflexive. Whether or not individual differences would affect their parsing decisions was also tested.

Experiment 2A was an offline task before the main eye tracking experiment (Experiment 2B) which included sentences in which locality and c-command constraints on reflexives and pronouns were manipulated. Sentences in (26) and (27) exemplify the conditions:

(26)

Reflexive conditions:

a. Inaccessible match, c-command: Adam believes that Ian blames himself.
b. Inaccessible mismatch, c-command: Diana knows that Mark helped himself.

c. Inaccessible match, no c-command: It appears to Maria that Jane cut herself.

(27)

Pronoun conditions:

a. Inaccessible match: Daniel recalled that Richard had woken him.

b. Inaccessible mismatch: Lucy says that Adam surprised her.

(Felser et al., 2009, p. 493)

The participants' task was to read the sentences and to decide whether referents for the reflexive and pronouns in the sentence were (un)grammatical in terms of syntactic constraints. The results of Experiment 2A showed that learners' response patterns were similar to the native speakers. Both groups could assign the binding-accessible antecedents as the referents for reflexives and pronouns conforming to syntactic constraints. For instance, both groups chose the c-commanding and local antecedent as the referent of the reflexive and the c-commanding and non-local antecedent as the referent of the pronouns. These results were taken as evidence for learners' sensitivity to the different binding requirements of reflexives and pronouns.

In Experiment 2B, 24 sets of short texts were used as experimental items. Each experimental sentence was preceded by a sentence presenting a context for the event mentioned in the experimental sentence. One context sentence was used for an experimental sentence set (28a-d) as exemplified in (28). Each experimental sentence was then followed by another sentence (again, the same sentence for all the conditions) to conclude the context.

(28)

John/Jane and Richard were very worried in the kitchen of the expensive restaurant.

a. Inaccessible match, c-command: John noticed that Richard had cut himself with a very sharp knife.
b. Inaccessible mismatch, c-command: Jane noticed that Richard had cut himself with a very sharp knife.
c. Inaccessible match, no c-command: It was clear to John that Richard had cut himself with a very sharp knife.
d. Inaccessible mismatch, no c-command: It was clear to Jane that Richard had cut himself with a very sharp knife.

Kitchens can be dangerous places.

(Felser et al., 2009, p. 494)

In (28a-d), the binding-accessible antecedent was *Richard*. The binding-inaccessible antecedent, *John* in (28a) matched the reflexive, *himself* in terms of phi-features and c-commanded, *himself* but it did not occur within the same local domain with *himself*. In (28b), the inaccessible antecedent, *Jane* mismatched the reflexive, *himself* in gender. In (28c), the inaccessible antecedent, *John* matched the reflexive, *himself* in terms of phi-features but it did not c-command it. In (28d), the inaccessible antecedent, *Jane* did not match the reflexive, *himself* in terms of phi-features and did not c-command it. Felser et al. (2009) investigated native speakers' and learners' eye-movements in the reflexive region and the postcritical region (two words following the reflexive) for six different eye tracking measures (first fixation duration, first-pass duration, regression path duration, second-pass duration, total reading time and regressions in) to examine early and delayed effects of the accessible antecedent and the inaccessible antecedent.

First fixation duration and first-pass duration measures showed that L2 learners read the reflexive region and the postcritical region significantly longer in

sentences such as (28a) where the reflexive's gender matched with the c-commanding binding-inaccessible antecedent than sentences such as (28b) where the gender of the reflexive mismatched the inaccessible antecedent. The gender match effect between the inaccessible antecedent and the reflexive was not found in non-c-command conditions (28c, d) for L2 learners.

First fixation duration and first-pass duration measures indicated that any reliable effects of the c-commanding and gender-matching antecedent on native speakers' eye-movements as they showed sensitivity only to the accessible antecedent for these early eye tracking measures. There was no effect of individual differences (reading span) on any eye tracking measures for either group of participants. Felser et al. (2009) conclude that although L2 learners' final antecedent choices were similar to native speakers as shown by the results of Experiment 2A, they considered a c-commanding and gender-matching inaccessible antecedent as a referent of the reflexive during online reference resolution. Therefore, L2 learners could not obey the locality constraint as well as native speakers during online processing.

In the lights of the above findings, Felser et al. (2009) suggest that the difference between native speakers and learners of English in terms of reflexive binding cannot be explained by processing factors or L1 influence. Even though Japanese-speaking learners of English did not have a reflexive similar to its English counterpart in their first language, their antecedent assignment for the reflexive in eye tracking experiment could not be attributed to L1 influence. Felser et al. (2009) state that syntactic constraints act as initial filter on antecedent search for native speakers; but, discourse-prominence was given primary importance by learners of English.

In another study, Felser and Cunnings (2012) also investigated the effect of discourse prominence and coreference constraints on anaphor resolution in the L2. The participants were German speaking learners of English and native speakers of English. Binding requirements of reflexives in German is similar to English in that both languages allow only local binding of reflexives.

Two eye tracking experiments were carried out in this study. After each eye tracking experiment, there was an offline task testing native speakers and L2 learners' final antecedent interpretation on reflexives. The aim of Experiment 1 was to analyze whether or not German speakers of English would take into consideration the binding-inaccessible antecedent as a potential referent of the reflexive given its discourse prominence. The offline task after Experiment 1 was a multiple-choice identification task which was carried out to test whether native speakers and L2 learners were sensitive to the binding requirements for reflexives and pronouns. Sentences such as (29) were used in the offline task:

(29)

a. Reflexive, single match: Emma noticed that the grandfather had explained himself carefully.
b. Reflexive, double match: Adam noticed that the grandfather had explained himself carefully.
c. Pronoun, single match: Daniel recalled that Emma had woken him too late.
d. Pronoun, double match: Daniel recalled that Adam had woken him too late.

(Felser & Cunnings, 2012, p. 578)

Participants were asked to decide whether the accessible antecedent, the inaccessible antecedent or either of them was the referent of a reflexive and a pronoun. The results showed that both groups were sensitive to the binding requirements for reflexives and pronouns. Local antecedent was chosen as the antecedent of the reflexive whereas non-local antecedent was chosen as the antecedent of the pronoun.

In Experiment 1, the first eye tracking experiment, following Sturt (2003) and Xiang et al. (2009); gender congruency was manipulated between the accessible antecedent and the reflexive and between the inaccessible antecedent and the reflexive. The accessible antecedent was a stereotypical male/female noun (*the soldier*) and the inaccessible antecedent was a proper name (*James/Helen*). Both antecedents c-commanded the reflexive as in (30):

(30)

a. Accessible Match, Inaccessible Match: James has worked at the army hospital for years. He noticed that the soldier had wounded himself while on duty in the Far East. Life must be difficult when you are in the army.

b. Accessible Match, Inaccessible Mismatch: Helen has worked at the army hospital for years. She noticed that the soldier had wounded himself while on duty in the Far East. Life must be difficult when you are in the army.

c. Accessible Mismatch, Inaccessible Match: Helen has worked at the army hospital for years. She noticed that the soldier had wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

d. Accessible Mismatch, Inaccessible Mismatch: James has worked at the army hospital for years. He noticed that the soldier had wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

(Felser & Cunnings, 2012, p. 579)

Felser and Cunnings (2012) predicted that syntactic constraints would guide the initial stages of reflexive processing for native speakers. That is, only the binding-accessible antecedent (*the soldier*) would be considered as the antecedent of the reflexive. For the L2 learners, it was predicted that discourse prominence of the c-commanding inaccessible antecedent would guide the initial stages of reflexive processing. The analyses were conducted for the reflexive region and the postcritical region (two words following the reflexive). To investigate earlier and later effects of the accessible antecedent and the inaccessible antecedent, four different eye tracking measures (first fixation duration, first pass reading time, regression path duration and rereading time) were examined.

Eye tracking measures indicating earlier stages of processing such as first fixation duration and first pass reading time showed that native speakers showed sensitivity to the stereotypical gender of the accessible antecedent for reflexive region and the postcritical region. That is, when there was a gender match between binding-accessible antecedent and the reflexive such as in (30a) and (30b), native speakers read these conditions faster than accessible mismatch conditions (30c, d) during earlier stages of processing. However, eye tracking measures indicating earlier stages of processing such as first fixation duration and first pass reading time showed that non-native speakers were initially affected by the discourse prominent inaccessible antecedent for reflexive region and the postcritical region. That is,

reliable effects of the inaccessible antecedent were observed for L2 learners; thus, there was a trend in shorter reading times when there was a gender match between the inaccessible antecedent and the reflexive such as in (30a) and (30c) than inaccessible mismatch conditions (30b, d). The effects of the accessible antecedent, on the other hand, were not observed until rereading of the reflexive region and the postcritical region for L2 learners.

According to Felser and Cunnings (2012), native speakers' processing was influenced by syntactic factors since they were initially affected by the stereotypical gender of the binding-accessible antecedent. However, L2 learners behaved differently from the native speakers in that they considered the discourse prominent but syntactically inaccessible antecedent as the antecedent for the reflexive even in the initial stages of processing as indicated by first fixation durations. Only at later stages, as shown by rereading time, they considered the accessible antecedent as the antecedent for the reflexive.

In Experiment 2, inaccessible antecedent that did not c-command the reflexives but linearly closer to the reflexives than the accessible antecedent was used to test whether linear proximity would have an effect on participants' antecedent choices. As in Experiment 1, there was an offline task after Experiment 2. The offline task was used to test the effect of inaccessible antecedent on final antecedent interpretation of reflexives. In this task, the inaccessible antecedent was the subject of a relative clause and the accessible antecedent was the subject of the matrix clause. Sentences such as (31a, b) were used:

(31)

a. Single Match: The grandfather that Emma was talking to explained himself carefully.

b. Double Match: The grandfather that Adam was talking to explained himself carefully.

(Felser & Cunnings, 2012, p. 590)

Participants were asked to decide whether the accessible antecedent, the inaccessible antecedent or either of them was the referent of a reflexive. Both native speakers and non-native speakers were sensitive to the binding requirements of reflexives as they chose the accessible antecedent in both single match and double match conditions.

In the online task, short texts parallel to Experiment 1 were used. In this experiment, the accessible antecedent (*the soldier*) was in the subject position of the matrix clause whereas the inaccessible antecedent (*he/she*) which co-referred with the inaccessible antecedent (*James/Helen*) was the subject of the embedded clause and was linearly closer to the reflexive as shown in (32):

(32)

a. Accessible Match, Inaccessible Mismatch: James has worked at the army hospital for years. The soldier that he treated on the ward wounded himself while on duty in the Far East. Life must be difficult when you are in the army.
b. Accessible Match, Inaccessible Mismatch: Helen has worked at the army hospital for years. The soldier that she treated on the ward wounded himself while on duty in the Far East. Life must be difficult when you are in the army.
c. Accessible Mismatch, Inaccessible Match: Helen has worked at the army hospital for years. The soldier that she treated on the ward wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

d. Accessible Mismatch, Inaccessible Mismatch: James has worked at the army hospital for years. The soldier that he treated on the ward wounded herself while on duty in the Far East. Life must be difficult when you are in the army.

(Felser & Cunnings, 2012, p. 590 – 591)

It was found that native speakers were initially sensitive to the stereotypical gender of the accessible antecedent during initial stages of processing such as in first-pass reading times even though this antecedent was linearly distant to the reflexive in the sentence; thus, accessible match conditions (32a, b) yielded shorter reading times than accessible mismatch conditions (32c, d) for native speakers. L2 learners were initially affected by the linearly closer inaccessible antecedent; therefore, shorter reading times were observed when inaccessible antecedent matched the reflexive in gender as in (32a) and (32c) compared to when it mismatched with the reflexive (32b) and (32d) even in early eye tracking measures as indicated by first fixation duration and first-pass reading time. The results indicated that instead of showing sensitivity to the accessible antecedent as the referent of the reflexive during earlier stages of processing, L2 learners linked the reflexive with the linearly closer inaccessible antecedent.

Felser and Cunnings (2012) maintain the idea that during early processing of reflexives by non-native speakers are influenced by the discourse prominence or the linear proximity of the inaccessible antecedent in the discourse whereas native speakers are sensitive to syntactic coreference constraints. Based on the results, Felser and Cunnings (2012) argue that sentence processing mechanisms of native and non-native speakers are different from each other supporting the Shallow Structure Hypothesis (SSH) of Clahsen and Felser (2006) which argues that non-

structural cues guide L2 processing whereas structural cues have a primary role in L1 processing (Clahsen & Felser, 2006).

All in all, studies investigating L2 learners' final antecedent interpretation to the reflexive is similar to native speakers, so L2 learners were sensitive to the binding requirements of the reflexives. However, the results of the online eye tracking experiments show that L2 speakers' initial antecedent preference was not syntactically-constrained, but it was influenced by discourse-related factors (Felser et al., 2009; Felser & Cunnings, 2012). Even though native speakers showed sensitivity to the syntactically-constrained antecedent in their antecedent retrieval process for a reflexive, L2 learners showed sensitivity to syntactically inaccessible but discourse prominent or linearly proximate antecedents even at the early stages of processing. This is true for learners coming from different language backgrounds (Japanese-speaking learners of English in Felser et al., 2009; German-speaking learners of English in Felser and Cunnings, 2012).

CHAPTER 4

THEORETICAL MODELS OF NON-NATIVE LANGUAGE PROCESSING

4.1 Overview

In this chapter, theoretical models of non-native language processing mechanisms will be discussed. Some models posit that the language processing systems of L2 learners is qualitatively different from those of native speakers (Clahsen & Felser, 2006; Felser & Clahsen, 2009; Ullman, 2005) in that L2 learners rely more on non-structural than structural information compared to native speakers. In relation to the first group's arguments, the difference between the processing mechanisms of native speakers and L2 learners is attributed to L2 learners' vulnerability to interference and their reliance on non-structural information such as discourse-related cues during accessing information from memory (Cunnings, 2017). Others, on the other hand, maintain that the differences in the processing behavior of native speakers and L2 learners can be attributed either to L2 learners' less automatized processing skills (Hopp 2006, 2010; McDonald, 2006) or to L2 learners' proficiency in the target language but not to qualitative differences in processing mechanisms between two groups (Hopp, 2006, 2010). Some other models take a different approach and suggest that L2 learners' non-native-like behavior in processing can be attributed to the difficulty they face in computing interfaces between syntax and other cognitive domains such as discourse or pragmatics (Sorace, 2011).

4.2 Theoretical models of non-native language processing

Ullman (2001) maintains that the differences observed between L1 and L2 processing can be attributed to the memory systems recruited during language

processing by these two groups. In Ullman's (2001) model, there are two memory systems: declarative memory and procedural memory. While the declarative memory system is responsible for registry and retrieval of facts and events, the procedural memory system is responsible for learning and computing new skills and habits. Regarding language processing, the declarative memory is used for representation of and access to lexical knowledge, where lexical entries are stored entries alongside their phonological and semantic properties. The procedural memory, on the other hand, is recruited for grammatical computations involving syntax, non-lexical semantics, morphology and phonology. So, while the lexicon is represented in the declarative memory system, grammatical structures are represented in the procedural memory system.

Ullman (2005) argues that native speakers and L2 learners use these memory systems in different ways. This differential use of the two memory systems is highly related to the L2 learners' age-of-exposure to the target language's grammar. Young learners behave similar to native speakers, so they are able to use procedural memory system for computing grammatical structures similar to native speakers. However, the maturational changes in the brain during adolescence affect adult learners of a language, so they do not make use of procedural routines as much as native speakers do. Thus, while grammatical operations are computed in the procedural memory for native speakers, a greater reliance on the declarative memory is observed to compute same grammatical operations in adult learners learning a new language. However, Ullman (2005) also states that age-of-exposure is not the only factor that explains the L2 learners' dependence on the declarative memory system. According to him, practice is also an important factor for adult learners' utilization of the procedural memory system to compute grammatical operations. With sufficient practice in the

target language, it is possible for an adult learner to rely on the procedural memory system for grammatical computations.

Evidence for Ullman's arguments comes from event-related potential (ERP) studies and the three ERP measures associated with language processing: left anterior negativities (LANs) taken as reflective earlier grammatical computations (Friederici, Hahne, & Mecklinger, 1996), P600 component taken as reflective late syntactic processing (Hagoort & Kutas, 1995; Osterhout, McLaughlin & Bersick, 1997), and N400 taken as reflective lexical-conceptual processing (Barrett & Rugg, 1990; Olivares, Bobes, Aubert & Valdes-Sosa, 1994). According to the declarative/procedural model, the ERP components associated with grammatical computations might be absent or modified in L2 processing compared to L1 processing; however, ERP components associated with lexical-conceptual processing might be similar in L1 and L2 processing.

One study supporting this prediction is by Hahne and Friederici (1999). Hahne and Friederici (1999) tested native German speakers and Japanese learners of German on phrase structure violations in German. It was found that an N400 effect, reflecting the lexical/conceptual processing, was similar for both native and non-native speakers of German. Although native speakers yielded both LANs and P600 for syntactic anomalies, these two components were not observed for L2 learners.

In another study, Hahne (2001) tested native speakers of German and Russian learners of German on selectional restriction violations and word category violations in an ERP study. It was found that native speakers yielded LAN for early morpho-syntactic violations, P600 for later syntactic violations and N400 for lexical-conceptual violations. Although L2 learners of German also yielded P600 and N400 components, both components were delayed compared to native speakers.

Additionally, L2 learners did not yield any LAN for early morpho-syntactic violations; showing that the L2 learners were not sensitive to the early morpho-syntactic violations in the same manner as native speakers.

Another ERP study testing native and non-native speakers was conducted by Osterhout and McLaughlin (2000) in French. The syntactic anomalies in Osterhout and McLaughlin's (2000) study yielded a P600 effect and semantic anomalies yielded an N400 effect with native speakers. Although there was an N400 effect for semantic anomalies with the L2 French learners, the syntactic anomalies yielded either N400 effect or no effect with the L2 learners. According to Ullman (2005), observation of an N400 effect for syntactic anomalies is compatible with the assumptions of the declarative/procedural model as L2 learners rely more on the declarative memory compared to native speakers. These studies, among others, were taken as evidence for the argument that compared to native speakers' language processing system, the use of grammatical knowledge or procedural memory is relatively more limited than the use of lexical knowledge or declarative memory in adult L2 learners' language processing system.

Similar to Ullman (2005), Clahsen and Felser (2006) posit that there are qualitative differences between native speakers and non-native speakers in real-time language processing. However, Clahsen and Felser (2006) differ from Ullman (2005) in several ways. Firstly, Ullman (2005) suggests that experience with the target language allows L2 learners to make use of procedural routines similar to native speakers, but Clahsen and Felser (2006) claim that L2 learners' use of syntactic information does not change qualitatively over time. Another difference is that Ullman (2005) suggests that L2 learners differ from native speakers in processing of both syntax and morphology; however, Clahsen and Felser (2006) claim that even

though morphological information is represented similarly in the processing systems of native speakers and L2 learners, syntactic information is represented differently in these two processing systems.

According to Clahsen and Felser (2006), native speakers are highly competent in integration of different sources of information such as syntactic, semantic, pragmatic and discourse-level information. L2 learners use lexical-semantic and pragmatic information in a similar fashion as native speakers, but they benefit from syntactic information less than native speakers during real-time language processing and L2 learners have difficulty in integrating different types of information sources. This is the essence of Clahsen and Felser's (2006) Shallow Structure Hypothesis (SSH). The SSH is configured more specifically as "the syntactic representations adult L2 learners compute for comprehension are shallower and less detailed than those of native speakers" (Clahsen & Felser, 2006, p. 32). According to SSH, as capacity sources of L2 learners are limited, for L2 learners, processing complex syntactic structures (e.g., syntactic dependencies across multiple clauses) is more difficult than simple syntactic dependencies (e.g., syntactic dependencies across local clauses). To compensate for their lack in grammatical parsing routines, L2 learners entertain other cues such as lexical, semantic or pragmatic information in processing their L2. Clahsen and Felser (2006) argue for this position regardless of L2 proficiency or amount of exposure to the L2. In their view, even a highly proficient L2 learner who has been exposed to the target language for a long duration will compute syntactically less detailed structures than a native speaker of that language.

The SSH has been based on the results of several studies, reviewed in more detail in Clahsen and Felser (2006) and summarized below. These studies

investigated first and second language processing of syntactic ambiguities and syntactic dependencies.

Papadopolou and Clahsen (2003) investigated relative clause (RC) attachment ambiguities that involved a complex genitive construction with the preposition (*of*) and in the preposition (*with*). It was found that L2 learners of Greek coming from different language backgrounds (Spanish, German and Russian) did not show any clear attachment preference for RC attachment ambiguities with the genitive (*of*) condition unlike native Greek speakers who showed a local attachment preference for this construction. However, L2 learners, just like native speakers, exhibited local attachment for the RC attachment ambiguities with the prepositional phrase (PP) condition (*with*). This finding suggested that L2 learners can compute thematic information provided with the PP condition (*with*) similar to native speakers, but unlike native speakers, they cannot compute syntactic information introduced with the genitive (*of*) condition, which introduces a syntactically more complex structure involving argument relations.

A similar finding was observed in Felser, Roberts, Marinis and Gross's (2003) study of L1 and L2 processing of English. Similar to Papadopolou and Clahsen (2003), Felser et al. (2003) also investigated RC attachment ambiguity resolution that involved a genitive preposition (*of*) condition and a thematic preposition (*with*) condition. Their findings were also similar to Papadopolou and Clahsen (2003) in that unlike native speakers of English who exhibited a clear local NP preference for both constructions, L2 learners showed a local NP preference only for the sentences that included the thematic preposition (*with*), but they did not show any clear attachment preferences for the sentences that included the genitive preposition (*of*). Felser et al. (2003) concluded that L2 learners are inclined to rely

more on non-structural cues because they behaved similar to native speakers in the thematic preposition (*with*) condition, but when there were only structural cues such as in the genitive preposition (*of*) conditions, L2 learners' processing decisions were random.

Another study conducted by Marinis, Roberts, Felser and Clahsen (2005) explored processing of long-distance wh-dependencies in sentences requiring an intermediate gap effect (*The nurse who the doctor argued that the rude patient had angered _____ is refusing to work late.*) and in sentences not requiring any intermediate gap effect (*The nurse who the doctor's argument about the rude patient had angered _____ is refusing to work late.*) by L2 speakers of English coming from different language backgrounds (Chinese, Japanese, German and Greek). The results indicated that learners with wh-movement background (L1 German and L1 Greek) and learners with wh-in-situ background (L1 Chinese and L1 Japanese) did not show any intermediate gap effect in conditions with the former sentence structure suggesting that they did not obey the subjacency principle. However, native speakers of English exhibited sensitivity to the intermediate gap positions and obeyed the subjacency principle during processing. Clahsen and Felser (2006) suggest for Marinis et al.'s (2005) results that unlike native speakers, L2 learners benefit from non-structural cues such as direct lexical association while processing long-distance wh-dependencies instead of obeying the subjacency principle and using structural cues.

Clahsen and Felser (2006) and Felser and Clahsen (2009) also claim that child and adult native speakers behave differently from adult L2 learners in processing syntactic information. They support their arguments by the results of several studies conducted on German plural inflection (Clahsen, Lück & Hahne,

2007; Hahne, Müller & Clahsen, 2006; Lück, Hahne & Clahsen, 2006) and filler-gap dependencies in English (Felser & Roberts, 2007; Roberts, Marinis, Felser & Clahsen, 2007). In these studies, child native speakers and adult L2 learners were found to be slower and less efficient than adult native speakers in terms of processing German plural inflection and filler-gap dependencies in English. However, clear differences were also identified between child/adult native speakers and adult L2 learners. Child native speakers used similar processing routines and relied more on structural information similar to adult native speakers. Adult L2 learners, in contrast, benefited more from non-structural cues and relied more on lexical and semantic information to compensate for their lack in using grammatical information effectively. Therefore, Felser and Clahsen (2009) suggest that L2 learners exhibit more sensitivity to non-structural cues in their interpretation and processing of target language input than to syntactic information, but native speakers use both structural and non-structural information where relevant.

SSH does not posit the claim that the differences between native speakers and L2 learners in their language processing behavior is due to L2 learners' incomplete acquisition of the grammatical structures in target language. If this were the case, L2 learners would not perform as successfully as native speakers in offline tasks, but they do (e.g., grammaticality judgment tasks in Felser et al. (2003) and Papadopoulou and Clahsen (2003)). The SSH does not attribute these differences to L1 transfer, either. If transfer played a role in L2 language processing, then learners from typologically different language backgrounds (Felser et al., 2003; Papadopolou & Clahsen, 2003; Marinis et al., 2005) would differ in their ambiguity resolution patterns in the target language and language learners whose L1 is similar to the L2 would be more native-like. The SSH attributes processing differences in native

speakers and L2 learners to L2 learners' difficulty in computing complex syntactic information.

The studies summarized above (Clahsen et al., 2007; Felser et al., 2003; Felser & Roberts, 2007; Hahne et al., 2006; Lück et al., 2006; Marinis et. al., 2005; Papadopoulou & Clahsen, 2003; Roberts et al., 2007) were taken as evidence for L2 learners' shallow parsing routines for syntactically complex structures. Clahsen and Felser (2006) conclude that "the sentential representations adult L2 learners compute for comprehension contain less syntactic detail than those of native speakers" (Clahsen & Felser, 2006, p. 35).

Cunnings (2017) maintains that differential uses of memory encoding, information storage and retrieval operations are the primary reasons for the differences between L1 and L2 processing. He suggests that L2 learners are more vulnerable to interference during memory retrieval compared to native speakers. He also states that L2 learners rely more on discourse-related cues during retrieval of information from memory.

For Cunnings (2017), data reported in previous studies supports his arguments on the different processing mechanism systems of native speakers and L2 learners. For instance, in the RC attachment study by Felser et al. (2003), L2 learners exhibited attachment preferences similar to those of native speakers when lexico-semantic cues were provided; but they did not show any attachment preferences when there was no lexical cue in the sentence. According to Clahsen and Felser (2006), lack of an attachment preference by L2 learners in Felser et al. (2003) show that L2 learners show shallow parsing routines when the only cue to correct parsing is available through structural information. However, Cunnings (2017) interprets these findings as a support for the different memory retrieval cues used during L2

learners' online sentence processing. He claims that L2 learners can also show clear attachment preferences, yet these preferences are not always similar to the preferences of native speakers. For instance, Witzel, Witzel and Nicol (2012) found that while Chinese-speaking learners of English showed non-local attachment preference, native English speakers exhibited local attachment preference in an RC attachment study in English. In Pan, Schimke and Felser's (2015) RC attachment study, it was found that L2 learners' attachment preferences were reliably guided by discourse-related information. That is, when L2 learners were given discourses biasing non-local attachment, they exhibited clear non-local attachment preference. When L2 learners were given discourses biasing local attachment, they exhibited local attachment preference. However, native speakers did not show any clear attachment preferences in this study. Considering the results of the studies, Cunnings (2017) maintains the difference between the RC attachment preferences of native speakers and L2 learners cannot be attributed only to the fact that L2 learners do shallow parses during sentence processing. Instead, Cunnings (2017) suggests that L2 learners can also exhibit clear attachment preferences as native speakers but these preferences are not always in the same direction as the preferences of native speakers (Pan et al., 2015; Witzel et al., 2012). L2 learners are more sensitive to the discourse context than native speakers, so they rely more on discourse-related cues while retrieving information from memory.

Cunnings (2017) also examined studies investigating reanalysis strategies used for garden-path sentences by native speakers and L2 learners. For instance, Jacob and Felser (2016) tested how native English speakers and German-speaking learners of English would process the garden-path effects at the syntactic disambiguation in sentences such as (1):

(1) While the gentleman was eating (,) the burgers were still being reheated in the microwave.

(Jacob & Felser, 2016, p. 913)

Experimental sentences were provided either with a comma or without a comma to the participants in this study. When a comma was used after *eating* in (1), the sentence became unambiguous whereas when there was no comma between *eating* and *the burgers*, the sentence was temporarily ambiguous as to whether *the burgers* was the direct object of the verb *eat* or the subject of the main clause. The reading times for the *were still* region were longer in temporarily ambiguous sentences (without a comma) than in unambiguous sentences (with a comma) for both native speakers and L2 learners, which shows that both groups were garden-pathed, so they needed to reanalyze the temporarily ambiguous sentences. It was also observed that when a comprehension question such as *Was the gentleman eating burgers?* was asked to the participants, both native speakers and L2 learners gave incorrect answers, but L2 learners gave more incorrect answers to those questions than native speakers. Considering the results of this study, Cunnings (2017) argues that in the L2 processing system, the initial interpretation of the temporarily ambiguous sentences continues even after the reanalysis, so their reanalysis pattern is shadowed by their initially wrong interpretation for the temporarily ambiguous sentences.

Cunnings (2017) reviews the studies on anaphora resolution, as well. He notes that syntactic locality requirement is the primary retrieval cue used by native speakers during online antecedent retrieval process (Dillon et al., 2013). He states that L2 learners differ from native speakers in showing sensitivity more to non-structural cues (discourse focus/linear proximity of the binding-inaccessible antecedent) during initial stages of processing (Felser & Cunnings, 2012), but this

difference cannot be explained solely by the assumptions of SSH (Clahsen & Felser, 2006). For instance, in Felser and Cunnings' (2012) study, German-speaking learners of English had longer reading times when the binding-inaccessible antecedent mismatched the reflexive in gender than when the binding-inaccessible antecedent matched the reflexive in gender. However, native speakers of English had longer reading times when the binding-accessible antecedent mismatched the reflexive in gender than when the binding-accessible antecedent matched the reflexive in gender. Cunnings (2017) claims that if L2 learners always parsed in a shallow manner, they would be affected by the linearly closer antecedent in Felser and Cunnings' (2012) study. Even though L2 learners showed sensitivity to the linearly closer binding-inaccessible antecedent in Felser and Cunnings' (2012) Experiment 2, they showed sensitivity to a more distant but discourse prominent binding-inaccessible antecedent in their Experiment 1. Considering the results of this study, Cunnings (2017) maintains that instead of doing across-the-board shallow parsing, L2 learners rely more on discourse-related information when assigning an antecedent to the reflexive. Compared to native speakers, L2 learners rely more on Subject/Topic cue during antecedent retrieval process for the reflexive; therefore, syntactically inaccessible but discourse prominent antecedents were considered to be the referent of the reflexives by L2 learners in Felser and Cunnings (2012)'s study.

In sum, Cunnings (2017) claims that "a precise characterization of the memory encoding, storage and retrieval operations involved in sentence processing can provide a promising framework to describe L1/L2 differences" (Cunnings, 2017, p. 673). A greater reliance on discourse-level information and being more vulnerable to interference during real-time sentence processing can explain the different processing mechanisms of native speakers and L2 learners.

Although SSH has received much attention in the L2 processing literature, Hopp (2006, 2010) and McDonald (2006) argue that the differences observed in language processing routines of native speakers and L2 learners are quantitative rather than qualitative. According to McDonald (2006), the main reason for adult learners' deviance from native-like processing in the L2 is due to their less automatized processing skills in the target language. This is because use of cognitive resources in L2 processing is relatively more demanding than use of cognitive resources in L1 processing, which can be attributed to L2 learners' poorer working memory and decoding abilities than those of native speakers. She also suggests that L2 learners' processing difficulties in complex grammatical structures result from the interaction between non-linguistic sources (e.g. working memory capacity, decoding ability or processing speed) and syntactic processing. The evidence for McDonald's (2006) approach comes from a study conducted with L2 learners with different language backgrounds and native speakers of English on comprehending word order, articles and past tense in English. Tests measuring L2 learners' working memory capacity, decoding ability and processing speed were also employed to examine whether these cognitive abilities would have an influence on L2 learners' grammaticality judgments in an auditory task. Participants' task was to decide whether the sentence they listened to was grammatical or ungrammatical in English. McDonald (2006) found that L2 learners gave less correct answers and they were slower in deciding whether the sentence they listened to was grammatical or ungrammatical compared to native speakers. She also found a positive correlation between working memory capacity, decoding ability and L2 learners' grammaticality judgment; but there was no correlation between processing speed measure and L2 learners' grammaticality judgment. As L2 learners' working memory capacity and

decoding ability skills increased, participants gave more correct answers and they were faster in deciding whether the sentence they listened to was grammatical or not. It was also observed that although L2 learners performed as well as native speakers on word order, they had difficulty in regular past tense morphology and articles. Based on the findings, McDonald (2006) suggests that poor grammatical performance in L2 might be explained by general processing problems in terms of learners' limited working memory capacity and their limited decoding ability skills.

According to Hopp (2006, 2010), even though processing in the L2 is cognitively more demanding than processing in the L1, processing in each language is fundamentally similar to each other. Hopp bases his arguments on the results of two studies investigating the effect of L2 proficiency on subject-object ambiguities in German (Hopp, 2006) and the effect of L2 proficiency and L1 effect on German case marking and subject-verb agreement (Hopp, 2010).

In Hopp's (2006) study, L2 learners were categorized into two groups based on their proficiency in German: near-native or advanced. It was found that proficiency in the L2 was a significant factor in sensitivity to the syntactic information in the target language. The near-native group in this study exhibited native-like sensitivity to the syntactic information and used syntactic information in a similar fashion as native speakers of German. The advanced group, on the other hand, were less successful in computing grammatical information compared to near-natives and native speakers of German as the advanced group were slower and less accurate than the other groups.

In Hopp's (2010) study, the results showed a significant effect of L2 proficiency; that is, near-native group behaved similar to native speakers of German while processing case marking and subject-verb agreement compared to advanced

group. L1 effects were also observed in a sense that when processing demands increased, such as in the speeded grammaticality judgment task, L1 English and L1 Dutch near-natives had difficulty in processing case marking. However, L1 Russian near-natives performed similarly to the native speakers of German even when the processing demands increased. According to Hopp (2010), this difference between English and Dutch versus Russian learners of German can be attributed to the typological similarities between German and Russian as both languages are rich in case marking and the typological difference between German and Dutch/English as English and Dutch are poor in case marking. Based on the results, Hopp (2010) suggest that native-likeness is possible for L2 learners in the domain of L2 morphosyntax. He also suggests that the first language of the L2 learners and reduced processing capacity have significant roles in processing L2 inflection. Unlike Clahsen and Felser (2006) and Ullman (2005), Hopp (2006, 2010) posits that native and non-native language processing systems are quantitively different as grammatical computations are less efficient in L2 processing.

Sorace (2011) does not link the difficulties L2 speakers face in processing to the cognitive mechanisms associated with language processing. In Sorace's (2011) view, L2 learners' processing difficulty in the target language occurs when grammatical representations in the L2 include an interface between syntax and other domains such as morphology, semantics and discourse. This is referred to as the Interface Hypothesis (IH; Sorace, 2011). In IH, even though L2 learners are able to compute structures requiring only syntactic information in a similar fashion to native speakers, they are not as competent as native speakers in integrating information related to syntax and other domains at the same time, which results in L2 learners' experience of more difficulty in real-time language processing than native speakers.

Belleti, Bennati and Sorace's (2007) results support this argument. Belleti et al. (2007) found that English learners of Italian did not have any difficulty in interpreting the null subject pronoun (*pro*) in Italian and they interpreted it in a similar fashion to the native speakers of Italian. However, they had problems with overt subject pronoun (*lei*) and interpreted it differently from native speakers. For instance, in processing (2a, b) below, both native and non-native speakers of Italian chose the subject of matrix clause (*la vecchietta*) as the antecedent of the null subject pronoun (*pro*) in (2a). However, non-native speakers behaved differently from native speakers when assigning an antecedent for the overt subject pronoun (*lei*) in (2b). Even though native speakers of Italian chose the object of the matrix clause (*la ragazza*) as it is the topic-shifter, non-native speakers chose the subject of the matrix clause (*la vecchietta*) as the antecedent of the overt subject pronoun in (2b).

(2)

a. La vecchietta saluta la ragazza quando *pro* attraversa la strada.

b. La vecchietta saluta la ragazza quando *lei* attraversa la strada.

'The old woman greets the girl when she crosses the road.'

(Belleti et al., 2007, p. 667)

According to IH, the presence of a topical antecedent in the sentence affects L2 learners' antecedent assignment for subject pronouns in Italian. To assign an antecedent for the overt subject pronoun (*lei*) in (2b), L2 learners need to make use of discourse-related information and syntactic information concurrently. As the overt pronouns in Italian signs a topic shift and requires a non-topical antecedent as their referent (Carminati, 2002), L2 learners would be expected to choose the object of the matrix clause (*la ragazza*) as the antecedent of the overt subject pronoun (*lei*) in (2b). However, unlike native speakers, L2 learners could not process the sentences

involving the integration of discourse-related information and syntactic information together, so they were less successful in assigning an appropriate antecedent for the overt subject pronoun in Italian than native speakers.

The present study will investigate how Turkish learners of English will process the reflexives in the target language. Even though several theoretical models are reviewed in Chapter 4 in detail, I will test only the SSH of Clahsen and Felser (2006), but the results will be evaluated through the theoretical assumptions of Cunnings (2017), Hopp (2006, 2010), McDonald (2006), as well.

If the SSH (Clahsen & Felser, 2006) is correct, the L2 learners of English in the current study are expected to rely more on non-structural cues while retrieving an antecedent for reflexives (in the initial stages of processing). That is, Turkish learners of English will be more sensitive to the gender (mis)matches between the binding-inaccessible antecedent and the reflexive rather than the gender (mis)matches between the binding-accessible antecedent and the reflexive. In both Experiment 1 and 2, the binding-inaccessible antecedent has discourse prominence. In Experiment 1, both the accessible and the inaccessible antecedents c-command the reflexive. In Experiment 2, the inaccessible antecedent does not c-command the reflexive, but it is linearly closer to the reflexive. Non-structural cues (discourse prominence in Experiment 1 and discourse prominence and linear proximity in Experiment 2) are expected to guide the L2 learners in their processing of these structures, so they are predicted to be sensitive to the gender (mis)matches between the inaccessible antecedent and the reflexive, but not to the gender (mis)matches between the accessible antecedent and the reflexive. If the results show this pattern, then they will replicate the previous studies on processing of reflexives (Felser et al., 2009; Felser & Cunnings, 2012).

The proficiency levels of the L2 learners were not manipulated in this study. The only participant group was advanced learners of English, so the arguments proposed by Hopp (2006, 2010) on the proficiency factor in native-like language processing will not be tested. However, Hopp (2006, 2010) and McDonald (2006) also argue that L1 and L2 processing are not qualitatively different. To test that argument, the results will be compared to the results obtained from native speakers in Sturt's (2003) study. If the L2 learners in the present study show similarities to the native speakers in Sturt's (2003) study, then the results will suggest that native-like processing is possible in the L2 and L2 learners do not differ from native speakers in (the ways they utilize) their language processing mechanisms. Hopp (2006, 2010) and McDonald (2006) also predict that the amount of information that L2 learners keep active during real-time sentence processing is limited. This argument predicts a role for linear proximity in antecedent retrieval in the sense that conditions which keep reflexive-antecedent dependencies as short as possible would be preferred over conditions which keep reflexive-antecedent dependencies long. Thus, the in contexts where binding-inaccessible antecedent is linearly closer to the reflexive than the binding-accessible antecedent (as in Experiment 2, see Chapter 5 for details), the participants may be sensitive to the gender (mis)matches associated with the binding-inaccessible antecedent.

Cunnings' (2017) argues L2 learners show more sensitivity to discourse-based retrieval cues than native speakers in the previous studies on reflexive resolution (Felser & Cunnings, 2012). If that is the case, L2 learners in the current study are predicted to be affected by the discourse prominent (subject/topic) inaccessible antecedent. Thus, Cunnings' (2017) predictions for the current materials

are similar to those proposed under the SSH, but his perspective on the underlying mechanisms for processing L2 input differs from the SSH.

Chapter 5 presents the three experiments conducted to test these predictions.

CHAPTER 5

THE PRESENT STUDY: ONLINE AND OFFLINE EXPERIMENTS IN ENGLISH

5.1 Introduction

This chapter describes the design of the study and reports on three experiments, two eye tracking experiments (Experiment 1 and Experiment 2) and an antecedent identification task (Experiment 3). All experiments were conducted in English and the participants were Turkish learners of English with advanced proficiency.

There are several reasons for using eye movement technique in this study. First of all, eye tracking is considered to make reading as natural as possible in an experimental setting (Duyck, Van Assche, Drieghe & Hartsuiker, 2007) and eye-movements during reading help us understand real-time processing in detail (Frenck-Mestre, 2005). Thanks to eye movements, it is possible to have information about cognitive processes during reading (Just & Carpenter, 1980; Rayner, 1998, 2009; Rayner, Sereno, Morris, Schmauder & Clifton, 1989) and to have information about both early and late processing stages during reading in the target language (Roberts & Siyanova-Chanturia, 2013). Roberts and Siyanova-Chanturia (2013) suggest that eye tracking is a useful technique to have information about L2 learners' grammatical knowledge in the target language and their usage of the grammatical knowledge during real-time processing, so that non-native language processing is understood in a better way. Additionally, eye tracking is considered to be a useful technique to answer the questions on how syntactic constraints are applied by L2 learners during online language processing (Roberts & Siyanova-Chanturia, 2013).

5.2 Experiment 1: Eye tracking experiment on discourse prominence

Experiment 1 examined whether Turkish learners of English would be influenced by structural constraints associated with BP-A or discourse-related information while processing reflexives in English. The experimental sentences included binding-accessible and binding-inaccessible antecedents, both of which c-commanded the reflexive. The experimental sentences were all embedded in discourse context to investigate the use of discourse-related information in L2 speakers' processing of reflexives. The gender feature of the accessible antecedent and the inaccessible antecedent was manipulated to create (in)congruency between the two antecedents and the reflexive. This would allow for examining whether one or the other antecedent was considered as the referent of the reflexive and during which stage of processing each of the two potential antecedents was considered as the referent of the reflexive.

5.2.1 Participants

Forty-eight Turkish learners of English studying at Boğaziçi University (38 females) participated in Experiment 1. They all had normal or corrected to the normal (with glasses or contact lenses) vision. Before the experiment, participants were asked to fill out a background questionnaire adapted from Gürel (2002) (Appendix B).

The age of the participants ranged between 19 and 45 (M = 21.21, SD = 3.97). All participants started learning English as a foreign language in Turkey and the mean age of participants' first exposure to English was 9.96. (SD = 1.46). They were all called as advanced learners of English for several reasons. Firstly, they were all studying at Boğaziçi University which is an English-medium university where all the classes and assessments are conducted in English. Secondly, they all passed

Boğaziçi University English Proficiency Test (BUEPT) which requires students to complete two listening, two reading and two writing tasks. The minimum score accepted as successful in BUEPT equals to 550 in TOEFL PBT (Paper-based Test), 79 in TOEFL IBT (Internet-based Test), and 6.5 in IELTS (International English Language Testing System) Academic. Furthermore, after passing BUEPT, all participants took courses on developing their communicative competence and written skills in their department during their freshman years.

All participants were given course credit and they were naïve to the purpose of the experiment.

5.2.2 Materials

The materials were taken from Sturt (2003) and adapted in a way that the reflexive pronoun (*himself/herself*) was the 15th word in each item. Also, low frequency words such as (*the bricklayer/the undertaker*) were replaced with higher frequency words such as (*the builder/the bishop*) to ensure that the L2 speakers in the current study knew all the words, especially those that were used to create semantic (in)congruency between the antecedents and the reflexive.

There were twenty-four experimental items (Appendix C). Each experimental item consisted of a lead-in sentence introducing a named referent (*Jonathan/Jennifer*), a critical sentence including the reflexive and a wrap-up/final sentence to ensure a meaningful and cohesive discourse. The proper names used in the lead-in sentence were all common English male or female names, with each pair (*Jonathan/Jennifer*) matched for length. *Jonathan/Jennifer* was used as the subject of the lead-in sentence and was referred to as a pronoun (*he/she*) in the critical sentence; which was the binding-inaccessible antecedent. Twelve stereotypically male (e.g. *the*

surgeon) and twelve stereotypically female nouns (e.g. *the nurse*) were used as the binding-accessible antecedents. In addition, gender congruence between the accessible antecedent and the reflexive, and between the inaccessible antecedent and the reflexive was manipulated; creating four different conditions as exemplified in (1):

(1)

a. Accessible Match - Inaccessible Match: Jonathan was pretty worried at the hospital. He remembered that the surgeon had pricked himself with a used syringe needle. There should be an investigation soon.
b. Accessible Match - Inaccessible Mismatch: Jennifer was pretty worried at the hospital. She remembered that the surgeon had pricked himself with a used syringe needle. There should be an investigation soon.
c. Accessible Mismatch - Inaccessible Match: Jennifer was pretty worried at the hospital. She remembered that the surgeon had pricked herself with a used syringe needle. There should be an investigation soon.
d. Accessible Mismatch - Inaccessible Mismatch: Jonathan was pretty worried at the hospital. He remembered that the surgeon had pricked herself with a used syringe needle. There should be an investigation soon.
   Question: Who had been pricked by the used syringe needle?
   a. the surgeon
   b. Jonathan/Jennifer

In (1a–1d), the structurally-governed antecedent for the reflexive in the critical sentence is *the surgeon*. In all conditions in (1), both the accessible antecedent (*the surgeon*) and the inaccessible antecedent (*Jonathan/Jennifer*) have a structural c-command relationship with the reflexive. The inaccessible antecedent

(*Jonathan/Jennifer*) is the first-mentioned character and it is re-used as a pronoun in the sentence that the reflexive occurred in; however, the accessible antecedent is mentioned in the context for only once. Therefore, the inaccessible antecedent is more prominent in the discourse than the accessible antecedent in (1a-1d).

In (1a), both the accessible antecedent (*the surgeon*) and the inaccessible antecedent (*Jonathan*) match the reflexive (*himself*) in gender. In (1b), the accessible antecedent (*the surgeon*) has the same gender feature with the reflexive (*himself*), but there is a gender mismatch between the inaccessible antecedent (*Jennifer*) and the reflexive (*himself*). In (1c), the accessible antecedent (*the surgeon*) and the reflexive (*herself*) mismatch in gender, but there is a gender match between the inaccessible antecedent (*Jennifer*) and the reflexive (*herself*). In (1d), neither the accessible antecedent (*the surgeon*) nor the inaccessible antecedent (*Jonathan*) have the same gender feature with the reflexive (*herself*).

Twenty-four experimental stimuli were distributed across four different lists in a Latin-square design. Seventy-two filler texts were also prepared and included to the experimental stimuli, and then all were pseudo-randomized. These filler texts consisted had a similar structure to the experimental items as they had a lead-in sentence, a critical sentence and a wrap-up sentence. They all had similar complexity to the experimental texts. Thus, each list contained one condition of each item and each condition occurred exactly the same number of times in these four lists.

5.2.3 Predictions

1. One of the most prominent hypotheses about L2 processing, namely SSH, predicts that as L2 learners' grammatical computations are "shallower and are less detailed than those of native speakers" (Clahsen & Felser, 2006, p. 32).

Thus, L2 learners rely more on non-structural cues than structural cues during real-time sentence processing. The findings in Felser et al. (2009) and Felser and Cunnings (2012) supported the SSH in that L2 learners of English considered the gender-matching and discourse prominent inaccessible antecedent as the antecedent of the reflexive in their initial analyses. If the SSH is right, then the initial antecedent preference by Turkish learners of English in Experiment 1 will not be constrained by syntactic factors (whereby they are predicted to consider the binding-accessible antecedent as the antecedent for the reflexive). Instead, they will consider the discourse-prominent and gender-matching but binding-inaccessible noun as the antecedent of the reflexive in their initial analyses.

2. If Clahsen and Felser (2006) are not correct and L2 learners are sensitive to structural cues regarding BP-A in their initial analyses, then in their processing of reflexives, Turkish learners of English in this study will be similar to the native speakers in Sturt's (2003) study (specifically the ones in Sturt (2003) as the same materials were used in Sturt (2003) and in the current study). That is, L2 learners' initial processing of the reflexives will be constrained by BP-A, so only the effects of the accessible antecedent (*the surgeon*) will be observed during the initial stages of processing. L2 learners will show sensitivity only to the gender (mis)match between the accessible antecedent and the reflexive at first. Thus, the reading times of Accessible Match conditions (1a, b) will be shorter than Accessible Mismatch conditions (1c, d) at the initial stages of processing. If Turkish learners of English behave similar to native speaker group in Sturt's (2003) study, they will show sensitivity to the gender (mis)match between the inaccessible antecedent

(*Jonathan/Jennifer*) only at later stages of processing, so the reading times of Inaccessible Match conditions (1a, c) will be shorter than Inaccessible Mismatch conditions (1b, d) for eye tracking measures reflecting late processing.

3. A transfer-based approach will predict that the parsing routines for reflexives by Turkish learners of English in their L2 will be influenced by the parsing routines for reflexives by these speakers in their L1 Turkish. Although I did not examine their L1 parsing per se, Antecedent Identification Task for Turkish reported in Chapter 2 showed that Turkish allows for both local and non-local binding of reflexives, *kendi* and *kendisi* (except when the embedded predicate is nominalized with -*IncA*). There is even a preference for non-local binding over local binding for the reflexive *kendisi* but note that the theoretical literature takes *kendi* as true reflexive in Turkish (Göksel & Kerslake, 2005) and native Turkish speakers in Antecedent Identification Task showed both local and non-local binding preference for *kendi.* If Turkish learners of English transfer L1-based parsing strategies to their L2, it is predicted that Turkish learners of English will not face any processing difficulty in Experiment 1. That is, no reliable difference is predicted between any of the conditions in (1a-d) and perhaps the only condition that they will face processing difficulty is (1d) where neither a local nor a non-local binder is available as both binders mismatched the reflexive in gender.

Given these predictions, Experiment 1 tested the following specific research questions:

1. Do Turkish learners of English show sensitivity to the structural information regarding BP-A in their initial analyses as it was reported for the native speaker group in Sturt (2003)?
2. Do Turkish learners of English make use of discourse prominence of the inaccessible antecedent as a cue to assign an antecedent during later stages of processing similar to the native speaker group in Sturt (2003)?
3. Does the behavior of Turkish learners of English resemble to non-native speaker groups in the previous studies (Felser et al., 2009; Felser & Cunnings, 2012) where non-native speakers were sensitive to the non-structural cues (i.e. discourse prominence of the inaccessible antecedent) instead of the structural information regarding the binding requirements of reflexive during the early stages of processing?
4. Do Turkish learners of English transfer their native language's binding properties (non-local binding of reflexives) into the target language, English?

5.2.4 Procedure

All participants were tested individually in a quiet laboratory. Their eye movements were recorded via SR EyeLink 1000 Plus system (SR Research, Mississauga, Ontario, Canada). The participants were told that it was a reading comprehension experiment and they would read small texts and answer a question after reading each text. The participants' eye movements were monitored and recorded as they read. Even though participants read binocularly, only information from the right eye was recorded for data analyses. To test the accuracy of calibration, each experimental session started with a calibration procedure in which participants were required to fixate on a series of dots presented at nine different positions on the screen. If there

was inaccuracy, the eye tracker was recalibrated. Each calibration was validated following the same procedure before commencing the experiment. Participants started the experiment after successful calibration and validation were ensured. Five practice items were shown to the participants to familiarize them with the experimental stimuli. The participants read the sentences at their own pace and used the mouse to answer the question. After reading each text, they answered a comprehension question. They did not get any feedback about the accuracy of their answers for the comprehension questions.

The instructions for the experiments or the practice sentences did not give any information about the purposes of the study. Participants were offered a break half-way through the experiment but none of them asked for it. It took 30-40 minutes on average for each participant to finish the experiment.

5.2.5 Data analysis

Six standard eye tracking measures, namely, first fixation duration, gaze duration, regression path duration, rereading duration, total reading time and probability of regression out were used for analyses (Clifton, Staub & Rayner, 2007; Liversedge, Paterson & Pickering, 1998; Rayner et al., 1989). First fixation duration is "the duration of the first fixation on a word, provided that the word wasn't skipped" (Clifton et al., 2007, p. 5). Gaze duration (also proposed as first pass reading time by Clifton et al., 2007; Liversedge et al., 1998; Rayner et al., 1989) is the sum of all fixations on a region of interest before the eyes move to the left or the right of that region. These two measures (first fixation duration and gaze duration) are considered to give information about the initial stages of processing (Clifton et al., 2007; Liversedge et al., 1998; Rayner et al., 1989). Regression path duration is "the sum of

all the fixations from the first fixation in a region up to but excluding the first fixation to the fight of this region" (Liversedge et al., 1998, p. 63). Regression path duration informs on processing difficulty and possible recovery (Liversedge et al., 1998). Rereading duration is "the regression path reading time for a region less the first pass reading time for a region" (Liversedge et al., 1998, p. 63) and it is calculated by subtracting gaze duration from total duration which is "all fixations made within a region of text, including those fixations made when re-reading the region" (Liversedge et al., p. 58). Probability of regression out is the proportion of fixation on a word that are regressive relative to that word. These four measures (regression path duration, rereading duration, total reading time and probability of regression out) are considered to give information about later stages of processing (Clifton et al., 2007; Liversedge et al., 1989; Rayner et al., 1989).

Prior to the calculation of these measures, the data were cleaned for extremely short or long durations (Rayner, 1978; Rayner et al., 1989; Morrison, 1984). Fixations under 80 ms were first merged with nearby fixations. Then, fixations below 80 ms and the fixations above 800 ms were excluded before the main analyses (Rayner et al., 1989).

The eye-movement data were analyzed using linear mixed effects regression (Bates, Maechler, Bolker & Walker, 2015) which allows for both subject- and item-level variance to be included in a single model (Baayen, 2008; Baayen, Davidson & Bates, 2008). Linear mixed effects regression also allows complex models to be evaluated with respect to their goodness of fit to the data (Betancort, Carreiras & Sturt, 2009; Kazanina & Phillips, 2009). All statistical analyses were carried out on the R software (R Core Team, 2017) and *lme4* (Bates et al., 2015) and *languageR* packages (Baayen, 2013) were used for the analyses.

Analyses were carried out for the 15th word - the disambiguating region – corresponding to the reflexive word (*himself/herself*) and for the spill-over region which included the two words following the reflexive. Each region was examined for the six eye tracking measures mentioned above.

5.2.6 Results

The data from one participant was excluded from the analyses due to calibration failure for that participant during the experiment. The data from six participants were also excluded from the analyses as these participants answered less than 80% of the comprehension questions correctly. Therefore, data from forty-one participants were used for the analyses in Experiment 1. Participants' overall comprehension accuracy was good; they answered 82.56% of the comprehension questions on average correctly. This confirms that participants were actively reading the experimental stimuli for comprehension.

As the main effects of the accessible antecedent and the inaccessible antecedent on participants' eye-movements at the disambiguating region and the spill-over region were investigated, Accessible Antecedent and Inaccessible Antecedent were selected as predictor variables. Each of these two predictor variables had two levels: Accessible Match vs. Accessible Mismatch for Accessible Antecedent; Inaccessible Match vs. Inaccessible Mismatch for Inaccessible Antecedent. For each eye tracking measure at the disambiguating region and the spill-over region, subjects and items were included in the model as random effects.

Analyses were first conducted with a single predictor (Accessible Antecedent or Inaccessible Antecedent as a predictor variable) and were then followed by complex models which included Accessible Antecedent and Inaccessible Antecedent

together as predictors or by complex models which involved an interaction between these two predictors. Model comparisons were done via log-likelihood ratio tests. The complex model which included the two predictors was compared to simpler models that included only one of the two predictors. The model including the interaction of the two predictor variables was compared to a simpler model that included the two predictors, but the two predictors did not interact. The most complex model which had a significantly improved fit to the data was considered to be the best fitting model. In all these model building steps, an alpha level of .05 was taken in deciding on the best fitting model.

5.2.6.1 The disambiguating region

Table 2 summarizes the mean values for the four conditions across the six eye tracking measures for the disambiguating region.

Table 2. Mean Values for Four Conditions with Standard Errors in Parentheses for the Six Eye Tracking Measures at the Disambiguating Region

	First Fixation Duration	Gaze Duration	Regression Path Duration	Rereading Duration	Total Duration	Probability of Regression Out
Accessible Match – Inaccessible Match	259 (11)	305 (12.8)	427 (36.3)	238 (39)	417 (31)	.177 (.0305)
Accessible Match – Inaccessible Mismatch	251 (6.08)	301 (10.6)	426 (29.3)	192 (23.5)	403 (22.1)	.156 (.0288)
Accessible Mismatch – Inaccessible Match	250 (7.57)	294 (9.99)	394 (25.1)	238 (37.9)	423 (31.6)	.145 (.0274)
Accessible Mismatch – Inaccessible Mismatch	256 (8.98)	313 (12.4)	445 (34.9)	296 (34)	456 (29.8)	.139 (.0270)

The complex model with two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Accessible Antecedent as a predictor variable for first fixation duration (χ^2 (1) = .1, p

= .99), gaze duration (χ^2 (1) = .51 p = .45), regression path duration (χ^2 (1) = .60, p = .44), rereading duration (χ^2 (1) = .11, p = .74), total duration (χ^2 (1) = .15, p = .70) and probability of regression out (χ^2 (1) = .37, p = .54).

Similarly, the complex model included two predictor variables did not explain the data better than the simple model with Inaccessible Antecedent as a predictor variable for first fixation duration (χ^2 (1) = .47, p = .49), gaze duration (χ^2 (1) = .047, p = .83), regression path duration (χ^2 (1) = .14, p = .70), rereading duration (χ^2 (1) = 2.23, p = .13), total duration (χ^2 (1) = 1.51, p = .22) and probability of regression out (χ^2 (1) = 1.31, p = .25). Thus, I report the simple models for the Accessible Antecedent as a predictor and the Inaccessible Antecedent as a predictor in the following.

In the model with the Accessible Antecedent as a predictor, no reliable reading time difference was observed between Accessible Match conditions (1a, b) and Accessible Mismatch conditions (1c, d) for first fixation duration (β = -.366, SE = 8.35, t = -.04, p = .97), gaze duration (β = 2.30, SE = 10.78, t = .21, p = .83), regression path duration (β = -11.62, SE = 30.09, t = -.38, p = .70), rereading duration (β = 44.78, SE = 29.95, t = 1.49, p = .13) and total duration (β = 29.16, SE = 23.69, t = 1.23, p = .21). The proportions of fixations that are regressive in Accessible Match conditions (1a, b) were not also significantly different from those of in Accessible Mismatch conditions (1c, d) for probability of regression out (β = -.27, SE = .24, z = -1.14, p = .25).

The model with the Inaccessible Antecedent as a predictor showed that reading times of Inaccessible Match conditions (1a, c) were not significantly different from those of Inaccessible Mismatch conditions (1b, d) for first fixation duration (β = -.20, SE = 8.32, t = -.025, p = .98), gaze duration (β = 7.98, SE = 10.75,

t = .74, p = .46), regression path duration (β = 23.22, SE = 30.02, t = .77, p = .44), rereading duration (β = 9.74, SE = 29.91, t = .33, p = .74) and total duration (β = 9.12, SE = 23.72, t = .38, p = .70). The proportions of fixations that are regressive in Inaccessible Match conditions (1a, c) were not significantly different from those of in Inaccessible Mismatch conditions (1b, d) for probability of regression out (β = .148, SE = .24, z = -.62, p = .53).

To better understand how the accessible/inaccessible antecedent and the match/mismatch in the gender manipulation may have interacted, four planned comparisons were carried out. These analyses were again conducted on the six eye tracking measures. Table 3 presents the comparison conditions:

Table 3. Planned Comparisons in Experiment 1

	Comparison	Comparison exemplified in (1)	Condition being compared	Condition kept constant in the comparison
Comparison 1:	Accessible Match – Inaccessible Match to Accessible Match – Inaccessible Mismatch	(1a) – (1b)	Inaccessible Match to Inaccessible Mismatch	Accessible Match
Comparison 2:	Accessible Mismatch – Inaccessible Match to Accessible Mismatch - Inaccessible Mismatch	(1c) – (1d)	Inaccessible Match to Inaccessible Mismatch	Accessible Mismatch
Comparison 3:	Accessible Match – Inaccessible Match to Accessible Mismatch - Inaccessible Match	(1a) – (1c)	Accessible Match to Accessible Mismatch	Inaccessible Match
Comparison 4:	Accessible Match – Inaccessible Mismatch to Accessible Mismatch - Inaccessible Mismatch	(1b) – (1d)	Accessible Match to Accessible Mismatch	Inaccessible Mismatch

The comparisons of the conditions at the disambiguating region did not reach any statistical significance (p's > .1) as illustrated in Tables 4 - 7 (FFD = first fixation duration, GD = gaze duration, RPD = regression path duration, RRD = rereading duration, TD = total duration, PRO = probability of regression out).

Table 4. Comparison of Accessible Match-Inaccessible Match as in (1a) to Accessible Match-Inaccessible Mismatch as in (1b)

	β	*SE*	*t*	*p*
FFD	-6.79	11.91	-.57	.56
GD	-2.49	15.34	-.16	.87
RPD	.34	42.87	.01	.99
RRD	-33.79	42.67	-.79	.42
TD	-14.45	33.50	-.43	.66
PRO	-.01	.03	-.51 (*z* value)	.60

Table 5. Comparison of Accessible Mismatch-Inaccessible Match as in (1c) to Accessible Mismatch-Inaccessible Mismatch as in (1d)

	β	*SE*	*t*	*p*
FFD	6.64	11.68	.56	.57
GD	18.07	15.06	1.20	.23
RPD	45.22	42.04	1.07	.28
RRD	51.67	41.88	1.23	.21
TD	32.75	33.55	.97	.32
PRO	-.01	.03	-.34 (*z* value)	.73

Table 6. Comparison of Accessible Match-Inaccessible Match as in (1a) to Accessible Mismatch-Inaccessible Match as in (1c)

	β	*SE*	*t*	*p*
FFD	-7.09	11.82	-.60	.54
GD	-8.12	15.22	-.53	.59
RPD	-34.54	42.54	-.81	.41
RRD	1.88	42.27	.04	.96
TD	5.55	33.42	.16	.86
PRO	-.03	.03	-.90 (*z* value)	.36

Table 7. Comparison of Accessible Match-Inaccessible Mismatch as in (1b) to Accessible Mismatch-Inaccessible Mismatch as in (1d)

	β	*SE*	*t*	*p*
FFD	6.34	11.79	.53	.59
GD	12.73	15.22	.83	.40
RPD	11.24	42.48	.26	.79
RRD	7.65	42.25	.75	.82
TD	52.94	33.54	1.57	.11
PRO	-.02	.03	-.74 (*z* value)	.45

5.2.6.2 The spill-over region

Table 8 summarizes the mean values of four conditions across the six eye tracking measures for the spill-over region.

Table 8. Mean Values for Four Conditions with Standard Errors in Parentheses for the Six Eye Tracking Measures at the Spill-over Region

	First Fixation Duration	Gaze Duration	Regression Path Duration	Rereading Duration	Total Duration	Probability of Regression Out
Accessible Match – Inaccessible Match	252 (11.2)	288 (20.4)	345 (19)	124 (25.4)	213 (18.7)	.155 (.0397)
Accessible Match – Inaccessible Mismatch	263 (12.5)	291 (15.3)	417 (36.1)	144 (30.2)	194 (18.8)	.159 (.0406)
Accessible Mismatch – Inaccessible Match	254 (10.7)	294 (17.7)	439 (56.6)	154 (28)	212 (19)	.157 (.0401)
Accessible Mismatch – Inaccessible Mismatch	288 (11)	292 (13.2)	490 (39.3)	130 (27.5)	215 (17.6)	.238 (.0479)

The complex model which included the two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Accessible Antecedent as a predictor variable for first fixation duration (χ^2 (1) = .95, p = .32), gaze duration (χ^2 (1) = .08, p = .76), regression path duration (χ^2 (1) = .09, p = .76), rereading duration (χ^2 (1) = .02, p = .80), total duration (χ^2 (1) = .50, p = .47) and probability of regression out (χ^2 (1) = 1.21, p = .27).

Similarly, the complex model with two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Inaccessible Antecedent as a predictor variable for first fixation duration (χ^2 (1) = .036, p = .95), gaze duration (χ^2 (1) = .03, p = .98), rereading duration (χ^2 (1) = .55, p = .45), total duration (χ^2 (1) = .47, p = .49) and probability of regression out (χ^2 (1) = 1.38, p = .23). The complex model with two predictors

explained the data better than the simple model with Inaccessible Antecedent as a predictor variable for regression path duration (χ^2 (1) = 10.56, $p < .01$), but the model with interaction of the two predictor variables did not explain the data better than the simpler model that included the two predictors for regression path duration (χ^2 (1) = 2.2787, $p = .13$). Analyses investigating each predictor's contribution to the data are reported below.

The model with the Accessible Antecedent showed no reliable reading time difference between Accessible Match conditions (1a, b) and Accessible Mismatch conditions (1c, d) for first fixation duration ($\beta = -.72$, $SE = 10.62$, $t = -.06$, $p = .94$), gaze duration ($\beta = .23$, $SE = 15.96$, $t = .01$, $p = .98$), rereading duration ($\beta = 17.84$, $SE = 24.03$, $t = .74$, $p = .45$) and total duration ($\beta = 9.98$, $SE = 14.51$, $t = .68$, $p = .49$). The proportions of regressions out of the spillover region in Accessible Match conditions (1a, b) were not also significantly different from those in Accessible Mismatch conditions (1c, d) for probability of regression out ($\beta = .37$, $SE = .32$, $z = 1.15$, $p = .24$). However, a significant reading time difference was observed between Accessible Match conditions (1a, b) and Accessible Mismatch conditions (1c, d) for regression path duration. Participants read the spill-over region significantly faster in Accessible Match conditions (1a, b) in which the stereotypical gender of the accessible antecedent matched the gender of the reflexive than in Accessible Mismatch conditions (1c, d) in which there was a gender mismatch between the accessible antecedent and the reflexive for this measure ($\beta = -128.49$, $SE = 39.24$, $t = -3.27$, $p < .01$).

Analyses with the Inaccessible Antecedent as a predictor demonstrated no reliable reading time difference between Inaccessible Match conditions (1a, c) and Inaccessible Mismatch conditions (1b, d) for first fixation duration ($\beta = 10.64$, $SE =$

10.76, t = .99, p = .32), gaze duration (β = -4.78, SE = 15.96, t = -.30, p = .76), regression path duration (β = 14.03, SE = 39.36, t = .357, p = .72), rereading duration (β = 5.895, SE = 24.56, t = .24, p = .81) and total duration (β = -10.35, SE = 14.53, t = -.71, p = .47). There was not a significant difference between the proportions of fixations that were regressive in Inaccessible Match conditions (1a, c) and those of in Inaccessible Mismatch conditions (1b, d) for probability of regressions (β = .35, SE = .32, z = 1.08, p = .27).

The same planned comparisons conducted for the disambiguating region were also conducted for the spillover region. The following tables (Tables 9 - 12) show the results of these comparisons. As in the Tables 4-7 for the planned comparisons for the disambiguating region, FFD stands for first fixation duration, GD stands for gaze duration, RPD stands for regression path duration, RRD stands for rereading duration, TD stands for total duration and PRO stands for probability of regression out.

Table 9. Comparison of Accessible Match-Inaccessible Match as in (1a) to Accessible Match-Inaccessible Mismatch as in (1b)

	β	*SE*	*t*	*p*
FFD	8.74	15.02	.58	.56
GD	-1.80	22.25	-.08	.93
RPD	80.12	56.15	1.42	.15
RRD	1.02	34.18	.03	.97
TD	-19.09	20.52	-.93	.35
PRO	.03	.04	.08 (*z* value)	.93

Table 10. Comparison of Accessible Mismatch-Inaccessible Match as in (1c) to Accessible Mismatch-Inaccessible Mismatch as in (1d)

	β	*SE*	*t*	*p*
FFD	12.60	15.37	.82	.41
GD	-7.92	22.81	-0.34	.72
RPD	-48.79	54.75	-.89	.37
RRD	11.08	35.17	.31	.75
TD	-1.57	20.55	-.07	.93
PRO	.05	.03	1.48 (*z* value)	.14

Table 11. Comparison of Accessible Match-Inaccessible Match as in (1a) to Accessible Mismatch-Inaccessible Match as in (1c)

	β	*SE*	*t*	*p*
FFD	2.44	15.09	.16	.87
GD	-3.18	22.35	-.14	.88
RPD	-24.35	24.98	-.28	.77
RRD	**-84.13**	**53.90**	**-3.41**	**< .001***
TD	1.20	20.48	.05	.95
PRO	.02	.04	.12 (*z* value)	.89

Table 12. Comparison of Accessible Match-Inaccessible Mismatch as in (1b) to Accessible Mismatch-Inaccessible Mismatch as in (1d)

	β	*SE*	*t*	*p*
FFD	1.05	15.11	.06	.94
GD	-2.70	22.33	-.12	.90
RPD	-20.83	25.44	-.24	.80
RRD	-67.39	56.43	-1.19	.23
TD	18.82	20.56	.91	.36
PRO	-.02	.04	-1.50	.13

None of the planned comparisons, except for Accessible Match (1a) to Accessible Mismatch (1c) revealed a reliable difference. As shown in Table 11, the comparison for the two Inaccessible Match conditions (1a, c) in the re-reading duration showed that the spill-over region in Accessible Match condition (1a) was read faster than that in Accessible Mismatch condition (1c) (β = -84.13, *SE*= 53.90, t = -3.41, $p < .001$). This finding shows that participants were sensitive to the structural cues for the binding of reflexives in English because the Accessible Match condition (1a) in which the stereotypical gender of the accessible antecedent matched the reflexive (*the surgeon…himself*) elicited significantly shorter reading times than Accessible Mismatch condition (1c) in which the stereotypical gender of the accessible antecedent mismatched the reflexive (*the surgeon…herself*). But note that this comparison kept the Inaccessible Match feature consistent across the comparison pair. It is not clear why other comparison of Accessible Match to Accessible Mismatch, especially when the Inaccessible Mismatch feature was kept constant (comparing (1b) to (1d)), did not reveal any significant differences. It may be likely

that the participants used both structural and non-structural information. That is, discourse prominence may also have affected their antecedent retrieval processes and cancelled out any syntactic biases in processing of these structures.

5.2.7 Discussion

Experiment 1 investigated whether Turkish learners of English would be guided by the BP-A and whether they would choose the structurally-governed antecedent as the referent of the reflexive during antecedent retrieval process for the reflexive. This experiment also explored whether a discourse-prominent, structurally c-commanding but syntactically ungrammatical antecedent would have an effect on L2 learners' antecedent retrieval process for the reflexive.

Under the SSH, L2 learners' syntactic configurations are considered to be "less detailed and shallower than those of native speakers" (Clahsen & Felser, 2006, p.32). Thus, Turkish learners of English in the present study were predicted to focus on discourse-related factors to compensate for their lack in computing detailed syntactic configurations. Thus, following the SSH, the first prediction was that if Turkish learners of English were influenced by non-structural information rather than structural information in their antecedent retrieval processes for English reflexives, they would consider the discourse prominent but binding-inaccessible antecedent as an antecedent for the reflexive. This would be evident in early stages of the antecedent retrieval process. However, the results did not confirm this prediction because there was no reliable difference between their fixation duration and gaze duration for Inaccessible Match conditions (1a, c) where there is a gender match between the inaccessible antecedent and the reflexive and for Inaccessible Mismatch conditions (1b, d) where there is a gender mismatch between the inaccessible

antecedent and the reflexive. This is contradictory to the observations for the non-native speaker groups in Felser et al. (2009) and Felser and Cunnings (2012). In both Felser et al. (2009) and Felser and Cunnings (2012), it was observed that L2 learners of English showed an initial sensitivity to the discourse prominent but binding-inaccessible antecedent, but Turkish learners of English in the present study did not show this pattern in their retrieval of antecedents for English reflexives; namely, their antecedent retrieval processes were not influenced by the discourse prominence of the inaccessible antecedent. Rather, in regression path duration measure at the spill-over region, they showed a reliable difference between Accessible Match conditions (1a, b) where the stereotypical gender of the accessible antecedent matched the gender of the reflexive and Accessible Mismatch conditions (1c, d) where there was a gender mismatch between the accessible antecedent and the reflexive. They also showed a reliable difference in rereading duration measure at the spill-over region in the planned comparison of Accessible Match-Inaccessible Match condition (1a) and Accessible Mismatch-Inaccessible Match condition (1c), suggesting that their online decisions, although somewhat delayed (because they were only evident in later measures such as regression path duration and rereading duration), were influenced by the structural information.

The results of Experiment 1 also did not show any L1 transfer effects. As Antecedent Identification Task in Turkish in Chapter 2 showed, Turkish speakers did both local and non-local binding for Turkish reflexives (*kendi* and *kendisi*) where non-local binding was more prominent for *kendisi*. If Turkish learners of English transferred binding features of Turkish to their second language, they would not face any processing difficulty in any of the conditions except for Accessible Mismatch-Inaccessible Mismatch condition (1d), but this was not the finding.

It is also possible that L2 learners can behave similar to native speakers in their L2 processing routines (Hopp, 2006, 2010). According to Hopp (2006, 2010), proficiency in the target language is a significant factor in behaving similar to native speakers. He claims that there is even a difference between advanced learners and near-native learners in processing the target structure similar to native speakers of that language, but the current study did not specifically test the effect of the proficiency on L2 sentence processing as only the participants that are advanced speakers of English were selected. These participants study at an English-medium university where all the classes and assessments are conducted in English. Although their exposure to English is mostly limited to the university settings, given their proficiency level, it is possible that they may behave similar to native speakers of English in their processing of English reflexives. In this scenario, it is predicted that Turkish speakers of English in the current study would behave similar to the native speaker group in Sturt (2003). That is, their antecedent preferences would be syntactically-constrained conforming to the assumptions of BP-A and the accessible antecedent would be chosen as the referent of the reflexive at the initial stages of processing. Therefore, the conditions in which there was a match between the gender of the reflexive and the stereotypical gender of the accessible antecedent as in (1a) and (1b) would be read faster than the conditions in which there was a mismatch as in (1c) and (1d). This was the case for the participants in the present study but evident only in the later measures of processing such as regression path duration and rereading duration. The non-native participants in the present study did not read Accessible Match conditions (1a, b) significantly faster than Accessible Mismatch conditions (1c, d) in early measures such as first fixation duration and gaze duration but they did so in the later measures such as regression path duration and rereading

duration. The analysis for the regression path duration of the spill-over region indicated that there was a reliable trend for shorter reading times in Accessible Match conditions (1a, b) in comparison to Accessible Mismatch conditions (1c, d). The comparison for the rereading duration of the spill-over region indicated that participants showed sensitivity only to the gender of the structurally-governed antecedent. Even though the same materials were used as in Experiment 1 of Sturt's (2003) study, there were no reliable effects of the accessible antecedent at the initial processing stages; that is, Turkish learners of English did not show any sensitivity to the gender match between the accessible antecedent and the reflexive at the initial stages of processing unlike the native speaker group in Sturt (2003).

It was also predicted that, similar to the native speakers in Sturt's (2003) study, the non-native speaker group would be affected by the c-commanding but syntactically inaccessible antecedent in later stages of processing; therefore, reliable effects of the discourse prominent inaccessible antecedent would be observed, as well but in measures reflecting later processing. However, the results of Experiment 1 showed that no reliable effects of the inaccessible antecedent on participants' eye-movements were observed for eye tracking measures indicating later stages of processing. This is not in parallel with the results of Sturt's (2003) study as he found that native speakers showed sensitivity to the discourse prominent but syntactically inaccessible antecedent in the second-pass reading time reflecting late processing.

All in all, the results of Experiment 1 show that Turkish learners of English did not behave similarly to the non-native participant groups in the previous studies (Felser et al., 2009; Felser & Cunnings, 2012) as the participants were not influenced by a discourse prominent but syntactically inaccessible antecedent during early and later stages of processing contra the assumptions of Clahsen and Felser (2006). The

participants' processing behavior showed that they chose the accessible antecedent for the reflexive, but this decision was somewhat delayed compared to the native speakers in Sturt (2003). Thus, even though the participants in the present study did not show any preference for the accessible antecedent in eye tracking measures reflecting early stages of processing, they showed sensitivity to the structurally-constrained accessible antecedent in measures reflecting later stages of processing. The processing behavior of the participants of the present study is not exactly native-like nor is it very different from native speakers. These results suggest that non-native speakers were affected by structural cues; however, they might need more time to integrate these structural cues while assigning a referent for the reflexive during the antecedent retrieval process compared to native speakers. This finding is not surprising given the previous reports on processing time lag for L2 speakers compared to native speakers. It is reported that L2 speakers are slower than native speakers while processing in the target language, which was shown in reading times in self-paced reading, eye tracking or ERP experiments (Cougling & Tremblay, 2013; Dinçtopal-Deniz, 2010; Foote, 2011; Hahne, 2001; Hopp, 2006, 2010; Jacob & Felser, 2016; Keating, 2009, 2010; McDonald, 2006; Roberts & Felser, 2011, among many others). Thus, it may be the case that the participants in the present study were only delayed in integrating the syntactic information. However, the findings do not support the view that processing mechanisms employed by L1 and L2 speakers are fundamentally different from each other (Clahsen & Felser, 2006).

5.3 Experiment 2: Eye tracking experiment on linear proximity

Experiment 2 investigated questions similar to those in Experiment 1. In addition, whether or not antecedent retrieval processes by Turkish learners of English was

influenced by the linear proximity of the antecedents to the reflexive was examined. This required including complex sentences which had relative clauses. In Experiment 2, the binding-inaccessible antecedent was linearly closer to the reflexive than the binding-accessible antecedent; but it did not c-command the reflexive. Even though the binding-accessible antecedent was linearly distant to the reflexive, it was the only antecedent that had a structural c-command relationship with the reflexive in this experiment.

5.3.1 Participants

Forty-seven Turkish learners of English studying at Boğaziçi University (36 females) participated in the experiment, with a mean age of 20.72 (*SD* = 1.96). All had normal or corrected to the normal (with glasses or contact lenses) vision. As in Experiment 1, participants were asked to fill out a background questionnaire (Gürel, 2002) before commencement of the experiment (Appendix B). All participants started learning English as a foreign language in Turkey and the mean age of participants' first exposure to English was 9.51 (*SD* = 1.55).

The participants were classified as advanced learners of English for several reasons. First of all, all of them were studying at Boğaziçi University. They all passed Boğaziçi University English Proficiency Test (BUEPT) which equals to 550 in TOEFL PBT (Paper-based Test), 79 in TOEFL IBT (Internet-based Test) and 6.5 in IELTS (International English Language Testing System).

All participants were given course credit and were not informed about the aim of the experiment. The participants of Experiment 2 were different from those in Experiment 1, but they were from the same subject pool.

5.3.2 Materials

As in Experiment 1, the experimental stimuli were taken from Sturt (2003) and adapted in a way that reflexive pronoun (*himself/herself*) was the 15th word in each item. Moreover, low frequency words such as (*the bricklayer/the undertaker*) were placed with higher frequency words such as (*the builder/the bishop)* to ensure that Turkish learners of English in the current study knew all the words.

Twenty-four experimental short texts similar to those in Experiment 1 were used in Experiment 2 (Appendix D). All short texts consisted of a lead-in sentence presenting the binding-inaccessible antecedent, a critical sentence where the reflexive occurred, and a wrap-up sentence to ensure a cohesive discourse. In Experiment 2, the linear ordering of the binding-accessible antecedent and the binding-inaccessible antecedent was reversed; that is, the binding-inaccessible antecedent was linearly closer to the reflexive than the binding-accessible antecedent in the critical sentence. However, the antecedents' accessibility for the reflexive with respect to BP-A was kept constant.

As in Experiment 1, stereotypical gender (in)congruence between (in) accessible antecedent and the reflexive was used to create a semantic bias. Manipulating gender congruence between the (in)accessible antecedent and the reflexive resulted in four conditions as in (2):

(2)

a. Accessible Match - Inaccessible Match: Jonathan was pretty worried at the hospital. The surgeon who treated Jonathan had pricked himself with a used syringe needle. There should be an investigation soon.

b. Accessible Match - Inaccessible Mismatch: Jennifer was pretty worried at the hospital. The surgeon who treated Jennifer had pricked himself with a used syringe needle. There should be an investigation soon.

c. Accessible Mismatch - Inaccessible Match: Jennifer was pretty worried at the hospital. The surgeon who treated Jennifer had pricked herself with a used syringe needle. There should be an investigation soon.

d. Accessible Mismatch - Inaccessible Mismatch: Jonathan was pretty worried at the hospital. The surgeon who treated Jonathan had pricked herself with a used syringe needle. There should be an investigation soon.

Question: Who had been pricked by the used syringe needle?

c. the surgeon

d. Jonathan/Jennifer

In (2a - 2d), the accessible antecedent (*the surgeon*) is the subject of the critical sentence and it c-commands the reflexive (*himself/herself*). The inaccessible antecedent (*Jonathan/Jennifer*) is the object of the predicate in the relative clause. It is linearly closer to the reflexive and is more prominent in the discourse, but it does not c-command the reflexive.

In (2a), both the accessible antecedent (*the surgeon*) and the inaccessible antecedent (*Jonathan*) match the reflexive (*himself*) in gender. In (2b), the accessible antecedent (*the surgeon*) has the same gender feature with the reflexive (*himself*), but there is a gender feature mismatch between the inaccessible antecedent (*Jennifer*) and the reflexive (*himself*). In (2c), the accessible antecedent (*the surgeon*) mismatches the reflexive (*herself*) in gender, but the inaccessible antecedent (*Jennifer*) matches the reflexive (*herself*) in gender. In (2d), neither the accessible

antecedent (*the surgeon*) nor the inaccessible antecedent (*Jonathan*) match the reflexive (*herself*) in gender.

Twenty-four experimental stimuli were divided into four different lists in a Latin-square design. Experimental stimuli were mixed with seventy-two filler texts that had a similar structure to the experimental items as they had a lead-in sentence, a critical sentence and a wrap-up sentence. All filler texts had similar complexity to the experimental item. Every trial in this experiment was followed by a comprehension question to ensure attention.

5.3.3 Predictions

1. The results of Experiment 1 showed that the participants in the current study, Turkish learners of English with advanced proficiency in English, are sensitive to structural binding constraints. Although their parsing behavior was similar to (though not exactly the same) native speakers in Sturt (2003) in terms of the linguistic resources used, Turkish learners of English in the current study were somewhat delayed in their use of these resources. That is, any evidence observed for sensitivity to syntactic cues was evident only in the measure reflecting late processing. (In Sturt (2003), the use of structural information was evident in earlier measures.) However, in Experiment 1, the linear proximity of the antecedents also favored the binding-accessible antecedent. (The binding-accessible antecedent was closer to the reflexive than the binding-inaccessible antecedent.) If the findings in Experiment 1 are generalizable to a structure where the binding-inaccessible antecedent is linearly closer to the reflexive, the participants in Experiment 2 (coming from the same subject pool as in Experiment 1) will behave similar to those in

Experiment 1. That is, they will be sensitive to structural cues in their antecedent retrieval processes. And again, it is likely that these sensitivities will be evident in measures reflecting later processes. In this case, Experiment 2 will further confirm the conclusion that although L2 learners may be delayed, they are not fundamentally different from native speakers in their language processing routines (Hopp, 2006, 2010; McDonald, 2006). That is, L2 learners' processing of the reflexives will be constrained by BP-A as that of native speakers in Sturt (2003), so only the effects of the accessible antecedent (*the surgeon*) will be observed and L2 learners will not consider the inaccessible antecedent as a possible antecedent for the reflexive at any stages of processing in Experiment 2 as the inaccessible antecedent does not have a structural c-command relationship with the reflexive. Therefore, Turkish learners of English will show sensitivity to the stereotypical gender of the accessible antecedent, so the disambiguating region and the spill-over region in Accessible Match conditions (2a, b) in which there was a gender match between the accessible antecedent and the reflexive will be read faster than those in Accessible Mismatch conditions (2c, d) in which there was a gender mismatch between the accessible antecedent and the reflexive.

2. However, it is reported in the L1 literature that working memory can also affect the antecedent retrieval processes (Cunnings & Felser, 2013). In the L2 literature, it is argued that working memory may even be more influential in second language processing (Juffs & Harrington, 2011; Roberts, 2012; Williams, 2006). Thus, it may even be more plausible for the L2 speakers in the present experiment to entertain the linearly closer but binding-inaccessible antecedent as the antecedent for the reflexive. If that is the case,

L2 learners will not be native-like in their processing. The findings in Felser and Cunnings (2012) showed that German learners of English kept anaphoric dependencies as short as possible when the binding-inaccessible antecedent was linearly closer to the reflexive than the accessible antecedent, so they used linear proximity of the inaccessible antecedent as a cue in their initial stages of antecedent retrieval process for the reflexive and they considered the linearly proximate but syntactically non-c-commanding inaccessible antecedent as the referent of the reflexive. If linear proximity influences the participants' antecedent retrieval processes for reflexives, then the initial antecedent preferences by Turkish learners of English in Experiment 2 will be similar to those of German learners of English. That is, Turkish learners of English will not use structural c-command relationship between the reflexive and its antecedent as a cue in their initial analyses. Instead, they will keep anaphoric dependencies between the reflexive and its antecedent shorter and they will consider the linearly proximate but structurally inaccessible antecedent as the referent of the reflexive in the early stages of antecedent retrieval process, so Inaccessible Match conditions (2a, c) in which there was a gender match between the inaccessible antecedent and the reflexive will be read faster than Inaccessible Mismatch conditions (2b, d) in which there was a gender mismatch between the inaccessible antecedent and the reflexive.

Given these predictions, Experiment 2 tested the following research questions:

1. Do Turkish learners of English show sensitivity only to the c-commanding binding-accessible antecedent even though this antecedent was linearly distant to the reflexive in the sentence as the native speaker group in Sturt (2003)?

2. Do Turkish learners of English behave similar to non-native speaker groups in the previous studies (Felser & Cunnings, 2012) where non-native speakers showed sensitivity to non-structural cues (i.e. linear proximity of the non-c-commanding binding-inaccessible antecedent) instead of the structural information (i.e. structural c-command relationship between the binding-accessible antecedent and the reflexive) during the early stages of processing?

5.3.4 Procedure

The experimental procedures were the same as in Experiment 1.

5.3.5 Data analysis

Procedures for data analysis were the same as in Experiment 1.

5.3.6 Results

Participants' overall comprehension was very good with an overall accuracy of 89.23%. This confirms that participants were actively reading the experimental stimuli for comprehension.

As in Experiment 1, the analyses were carried out for the disambiguating region and the spill-over region. Analyses were first conducted with a single predictor (Accessible Antecedent or Inaccessible Antecedent as the predictor variable) and then followed by a complex model including two predictor variables together as predictors or by a complex model involving an interaction between two predictor variables.

Simpler models were compared to the complex models to decide which model explained the data better. The most complex model which had a significantly

improved fit to the data was considered as the best fitting model. An alpha level of .05 was taken in deciding on the best fitting model in all these model building steps.

After these analyses, planned comparisons were carried out to examine whether or not the experimental conditions that address the research questions in detail were significantly. All the analyses were conducted on the six standard eye tracking measures; namely, first fixation duration, gaze duration, regression path duration, rereading duration, total duration and probability of regression out.

5.3.6.1 The disambiguating region

Table 13 summarizes the mean values across the six eye tracking measures for the disambiguating region.

Table 13. Mean Values for Four Conditions with Standard Errors in Parentheses for the Six Eye Tracking Measures at the Disambiguating Region

	First Fixation Duration	Gaze Duration	Regression Path Duration	Rereading Duration	Total Duration	Probability of Regression Out
Accessible Match – Inaccessible Match	255 (6.78)	293 (9.21)	386 (25.9)	255 (29.6)	433 (26.9)	.143 (.0255)
Accessible Match – Inaccessible Mismatch	255 (6.33)	297 (8.88)	407 (22.5)	301 (32.8)	448 (27.6)	.152 (.0266)
Accessible Mismatch – Inaccessible Match	254 (6.02)	300 (9.26)	493 (43.3)	361 (34.5)	508 (31.1)	.179 (.0274)
Accessible Mismatch – Inaccessible Mismatch	261 (7.02)	303 (9.1)	416 (25)	289 (26.1)	509 (27.2)	.156 (.0254)

The complex model which included two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Accessible Antecedent as a predictor variable for first fixation duration (χ^2 (1) = .44, p = .50), gaze duration (χ^2 (1) = .24, p = .62), regression path duration (χ^2 (1) = .92, p = .33), rereading duration (χ^2 (1) = .22, p = .63), total duration (χ^2 (1) = .11, p

= .73), probability of regression out (χ^2 (1) = .16, p = .68). Similarly, the complex model with two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Inaccessible Antecedent for first fixation duration (χ^2 (1) = .15, p = .69), gaze duration (χ^2 (1) = .56, p = .45), but it explained the data better than the simple model with Inaccessible Antecedent for regression path duration (χ^2 (1) = 3.88, p < .05), rereading duration (χ^2 (1) = 5.18, p < .05), total duration (χ^2 (1) = 10.28, p < .01) and probability of regression out (χ^2 (1) = 4.11, p < .05). The complex models for regression path duration, rereading duration, total duration and probability of regression out which explained the data better were compared to more complex models which included the interaction of the two predictors. The results of log-likelihood ratio tests showed for total duration and probability of regression out, the simpler models fit the data better, (χ^2 (1) = .20, p = .65 for total duration and χ^2 (1) = .22, p = .63 for probability of regression out). However, the interaction model explained the data better than the simpler model including two predictor variables for regression path duration (χ^2 (1) = 3.15, p < .05) and rereading duration (χ^2 (1) = 5.55, p < .05). To better understand each predictor's contribution to the data, analyses were run separately for Accessible Antecedent and Inaccessible Antecedent.

Analyses with the Inaccessible Antecedent as a predictor variable showed that no significant effect of the inaccessible antecedent was found on participants' eye-movements during antecedent retrieval process for the reflexive for any eye tracking measure such as for first fixation duration (β = 4.20, SE = 6.20, t = .67, p = .49), gaze duration (β = 4.33, SE = 8.54, t = .50, p = .61), regression path duration (β = -27.03, SE = 29.37, t = -.92, p = .35), rereading duration (β = -10.16, SE = 24.22, t

= -.42, p = .67), total duration(β = 6.93, SE = 21.28, t = .32, p = .74) and probability of regression out (β = .02, SE = .47, z = .44, p = .65).

Analyses with the Accessible Antecedent as a predictor variable on regression path duration, rereading duration, total duration and probability of regression out showed that when the accessible antecedent matched the reflexive in gender as in Accessible Match conditions (2a, b), participants' fixation on the disambiguating region was reduced compared to when the accessible antecedent mismatched the reflexive in gender as in Accessible Mismatch conditions (2c, d) for regression path duration (β = -57.39, SE = 29.38, t = -1.95, p < .05), rereading duration (β = -54.92, SE = 24.18, t = -2.27, p < .05), total duration (β = -68.13, SE = 21.20, t = -3.21, p < .01). Participants were also less likely to regress out of the disambiguating region when the accessible antecedent matched the reflexive in gender as in Accessible Match conditions (2a, b) than when the accessible antecedent and the reflexive mismatched in gender as in Accessible Mismatch conditions (2c, d) for probability of regression out (β = -.096, SE = .4711, z = -2.054, p < .05).

Analyses with the Accessible Antecedent as a predictor variable showed that reading times of Accessible Match conditions (2a, b) were not statistically different from those of Accessible Mismatch conditions (2c, d) for first fixation duration (β = 2.52, SE = 6.21, t = .40, p = .68) and gaze duration (β = 6.50, SE = 8.56, t = .76, p = .44).

As in Experiment 1, to better understand how the accessible/inaccessible antecedent and the match/mismatch in the gender manipulation may have interacted, four planned comparisons were carried out. These comparisons were again conducted for the six eye tracking measures. Table 14 presents the details of the comparison conditions:

Table 14. Planned Comparisons in Experiment 2

	Comparison	Comparison exemplified in (2)	Condition being compared	Condition kept constant in the comparison
Comparison 1:	Accessible Match – Inaccessible Match to Accessible Match – Inaccessible Mismatch	(2a) – (2b)	Inaccessible Match to Inaccessible Mismatch	Accessible Match
Comparison 2:	Accessible Mismatch – Inaccessible Match to Accessible Mismatch - Inaccessible Mismatch	(2c) – (2d)	Inaccessible Match to Inaccessible Mismatch	Accessible Mismatch
Comparison 3:	Accessible Match – Inaccessible Match to Accessible Mismatch - Inaccessible Match	(2a) – (2c)	Accessible Match to Accessible Mismatch	Inaccessible Match
Comparison 4:	Accessible Match – Inaccessible Mismatch to Accessible Mismatch - Inaccessible Mismatch	(2b) – (2d)	Accessible Match to Accessible Mismatch	Inaccessible Mismatch

When Inaccessible Match was kept constant and Accessible Match (2a) was compared to Accessible Mismatch (2c) as in Comparison 3, the analyses for regression path duration, rereading duration and total duration showed that the reading times were shorter in Accessible Match condition (2a) than Accessible Mismatch condition (2c) for regression path duration (β = -110.76, SE = 41.57, t = -2.66, $p < .01$), rereading duration (β = -112.63, SE = 34.19, t = -3.29, $p < .01$) and total duration (β = -77.72, SE = 29.98, t = -2.592, $p < .01$) as illustrated in Table 17.

When Inaccessible Mismatch was kept constant and Accessible Match (2b) was compared to Accessible Mismatch (2d) as in Comparison 4, the analyses for total duration indicated that reading times shorter for Accessible Match condition (2b) than for Accessible Mismatch (2d) condition (β = -58.54, SE = 29.98, t = -1.96, $p < .05$) as shown in Table 18.

None of the other comparisons for the other eye tracking measures reached statistical significance (p's > .09). Tables 15 – 18 show all comparisons for six eye tracking measures (FFD = first fixation duration, GD = gaze duration, RPD = regression path duration, RRD = rereading duration, TD = total duration, PRO = probability of regression out).

Table 15. Comparison of Accessible Match-Inaccessible Match as in (2a) to Accessible Match-Inaccessible Mismatch as in (2b)

	β	*SE*	*t*	*p*
FFD	.05	8.61	.01	.99
GD	2.97	12.31	.24	.80
RPD	26.62	42.25	.63	.52
RRD	48.29	34.76	1.38	.16
TD	16.54	30.13	.54	.58
PRO	.01	.03	-.20 (*z* value)	.84

Table 16. Comparison of Accessible Mismatch-Inaccessible Match as in (2c) to Accessible Mismatch-Inaccessible Mismatch as in (2d)

	β	*SE*	*t*	*p*
FFD	8.07	8.61	.93	.34
GD	5.60	11.88	.47	.63
RPD	-46.92	40.75	-1.58	.11
RRD	-44.69	33.57	-1.62	.09
TD	-2.65	30.08	-.08	.93
PRO	-.01	.03	-.55 (*z* value)	.58

Table 17. Comparison of Accessible Match-Inaccessible Match as in (2a) to Accessible Mismatch-Inaccessible Match as in (2c)

	β	*SE*	*t*	*p*
FFD	-1.64	8.81	-.18	.85
GD	5.07	12.14	.41	.67
RPD	**-110.76**	**41.57**	**-2.66**	**< .05***
RRD	**-112.63**	**34.19**	**-3.29**	**< .05***
TD	**-77.72**	**29.98**	**-2.59**	**< .05***
PRO	.05	.05	.94 (*z* value)	.34

Table 18. Comparison of Accessible Match-Inaccessible Mismatch as in (2b) to Accessible Mismatch-Inaccessible Mismatch as in (2d)

	β	*SE*	*t*	*p*
FFD	6.63	8.75	.75	.44
GD	7.92	12.06	.65	.51
RPD	4.66	41.29	.11	.91
RRD	-1.82	33.91	-.05	.95
TD	**-58.54**	**29.98**	**-1.96**	**< .05***
PRO	.01	.02	.18 (*z* value)	.85

5.3.6.2 The spill-over region

Table 19 summarizes the mean values across the six eye tracking measures for the spill-over region.

Table 19. Mean Values for Four Conditions with Standard Errors in Parentheses for the Six Eye Tracking Measures at the Spill-over Region

	First Fixation Duration	Gaze Duration	Regression Path Duration	Rereading Duration	Total Duration	Probability of Regression Out
Accessible Match – Inaccessible Match	268 (14.4)	295 (16.5)	487(35.1)	137 (25.4)	227 (18)	.177 (.0361)
Accessible Match – Inaccessible Mismatch	243 (9.77)	269 (12)	467 (25.7)	140 (25)	212 (17.7)	.192 (.0388)
Accessible Mismatch – Inaccessible Match	285 (14)	300 (14.5)	511 (40.4)	179 (30)	245 (19.4)	.146 (.0349)
Accessible Mismatch – Inaccessible Mismatch	245 (8.09)	286 (13.8)	543 (43.7)	170 (26.2)	241 (18.9)	.252 (.0414)

The complex model with the two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Accessible Antecedent as a single predictor for gaze duration (χ^2 (1) = 1.61, p = .20), regression path duration (χ^2 (1) = .01, p = .93), rereading duration (χ^2 (1) = 0.09, p = .75), total duration (χ^2 (1) = .58, p = .44) and probability of regression out (χ^2 (1) = 2.43, p = .11). The complex that included two predictors explained the data better than the simple model with Accessible Antecedent as a single predictor variable for first fixation duration (χ^2 (1) = 6.07, p < .05).

The complex model containing the two predictor variables (Accessible Antecedent and Inaccessible Antecedent) did not explain the data better than the simple model with Inaccessible Antecedent as a predictor variable for first fixation duration (χ^2 (1) = .54, p = .46), gaze duration (χ^2 (1) = .37, p = .54), rereading duration (χ^2 (1) = .70, p = .40), total duration (χ^2 (1) = 1.86, p = .17) and probability

of regression out (χ^2 (1) = .15, p = .69). The complex model with two predictor variables explained the data better than the simple model with Inaccessible Antecedent as a predictor variable for regression path duration (χ^2 (1) = 4.20, p < .05).

Thus, for first fixation duration and regression path duration, the complex models were compared to more complex models which included the interaction of the two predictors. The model including the interaction of two predictors did not explain the data better than the simpler model including two predictors for neither first fixation duration (χ^2 (1) = .48, p = .48) nor for regression path duration (χ^2 (1) = .10, p = .74). Analyses investigating each predictor's contribution to the data are reported below.

The model with Inaccessible Antecedent as the predictor variable showed that a significant effect of the inaccessible antecedent for first fixation duration was observed but in a direction that is reverse of what was predicted. That is, participants read the spill-over region significantly faster in Inaccessible Mismatch conditions (2b, d) than in Inaccessible Match conditions (2a, c) (β = -27.17, SE = 11.08, t = -2.45, p < .05). No significant effect of the inaccessible antecedent was not observed on participants' eye-movements for gaze duration (β = -16.83, SE = 13.43, t = -1.25, p = .21), regression path duration (β = 11.61, SE = 73.66, t = .158, p = .87), rereading duration (β = -6.70, SE = 23.15, t = -.29, p = .77), total duration (β = -11.06, SE = 14.49, t = -.76, p = .44) and probability of regression out (β = .40, SE = .25, z = 1.58, p = .11).

Analyses with the Accessible Antecedent as a predictor variable indicated for regression path duration that participants read the spill-over region significantly faster in Accessible Match conditions (2a, b) where the stereotypical gender of the

accessible antecedent matched the gender of the reflexive than Accessible Mismatch conditions (2c, d) where there was a gender mismatch between the accessible antecedent and the reflexive for regression path duration (β = -50.60, *SE* = .33, *t* = -2.06, *p* < .05). No eye tracking measure other than regression path duration showed any reliable effects of the accessible antecedent. That is, reading times for the spill-over region in Accessible Match conditions (2a, b) were not statistically different from in Accessible Mismatch conditions (2c, d) for first fixation duration (β = 7.2, *SE* = 11.11, *t* = .65, *p* = .51), gaze duration (β = 7.6, *SE* = 13.42, *t* = .56, *p* = .57), rereading duration (β = 19.17, *SE* = 23.10, *t* = .83, *p* = .40), total duration (β = 19.78, *SE* = 14.49, *t* = 1.36, *p* = .17). The proportions of regressions out of the spill-over region in Accessible Match conditions (2a, b) were not significantly different from those in Accessible Mismatch conditions (2c, d) for probability of regression out (β = .11, *SE* = .25, *z* = 0.47, *p* = .63).

The analyses were followed with planned comparisons as shown in Table 14. None of the planned comparisons, except for Inaccessible Match (2c) to Inaccessible Mismatch (2d) revealed a significant difference (*p*'s > .09). As shown in Table 21, the comparison for the two Accessible Mismatch conditions (2c, d) in the first fixation duration showed that the spill-over region in Inaccessible Mismatch condition (2d) in which the gender of the inaccessible antecedent mismatched the gender of the reflexive was read significantly faster than that in Inaccessible Match condition (2c) in which there was a gender match between the reflexive and the inaccessible antecedent (β = -34.81, *SE* = 15.70, *t* = -2.217, *p* < .05). Tables 20 – 23 illustrate comparisons for six eye tracking measures (FFD = first fixation duration, GD = gaze duration, RPD = regression path duration, RRD = rereading duration, TD = total duration, PRO = probability of regression out).

Table 20. Comparison of Accessible Match-Inaccessible Match as in (2a) to Accessible Match-Inaccessible Mismatch as in (2b)

	β	*SE*	*t*	*p*
FFD	-19.63	15.62	-1.25	.20
GD	-18.15	18.99	-.95	.34
RPD	-12.61	53.82	-.12	.90
RRD	.06	32.71	.01	.99
TD	-15.21	20.49	-.74	.45
PRO	.01	.05	.37 (*z* value)	.70

Table 21. Comparison of Accessible Mismatch-Inaccessible Match as in (2c) to Accessible Mismatch-Inaccessible Mismatch as in (2d)

	β	*SE*	*t*	*p*
FFD	**-34.81**	**15.70**	**-2.21**	**< .05***
GD	-15.50	19.04	-.81	.41
RPD	36.11	54.50	.34	.73
RRD	-13.49	32.83	-.41	.68
TD	-6.90	20.51	-.33	.73
PRO	.03	.04	1.09 (*z* value)	.22

Table 22. Comparison of Accessible Match-Inaccessible Match as in (2a) to Accessible Mismatch-Inaccessible Match as in (2c)

	β	*SE*	*t*	*p*
FFD	14.85	15.83	.93	.34
GD	6.33	19.14	.33	.74
RPD	56.92	33.72	1.22	.22
RRD	26.40	33.01	.80	.42
TD	15.63	20.50	.76	.44
PRO	-.02	.05	-.43 (*z* value)	.66

Table 23. Comparison of Accessible Match-Inaccessible Mismatch as in (2b) to Accessible Mismatch-Inaccessible Mismatch as in (2d)

	β	*SE*	*t*	*p*
FFD	-.16	15.63	-.01	.99
GD	8.89	18.90	.47	.63
RPD	74.07	33.48	1.68	.09
RRD	12.19	33.01	.37	.70
TD	23.92	20.49	1.16	.24
PRO	.05	.05	1.08 (*z* value)	.28

5.3.7 Discussion

Experiment 2 explored whether Turkish learners of English would be affected by the linearly proximate but non-c-commanding inaccessible antecedent or they would show sensitivity to the linearly distant but structurally-governed accessible antecedent while retrieving an antecedent for a reflexive.

In Experiment 1, the accessible antecedent was also the antecedent that was linearly closer to the reflexive. The linear distance is important in the sense that it manipulates the length of the anaphoric dependency. An antecedent that is closer to the reflexive keeps the anaphoric dependency short and hence cognitively less demanding (Cunnings & Felser, 2013; Felser & Cunnings, 2012). Therefore, in Experiment 1, it was not clear whether it was linear proximity or structural constraints that influenced the participants' antecedent retrieval routines. In Experiment 2, the sentential structure was manipulated in such a way that the linearly closer antecedent was structurally inaccessible one. This would allow us to disentangle whether it was the structural constraints or the linear proximity that influenced the participants' antecedent retrieval behavior in Experiment 1. If the findings in Experiment 1 are attributable to linear distance, then it was predicted that the linearly closer antecedent, which was the inaccessible antecedent in Experiment 2, would be entertained as the antecedent for the reflexive. However, if the findings are attributable to structural constraints, the regardless of its proximity to the reflexive, the participants would entertain the accessible antecedent as the antecedent of the reflexive. The results appear to support the latter; that is, linear proximity does not seem to affect antecedent retrieval processes for English reflexives by Turkish learners of English contra to Felser and Cunnings (2012) in which German learners of English kept the anaphoric dependencies as short as possible and tried to link the reflexive with the linearly proximate but structurally inaccessible antecedent. However, Turkish learners of English in the current study were sensitive only to the structural information. In regression path duration, rereading duration, total duration and probability of regression measures at the disambiguating region and in regression path duration at the spill-over region, they showed sensitivity to the

structurally-governed accessible antecedent; therefore, Accessible Match conditions (2a, b) in which the stereotypical gender of the accessible antecedent matched the reflexive yielded significantly shorter reading times or less proportions of regressions than Accessible Mismatch conditions (2c, d) in which the stereotypical gender of the accessible antecedent mismatched the reflexive. They also showed a reliable difference in regression path duration, rereading duration and total duration measures at the disambiguating region in the planned comparison of Accessible Match-Inaccessible Match (2a) and Accessible Mismatch-Inaccessible Match (2c) and in total duration measure at the disambiguating region in the planned comparison of Accessible Match-Inaccessible Mismatch (2b) and Accessible Mismatch-Inaccessible Mismatch (2d), suggesting that their antecedent retrieval process were solely affected by structural information. However, the effect of the structural information was evident only at the later stages of processing such as regression path duration, rereading duration, total duration and probability of regression out measures. It was further observed that Inaccessible Match conditions (2a, c) were read slower than Inaccessible Mismatch conditions (2b, d), which is contra the linear proximity predictions.

The results therefore confirm that just like the native speakers in Sturt (2003), Turkish learners of English used structural cues but not non-structural cues as discourse prominence and linear proximity. The main difference between the participants in the present study and the native speakers in Sturt's (2003) study is that the use of the structural cues by Turkish learners of English was only evident in later stages of processing.

All in all, as in Experiment 1, it was observed that Turkish learners of English did not use non-structural cues such as linear proximity of the inaccessible

antecedent in assigning an antecedent for the reflexive unlike the L2 groups in the previous studies (Felser & Cunnings, 2012). Instead, their processing behavior was similar to native speaker group in Sturt's (2003) study as they were strongly affected by the accessible antecedent, but this effect was somewhat delayed compared to native speaker group in Sturt (2003). Therefore, the results are contradictory with the view that L2 learners are qualitatively different from native speakers in real-time language processing (Clahsen & Felser, 2006).

5.4 Experiment 3: Antecedent identification task in English

After eye tracking experiments, all participants who took part in Experiment 1 and Experiment 2 were given an offline pen-and-paper antecedent identification task. Ninety-five participants in total took part in this task (74 females, $M = 20.97$, $SD = 3.13$). The main aim of this offline task was to investigate non-native speakers' final interpretation for the reflexive. This task also investigated whether contextual information and linear proximity of the antecedent would have an effect on participants' final interpretation of the reflexive in an offline task like this.

5.4.1 Design of the experiment

All experimental items were taken from Sturt (2003). In the original version, all experimental stimuli were presented with a context. In the current version, two new conditions (3c, d) were added and they were presented without a context. Twenty-four experimental stimuli, each with four conditions, were prepared (Appendix E). Discourse context and c-command relationship between the binding-inaccessible antecedent and the reflexive were manipulated. Half of the conditions presented the experimental items with a context as in (3a) and (3b) and the other half presented

them without a context as in (3c) and (3d). In each With Context/No Context conditions, half of the sentential items included binding-inaccessible antecedents in embedded clauses where the binding-inaccessible antecedent c-commanded the reflexive, but it was linearly distant antecedent as in (3a) and (3c) and the other half presented the reflexives in a relative clause where the binding-inaccessible antecedent did not c-command the reflexive, but it was linearly closer antecedent as (3b) and (3d) below:

(3)

a. With Context – Embedded Clause: Jonathan was pretty worried at the hospital. He remembered that the surgeon had pricked himself with a used syringe needle.

b. With Context – Relative Clause: Jonathan was pretty worried at the hospital. The surgeon who treated Jonathan had pricked himself with a used syringe needle.

c. No Context – Embedded Clause: Jonathan remembered that Barry had pricked himself with a used syringe needle.

d. No Context – Relative Clause: Barry who treated Jonathan had pricked himself with a used syringe needle.

   Question: Who had been pricked with a used syringe needle?

   a. the surgeon/Barry

   b. Jonathan

When sentences were presented with a context, stereotypical male (e.g. *the surgeon*) and female nouns (e.g. *the nurse*) having with the same gender feature as the reflexive were used as the binding-accessible antecedent as in (3a) and (3b). However, when there was no context such as in (3c) and (3d), proper names (e.g.

Barry) which had the same gender feature with the reflexive were used as the binding-accessible antecedent. Even though both the binding-accessible antecedent (*the surgeon*) and the binding-inaccessible antecedent (*Jonathan*) c-commanded the reflexive in Embedded Clause conditions as in (3a) and (3c), only the binding-accessible antecedent (*Barry*) c-commanded the reflexive in Relative Clause conditions as in (3b) and (3d).

Experimental stimuli were distributed across four list contained exactly one condition of one experimental items and they were intermingled with seventy-two filler texts.

The participants read each experimental item presented on paper and they answered the question afterwards by circling one of the two options stated below the question.

5.4.2 Results

Participants' answers to the comprehension questions were entered as binary data (accessible antecedent preference and inaccessible antecedent preference). The data were then analyzed using generalized linear mixed model (Marschner, 2011). As in the eye tracking experiments, all the analyses were conducted in the R statistical computing software (R Core Team, 2017) using *glmer* function. To perform analyses, an additional argument, *family*, was added to the model and was set to *binomial* to describe the error distribution. In the analyses, subjects and items were included as random effects and Context and Sentence Structure were included as the predictor variables. Each of these predictor variables had two levels: With Context and No Context for the predictor variable, Context; Relative Clause and Embedded Clause for predictor variable, Sentence Structure.

Analyses were first conducted with the single predictor variables (either Context or Sentence Structure as the predictor variable) and were then followed by the complex model including Context and Sentence Structure together as predictors. The model with an interaction of Context and Sentence Structure was compared to a simpler model including the two predictor variables (where the two predictor variables did not interact). Model comparisons were carried out via using likelihood ratio tests. Simpler models and complex models were compared to each other to decide which model gave the best fit to the data. The most complex model providing the best fit to the data was chosen as the best fitting model.

Table 24 below shows the mean percentages for participants' preference for choosing the accessible antecedent as the referent of the reflexive for each condition:

Table 24. Mean Percentages of Accessible Antecedent Preference

Conditions	Accessible Antecedent Preference (%)
With Context – Embedded Clause	72.6
With Context – Relative Clause	77.7
No Context – Embedded Clause	83.3
No Context – Relative Clause	83.5

The overall percentage of choosing the grammatically accessible antecedent for the referent of the reflexive was 79.30%, this was even higher for sentences which did not include any context (83.4%). This confirms that Turkish learners of English knew the binding requirements of reflexives in English and obeyed these requirements during the antecedent identification process for the reflexive in the offline task.

Model comparisons indicated that the complex model including the two predictor variables (Context and Sentence Structure) explained the data better than the simple model with Context as a predictor variable (χ^2 (1) = 31.68, $p < .001$) and it explained the data better than the simple model with Sentence Structure as a predictor variable (χ^2 (1) = 25.62, $p < .001$). The model with the interaction of two

predictor variables explained the data better than a simpler model including two predictor variables (χ^2 (1) = 16.04, $p < .001$), so its results are reported.

The interaction model with the two predictors variables showed that No Context conditions (3c, d) yielded more accessible antecedent preferences than With Context conditions (3a, b) ($\beta = .61$, $SE = .12$, $z = 5.14$, $p < .001$). The interaction model of the two predictors also indicated that participants chose the accessible antecedent more as the referent of the reflexive in Relative Clause conditions (3b, d) than Embedded Clause conditions (3a, c) ($\beta = .25$, $SE = .11$, $z = 2.24$, $p < .05$).

After these analyses, planned comparisons were carried out to investigate whether there was a significant difference between the experimental conditions in participants' accessible antecedent choices in Experiment 3. The following table presents the comparison conditions:

Table 25. Planned Comparisons in Experiment 3

	Comparison	Comparison exemplified in (3)	Condition being compared	Condition kept constant in the comparison
Comparison 1:	With Context – Embedded Clause to With Context – Relative Clause	(3a) – (3b)	Embedded Clause to Relative Clause	With Context
Comparison 2:	No Context – Embedded Clause to No Context - Relative Clause	(3c) – (3d)	Embedded Clause to Relative Clause	No Context
Comparison 3:	With Context – Embedded Clause to No Context – Embedded Clause	(3a) – (3c)	With Context to No Context	Embedded Clause
Comparison 4:	With Context – Relative Clause to No Context – Relative Clause	(3b) – (3d)	With Context to No Context	Relative Clause

Comparison 1 (3a to 3b) showed that a significant difference was observed between Embedded Clause and Relative Clause conditions. Participants chose accessible antecedent more in With Context-Relative Clause condition (3b) than With Context-Embedded Clause condition (3a) ($\beta = .40$, $SE = .15$, $z = 2.60$, $p < .05$). Comparison 2

indicated that (3c to 3d) any significant difference was observed between Embedded Clause and Relative Clause conditions. That is, the accessible antecedent choice difference between No Context-Embedded Clause condition (3c) and No Context-Relative Clause condition (3d) did not reach any statistical significance ($\beta = .02$, $SE = .17$, $z = .15$, $p > .05$).

Comparison 3 (3a to 3c) showed that there was a significant difference in the participants' accessible antecedent preference for the reflexive between With Context and No Context conditions. No Context-Embedded Clause condition (3c) elicited more accessible antecedent preferences than With Context-Embedded Clause (3a) condition ($\beta = .86$, $SE = .16$, $z = 5.252$, $p < .001$). Lastly, Comparison 4 (3b to 3d) indicated that there was a reliable difference in participants' accessible antecedent choices between With Context and No Context conditions, that is, more accessible antecedent preferences for the reflexive were given in No Context-Relative Clause condition (3d) compared to With Context-Relative Clause condition (3b) ($\beta = .43$, $SE = .16$, $z = 2.58$, $p < .05$).

The results of planned comparisons are summarized in Table 26 below. All inequalities are at an alpha level of .05 or smaller.

Table 26. Results of the Planned Comparisons in Experiment 3

Conditions		%Accessible Antecedent
Context	With Context	Relative Clause > Embedded Clause
	No Context	Embedded Clause = Relative Clause
Structure	Embedded Clause	No Context > With Context
	Relative Clause	No Context > With Context

5.4.3 Discussion

The offline pen-and-paper tasks in the previous studies (Felser et al., 2009; Felser & Cunnings, 2012, Tanış, 2007) investigated whether non-native speakers of English would obey the requirements of BP-A or they would be different from native speakers of English in their final interpretations of reflexives. Complex sentences containing two possible referents for the reflexive were used in these tasks, but the sentences were not presented with context. The participants in the previous studies preferred the accessible antecedent as the referent of the reflexive in their decisions, reflecting their knowledge of the binding requirements of reflexives. Antecedent Identification Task in the current study investigated not only the percentage of choosing the accessible antecedent and the inaccessible antecedent for the referent of the reflexive but also the effects of contextual information and sentence structure on participants' final interpretation for reflexives.

It was observed that Turkish learners of English chose the accessible antecedent more than the inaccessible antecedent as the referent of the reflexive in the offline task. It shows that non-native speakers of English were aware of the binding requirements of the reflexive as they chose a c-commanding and binding-accessible antecedent as the referent of the reflexive. It was also found that both contextual information and sentence structure had effects on the participants' final interpretation in the offline task. For instance, when contextual information was not provided as in No Context conditions (3c, d), participants chose the accessible antecedent more as the referent of the reflexive as opposed to With Context conditions (3a, b). When the sentence structure was more complex as in Relative Clause conditions (3b, d), the percentage of choosing the accessible antecedent as the

referent of the reflexive was significantly higher as opposed to Embedded Clause conditions (3a, c). There are several explanations for these findings.

First of all, sentences including reflexives were preceded by a discourse context in With Context conditions as in (3a) and (3b). The inaccessible antecedent was highly focused in the discourse as it was the subject of the matrix clause and it was mentioned twice in these conditions. Given that the participants' accessible antecedent preference was reduced in these contexts compared to No Context conditions (3c, d), participants might be using this discourse-related information in their final decisions, so they might consider the inaccessible but discourse prominent inaccessible antecedent as a potential referent for the reflexive. In No Context conditions (3c, d), sources of information the participants could use was structural information and they successfully used it.

The native speakers in Sturt's (2003) eye tracking experiments were mostly influenced by syntactic information in their earlier decisions (as shown by eye tracking measures reflecting early processes) and their later processing were influenced by non-structural factors (as shown by measures reflecting later processes). The participants in the present study were also influenced by structural information in their online decisions, but this was evident only in later measures. My conclusion for this observation was that the non-native speakers may be using similar sources of information to native speakers, but their utilization of these sources might be delayed. The fact that the participants were affected by the contextual information in their offline decisions in Antecedent Identification Task appear to further confirm this conclusion. That is, Turkish learners of English can also use contextual information similar to native speakers of English, but this is also delayed as it can be observed in their offline decisions. As it was observed in Sturt's (2003) follow-up

experiment, native speakers were affected by contextual information and they chose the inaccessible antecedent as the referent of the reflexive when the inaccessible antecedent matched the reflexive in gender and c-commanded it.

In Relative Clause conditions (3b, d), compared to Embedded Clause conditions (3a, c), the inaccessible antecedent did not c-command the reflexive, but it was linearly closer to it. The participants chose the accessible antecedent more than the inaccessible antecedent as the referent of the reflexive in Relative Clause conditions (3b, d), confirming the earlier finding in the eye tracking experiments that rather than the linear proximity and discourse focus, participants' ultimate decision is influenced by syntactic information. This observation could have another explanation. Embedded Clause conditions (3a, c) had syntactically simpler structure (no filler-gap dependencies) compared to Relative Clause conditions (3b, d) (filler-gap dependencies). As the sentence structure was less complex in Embedded Clause conditions (3a, c), participants might have utilized the lexical information in addition to the syntactic information as computing the structure will be cognitively less demanding leaving room for use of other sources of information. However, in Relative Clause conditions (3b, d), in addition to the antecedent retrieval, the participants will also need to compute the filler-gap dependency introduced by the relative clause. This might be cognitively more challenging and thus leave no room for use of other sources of information but syntax, explaining the higher percentage of choosing the inaccessible but discourse-prominent antecedent as the referent of the reflexive in Embedded Clause conditions (3a, c) compared to Relative Clause conditions (3b, d).

CHAPTER 6

GENERAL DISCUSSION AND CONCLUSION

6.1 Summary and general discussion

This thesis work investigated how Turkish learners of English process the English reflexives (*himself/herself*). The specific question was whether their antecedent retrieval processes would be affected by structural constraints associated with the binding requirements of reflexives or by non-structural information such as discourse prominence or linear proximity. Two eye tracking experiments and one antecedent identification task were employed to test these questions. The results showed that Turkish learners of English were, to a good extent, similar to native speakers of English in their reflexive antecedent retrieval behavior both in their processing and in their ultimate interpretations. In the eye tracking experiments, the group's antecedent search was affected by the requirements of BP-A (Chomsky, 1981, 1986) as they showed sensitivity to gender feature (mis)matches associated with only the local and c-commanding antecedent. They did not show sensitivity to gender (mis)matches associated with binding-inaccessible but a discourse prominent antecedent in Experiment 1 and with binding-inaccessible but a discourse prominent and linearly proximate antecedent in Experiment 2 at any stages of reflexive resolution. In the antecedent identification task in English, Turkish learners of English chose the local and c-commanding antecedent as the referent of the reflexive, but they used discourse information, as well because in contexts with a discourse prominent c-commanding binding-inaccessible antecedent, the local antecedent choices were reduced.

The findings of the current study will first be compared to the findings of the previous studies on L1 reflexive binding in English, more specifically to those reported in Sturt (2003) since the experimental materials were taken from Sturt (2003). The results will then be evaluated with respect to the assumptions of the theoretical models for non-native language processing (Clahsen & Felser, 2006; Cunnings, 2017; Hopp, 2006, 2010; McDonald, 2006).

The materials in the two eye tracking experiments were taken (and slightly adapted) from Sturt (2003) and the materials in the antecedent identification task were largely based on those. Thus, I will first compare my results to Sturt's (2003) findings for native speakers of English. Sturt (2003) found that English native speakers were influenced by structural constraints in their early decisions as indicated by eye tracking measures reflecting early stages of processing (e.g., first fixation and first-pass reading times) but factors such as discourse prominence affected later stages of processing as indicated by later measures of processing (e.g. second-pass reading time) only when the inaccessible antecedent had a structural c-command relationship with the reflexive (his Experiment 1). In his Experiment 2, where the inaccessible antecedent was linearly proximate to the reflexive (unlike his Experiment 1 where the structurally accessible antecedent was also the linearly closer antecedent), but it did not c-command it, the native speakers did not use non-structural information such as linear proximity (or discourse prominence) as a cue in their antecedent retrieval for the reflexive. That is, native speakers did not show any sensitivity to the gender (mis)matches between the inaccessible antecedent and the reflexive, but they were affected by structural constraints associated with the binding requirements of reflexives, so they showed sensitivity to the c-commanding and local binding-accessible antecedent from the initial stages of processing (e.g. first fixation

and first-pass reading times) as this antecedent was the only antecedent that had a structural c-command relationship with the reflexive in the sentence. Sturt's (2003) follow-up experiment (with an antecedent identification task) also demonstrated that native speakers used discourse-related information in addition to structural information. They chose the accessible antecedent as the referent of the reflexive; however, when the inaccessible antecedent was highly prominent in the discourse and it matched the reflexive in gender, native speakers considered the inaccessible antecedent as the referent of the reflexive.

The results of the present study are mostly parallel to Sturt's (2003) findings, but Turkish learners of English were slower in their parsing decisions than the native speakers in Sturt's (2003) study. The L2 learners in the present study were affected by structural cues associated with BP-A, so they considered the binding-accessible antecedent as the referent of the reflexive during their antecedent retrieval processes just like the native speakers in Sturt (2003). However, their use of structural information was evident only in measures reflecting later stages of processing (e.g. regression path duration, rereading duration, total duration, probability of regression out) suggesting that L2 learners were slower than native speakers in integrating structural information. Unlike the native speakers in Sturt's (2003) study, Turkish learners of English did not show any sensitivity to the gender (mis)match between the inaccessible antecedent and the reflexive at later stages of processing neither in Experiment 1 nor in Experiment 2 (note that Sturt's (2003) participants also did not show sensitivity to the gender (mis)matches between the inaccessible antecedent and the reflexive when the inaccessible antecedent did not c-command the reflexive.) That is, even though native speakers used discourse prominence of the inaccessible

antecedent as a cue for antecedent retrieval when the inaccessible antecedent c-commanded the reflexive, L2 learners in the current study did not.

The results of the antecedent identification task were also parallel to the results of the offline task in Sturt's (2003) study. Sturt's (2003) results showed that where the binding inaccessible antecedent c-commanded the reflexive and matched it in gender, the percentage of choosing the inaccessible antecedent as the referent of the reflexive increased, suggesting that non-structural information such as discourse prominence influenced the native speakers' ultimate decisions. The results of the antecedent identification task in this study showed an increase in the percentage of choosing the inaccessible antecedent as the referent of the reflexive when there was a context putting it in discourse focus, suggesting that non-structural information such as discourse prominence influenced L2 learners' ultimate decisions. This may be taken as evidence that L2 learners in the present study also used discourse-related information, but they were delayed in their integration of such information compared to native speakers because discourse prominence influenced their offline decisions only.

Thus, although Turkish learners of English did not behave exactly in the same manner as native speakers of English in Sturt's (2003) study (neither did they behave similar to any native speaker group reported in any of the previous studies (Badecker & Straub, 2002; Clackson et al., 2011; Clackson & Heyer, 2014; Cunnings & Felser, 2013; Dillon et al., 2013; Nicol & Swinney, 1989; Patil et al., 2016; Xiang et al., 2009), their behavior in the online tasks and in the offline tasks together show parallelism to the behavior of native speakers in Sturt (2003). Turkish learners of English integrated structural information first (in their online decisions) and used discourse-related information later (in their offline decisions), in the same

order as native speakers, but they were apparently slower than native speakers in integrating these sources of information.

The results pose a challenge to the Shallow Structure Hypothesis (SSH) of Clahsen and Felser (2006). According to SSH, L2 learners' processing mechanisms are qualitatively different from those of native speakers and L2 learners are less successful in computing structural information than native speakers in real-time sentence processing, and since L2 learners do syntactically less detailed grammatical computations than native speakers, they rely more on non-structural cues (discourse-related information, semantic information or pragmatic information) than native speakers during online sentence processing. SSH was tested and confirmed in several studies on L2 sentence processing (Clahsen et al., 2007; Felser et al., 2003; Felser & Roberts, 2007; Hahne et al., 2006; Lück et al., 2006; Marinis et. al., 2005; Papadopoulou & Clahsen, 2003; Roberts et al., 2007). Some studies also tested it with respect to the processing of reflexives (Felser et al., 2009; Felser & Cunnings, 2012). Felser et al. (2009) and Felser and Cunnings (2012) reported that non-native speakers' reflexive resolution showed reliance on non-structural constraints such as discourse prominence or linear proximity of the inaccessible antecedent rather than structural cues such as locality and c-command requirements, even at the initial stages of processing. For materials similar to those used in the present study, Felser et al. (2009) and Felser and Cunnings (2012) reported reliable effects of gender (mis)match associated with the inaccessible antecedent. That is, when there was a gender match between the inaccessible antecedent and the reflexive, the reading times were shorter than when there was a gender mismatch between the inaccessible antecedent and the reflexive. L2 learners in Felser et al. (2009) and Felser and Cunnings (2012) also used the structural cues and showed sensitivity to gender

(mis)matches associated with the accessible antecedent; but this was evident only for eye tracking measures reflecting later stages of processing. There was also a delayed effect of the gender (mis)match associated with the accessible antecedent in the present study but this effect did not follow sensitivity to the gender (mis)match associated with the inaccessible antecedent. That is, the participants in the present study never considered a discourse prominent inaccessible noun as the antecedent for the reflexive before they considered the binding accessible noun as the antecedent for it. Turkish learners of English in the present study did not consider the inaccessible antecedent as a potential referent of the reflexive even when it was highly focused in the discourse and it c-commanded the reflexive in Experiment 1 and it was linearly closer to the reflexive in Experiment 2. They showed signs of use of non-structural information in the offline task only. Thus, these results challenge the SSH which maintains that L2 learners' parsing procedures are "less detailed and shallower than those of native speakers" (Clahsen & Felser, 2006, p. 32) because in the current study Turkish learners of English did use syntactic information for a complex structure, albeit in a delayed manner.

The results of the current study are not compatible with the theoretical assumptions of Cunnings (2017), either. Cunnings (2017) argues that the difference between the processing mechanisms of native speakers and L2 learners is related to the type of cues are used during antecedent retrieval processes. Because of their different memory encoding systems, locality and c-command requirement is the main retrieval cue for native speakers (Dillon et al., 2013; Nicol & Swinney, 1989) but discourse-related information is the main retrieval cue for L2 learners during antecedent retrieval process for the reflexive. Thus, L2 learners are predicted to show a greater reliance on discourse-related information in their real-time sentence

processing than native speakers. The binding-inaccessible antecedents in the materials used in the present study were all (except for the No Context conditions in the antecedent identification task) the first-mentioned character and highly focused in the discourse. However, the L2 learners in the present study did not use discourse-related information (Subject/Topic cue) in their online parsing decisions as they did not show sensitivity to the gender (mis)matches between the discourse prominent, topical but binding-inaccessible antecedent and the reflexive. Instead, they relied on structural constraints associated with BP-A and showed sensitivity to the gender (mis)matches between the binding-accessible antecedent and the reflexive. Discourse-related information was used only in the antecedent identification task, but it did not reverse the locality preference. The locality preference was only reduced when there was a discourse prominent binding-inaccessible antecedent.

It is also not possible to explain the results with reference to transfer (Hopp, 2010). As it was reviewed in Chapter 2, Turkish allows for non-local binding of the reflexives (Aissen, 1974; Enç, 1989; Kornfilt, 1984, 1997, 2001; Meral, 2010, 2013; Palaz, 2013; Sezer, 1979). The results of antecedent identification task in Turkish (also presented in Chapter 2) confirmed the theoretical claims that native speakers of Turkish tend to bind *kendi*, which is considered to be the true reflexive in Turkish, as well as *kendisi* to a non-local antecedent in pragmatically-neutral complex sentences. If the participants had been to transfer the binding features of Turkish into English, they would have considered the non-local (binding-inaccessible) antecedent for the reflexive in the eye tracking experiments, but this was not the case. Just like native speakers of English (although delayed in their decision compared to native speakers), they considered the binding-accessible noun as an antecedent for the reflexive.

The results partially support the proposals by Hopp (2006, 2010) and McDonald (2006) in that the processing mechanisms of L2 learners are not qualitatively different from those of native speakers (Hopp, 2006, 2010; McDonald, 2006). Turkish learners of English in the current study used structural constraints associated with BP-A in their online reference resolution. Hopp (2006, 2010) and McDonald (2006) argue that L2 learners have limited resources or are slower in processing than native speakers. In the current study, Turkish learners of English abided by the structural constraints regarding BP-A in their antecedent retrieval processes, but they were slower than native speakers in Sturt's (2003) study as the L2 learners showed sensitivity to the gender (mis)matches between the accessible antecedent and the reflexive only for eye tracking measures reflecting late processing stages. As Hopp (2006, 2010) and McDonald (2006) claim, this can be attributed to L2 learners' slower processing speed and perhaps to their limited resources. However, this result does not allow us to fully confirm the arguments by Hopp (2006, 2010) and McDonald (2006). The arguments by Hopp (2006, 2010) and McDonald (2006) also imply that linear proximity of the (in)accessible antecedent to the reflexive can affect L2 learners' parsing behavior. That is, if cognitive resources of L2 learners are limited, in processing the structures tested in this study, L2 learners can benefit from a memory-friendly option and prefer to keep anaphoric dependencies as short as possible regardless of the structural constraints. This would lead the participants to choose the binding-inaccessible but linearly closer noun as an antecedent for the reflexive in Experiment 2. However, in Experiment 2, just like in Experiment 1, Turkish learners of English showed sensitivity to structural constraints in their parsing decisions but not to linear proximity or discourse prominence. Thus, L2 learners' delayed sensitivity to the structural information during antecedent

retrieval process for the reflexive confirms the arguments by Hopp (2006, 2010) and McDonald (2006) in the sense that L2 learners are slower than native speakers in real-time sentence processing, but the participants' lack of sensitivity to the linear proximity on participants' parsing decisions refrains us from fully attributing the findings to the proposals by Hopp (2006, 2010) and McDonald (2006).

6.2 Conclusion

The eye tracking experiments in the present study revealed that Turkish learners of English used structural information associated with BP-A effectively: the only antecedent that they considered as the referent of the reflexive was the binding-accessible antecedent but they were delayed in integrating this information when compared to the native speakers in Sturt (2003). Unlike the non-native speaker groups in Felser et al. (2009) and Felser and Cunnings (2012), Turkish learners of English did not show an initial sensitivity to the non-structural cues such as discourse prominence and linear proximity of the inaccessible antecedent although they used non-structural information such as discourse prominence in their final interpretations. The results appear to be parallel to those reported in Sturt (2003) with the exception that the L2 learners were slower than native speakers in their integration of structural and non-structural information (Hopp, 2006, 2010; McDonald, 2006). This is in line with the previous research (Coughlin & Tremblay, 2013; Dinçtopal-Deniz, 2010; Foote, 2011; Hahne, 2001; Hopp, 2006, 2010; Jacob & Felser, 2016; Keating, 2009, 2010; McDonald, 2006, Roberts & Felser, 2011) which also showed that L2 learners are slower than native speakers in their language processing. The results therefore indicate that L2 learners are not qualitatively different from native speakers in their language processing, contra the SSH of Clahsen and Felser (2006).

6.3 Limitations and further research

This study contributes to the L2 processing research in several ways. It was, to my knowledge, the first study investigating processing of reflexives by Turkish learners of English. Despite the binding requirement differences in the two languages, the results showed that Turkish learners of English can be native-like in their antecedent retrieval behavior for reflexives although their integration of linguistic information (both structural and non-structural) in this process could be delayed.

However, the study has some limitations, too. The most important one is that the only participant group in the study was Turkish learners of English and their reference resolution strategies were examined and compared to those of the native speakers in Sturt's (2003) study. Although the materials were taken (and adapted) from Sturt (2003), having an English-speaking control group would have allowed for more direct comparisons and would have reduced any variability attributable to lab settings or the testing equipment.

A potential variable that can explain L2 processing, namely Working Memory (WM) capacity, was also not included in the present study. This refrains us from commenting on how individual differences with respect to WM capacity could have contributed to the L2 processing of this structure.

The participant group in this study had advanced proficiency in English. A further study examining online reference resolution strategies of L2 learners with different proficiency levels could inform on how use of structural or non-structural information is integrated as language proficiency increases.

APPENDIX A

ITEMS AND QUESTIONS USED IN THE ANTECEDENT IDENTIFICATION TASK IN TURKISH

1. Ali Ayşe'nin *kendini/kendisini* bağışladığını düşünüyor.

   Bağışlanan kimdir?

   a. Ali b. Ayşe

2. Fırat Zeynep'in *kendini/kendisini* sevdiğini düşünüyor.

   Sevilen kimdir?

   a. Fırat b. Zeynep

3. Müge Berk'in *kendini/kendisini* hırpaladığını doğrulamış.

   Hırpalanan kimdir?

   a. Müge b. Berk

4. Veli Merve'nin *kendini/kendisini* önemsediğini söylüyor.

   Önemsenen kimdir?

   a. Veli. b. Merve

5. Elif Ramazan'ın *kendini/kendisini* umursadığını zannediyor.

   Umursanan kimdir?

   a. Elif. b. Ramazan

6. Derya Emir'in *kendini/kendisini* ısırdığını söyledi.

   Isırılan kimdir?

   a. Derya b. Emir

7. Murat Şebnem'e *kendini/kendisini* anlattığını sanıyormuş.

   Anlatılan kimdir?

   a. Murat b. Şebnem

8. Burçin Çağatay'a *kendini/kendisini* sevdirdiğini düşünüyor.

   Sevilen kimdir?

   a. Burçin b. Çağatay

9. İrfan Neşe'ye *kendini/kendisini* unutturduğunu söylemişti.

   Unutulan kimdir?

   a. İrfan b. Neşe

10. Burçak Anıl'a *kendini/kendisini* öptürdüğünü açıklamış.

    Öpülen kimdir?

    a. Burçak b. Anıl

11. Emir Tuğçe'ye *kendini/kendisini* izlettiğini söyledi.

    İzlenen kimdir?

    a. Emir b. Tuğçe

12. Mehmet Hilal'e *kendini/kendisini* arattığını söylüyor.

    Aranan kimdir?

    a. Mehmet b. Hilal

13. Faruk Ayşen'in *kendini/kendisini* izlemesinden rahatsız oldu.

    İzlenen kimdir?

    a. Faruk b. Ayşen

14. Azra Murat'ın *kendini/kendisini* incelemesine anlam verememişti.

    İncelenen kimdir?

    a. Azra b. Murat

15. Gökhan Elif'in *kendini/kendisini* sevmesine şaşırmıştı.

    Sevilen kimdir?

    a. Gökhan b. Elif

16. Akın Pelin'in *kendini/kendisini* beğenmesini istiyormuş.

Beğenilen kimdir?

a. Akın b. Pelin

17. Hayri Hatice'nin *kendini/kendisini* dinlemesini istiyordu.

Dinlenen kimdir?

a. Hayri b. Hatice

18. Sema Cevdet'in *kendini/kendisini* korumasını bekliyormuş.

Korunan kimdir?

a. Sema b. Cevdet

19. Melike Oğuzhan'ın *kendini/kendisini* görünce şaşırmıştı.

Görülen kimdir?

a. Melike b. Oğuzhan

20. Batuhan Gülcan'ın *kendini/kendisini* bekleyince sıkılıyordu.

Beklenen kimdir?

a. Batuhan b. Gülcan

21. Derya Furkan'ın *kendini/kendisini* bulunca sevindi.

Bulunan kimdir?

a. Derya b. Furkan

22. Bilal Sedef'in *kendini/kendisini* unutunca rahatlıyordu.

Unutulan kimdir?

a. Bilal b. Sedef

23. Kübra Hüseyin'in *kendini/kendisini* beğenince üzülüyormuş.

Beğenilen kimdir?

a. Kübra b. Hüseyin

24. Serhat Betül'ün *kendini/kendisini* duyunca rahatlamıştı.

Duyulan kimdir?

a. Serhat b. Betül

25. Hande İrfan'a *kendini/kendisini* göstermek istemişti.

    Gösterilen kimdir?

    a. Hande b. İrfan

26. Süleyman Semra'ya *kendini/kendisini* sevdirmek istiyormuş.

    Sevdirilen kimdir?

    a. Süleyman b. Semra

27. Onur Kübra'ya *kendini/kendisini* hatırlatmayı hedefliyordu.

    Hatırlatılan kimdir?

    a. Onur b. Kübra

28. Yeşim Yasin'e *kendini/kendisini* umursatmayı hedeflemişti.

    Umursatılan kimdir?

    a. Yeşim b. Yasin

29. Can Aybüke'ye *kendini/kendisini* önemsetmeyi amaçlıyor.

    Önemsetilen kimdir?

    a. Can b. Aybüke

30. Erdal Şeyda'ya *kendini/kendisini* unutturmak istiyordu.

    Unutturulan kimdir?

    a. Erdal b. Şeyda

APPENDIX B

BACKGROUND QUESTIONNAIRE FOR PARTICIPANTS

I agree to participate in this study:

Signature: _____ Name (Please print): _____

Date: _____

I. PERSONAL INFORMATION (Will Remain Confidential)

1. Sex: Female Male
2. Date of Birth: Place of Birth: City: Country:
3. Occupation:
4. Highest Level of Schooling: Secondary High school University
5. Do you have any visual problem?
   a. Yes
   b. No
6. If yes, how do you correct it?
   a. I use glasses
   b. I use contact lenses
   c. Other (Please specify):

      _____

II. LINGUISTIC INFORMATION

1. Mother Tongue:
2. Language of Education
   a. Primary

      School:_____
   b. Secondary School: _____
   c. High School: _____
   d. University: _____
3. Age & Place of first exposure to English:
4. How often do you use English?
5. Where do you generally use English?

a. Home: _____ hours

b. Work:_____ hours

c. Social:_____ hours

6. 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:

III. ENGLISH LANGUAGE PROFICIENCY

1. Have you ever taken any standardized English Proficiency Test (e.g., TOEFL, IELTS)?
   a. Yes
   b. No
2. If yes, what was your score?:

   _____

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

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

IV. SECOND LANGUAGE(S):

1. Do you speak any other foreign languages besides English?
   a. Yes
   b. No

2. If yes, please specify what languages you speak:_____
3. How would you rate your linguistic ability in those languages in the following areas?

Language 1: _____

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

Language 2: _____

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

APPENDIX C

ITEMS AND QUESTIONS USED IN EYE TRACKING EXPERIMENT 1:

1.

a. **Accessible Match - Inaccessible Match:** Jonathan was pretty worried at the hospital. He remembered that the surgeon had pricked himself with a used syringe needle. There should be an investigation soon.
b. **Accessible Match - Inaccessible Mismatch:** Jennifer was pretty worried at the hospital. She remembered that the surgeon had pricked himself with a used syringe needle. There should be an investigation soon.
c. **Accessible Mismatch - Inaccessible Match:** Jennifer was pretty worried at the hospital. She remembered that the surgeon had pricked herself with a used syringe needle. There should be an investigation soon.
d. **Accessible Mismatch - Inaccessible Mismatch:** Jonathan was pretty worried at the hospital. He remembered that the surgeon had pricked herself with a used syringe needle. There should be an investigation soon.

Who had been pricked with a used needle?

a. Jonathan (Jennifer)
b. the surgeon

2.

a. **Accessible Match - Inaccessible Match:** John didn't enjoy the pleasure flight at all. He claimed that the pilot injured himself quite badly during the journey. It's enough to make anyone nervous.
b. **Accessible Match - Inaccessible Mismatch:** Mary didn't enjoy the pleasure flight at all. She claimed that the pilot injured himself quite badly during the journey. It's enough to make anyone nervous.
c. **Accessible Mismatch - Inaccessible Match:** Mary didn't enjoy the pleasure flight at all. She claimed that the pilot injured herself quite badly during the journey. It's enough to make anyone nervous.
d. **Accessible Mismatch - Inaccessible Mismatch:** John didn't enjoy the pleasure flight at all. He claimed that the pilot injured herself quite badly during the journey. It's enough to make anyone nervous.

Who got injured?

a. John (Mary)
b. the pilot

3.

a. **Accessible Match - Inaccessible Match:** Henry was shaken up after the accident. He mentioned that the firefighter had cut himself on a piece of broken glass. Luckily there were no fatalities.

b. **Accessible Match - Inaccessible Mismatch:** Jenny was shaken up after the accident. She mentioned that the firefighter had cut himself on a piece of broken glass. Luckily there were no fatalities.
c. **Accessible Mismatch - Inaccessible Match:** Jenny was shaken up after the accident. She mentioned that the firefighter had cut herself on a piece of broken glass. Luckily there were no fatalities.
d. **Accessible Mismatch - Inaccessible Mismatch:** Henry was shaken up after the accident. He mentioned that the firefighter had cut herself on a piece of broken glass. Luckily there were no fatalities.

Who got cut?

a. Henry (Jenny)
b. the firefighter

4.

a. **Accessible Match - Inaccessible Match:** Tony found the funeral house quite scary. He noticed that the bishop whispered to himself all the time with a grimace. Not an ideal holiday job.
b. **Accessible Match - Inaccessible Mismatch:** Anne found the funeral house quite scary. She noticed that the bishop whispered to himself all the time with a grimace. Not an ideal holiday job.
c. **Accessible Mismatch - Inaccessible Match:** Anne found the funeral house quite scary. She noticed that the bishop whispered to herself all the time with a grimace. Not an ideal holiday job.
d. **Accessible Mismatch - Inaccessible Mismatch:** Tony found the funeral house quite scary. He noticed that the bishop whispered to herself all the time with a grimace. Not an ideal holiday job.

Who did the bishop whisper to?

a. Tony (Anne)
b. the bishop

5.

a. **Accessible Match - Inaccessible Match:** Harry really enjoyed walking in the sports ground. He entertained that the footballer taught himself to paint the lines on the pitch. It was a nice location.
b. **Accessible Match - Inaccessible Mismatch:** Helen really enjoyed walking in the sports ground. She entertained that the footballer taught himself to paint the lines on the pitch. It was a nice location.
c. **Accessible Mismatch - Inaccessible Match:** Helen really enjoyed walking in the sports ground. She entertained that the footballer taught herself to paint the lines on the pitch. It was a nice location.
d. **Accessible Mismatch - Inaccessible Mismatch:** Harry really enjoyed walking in the sports ground. He entertained that the footballer taught herself to paint the lines on the pitch. It was a nice location.

Who learned to paint the lines?

a. Harry (Helen)

b. the footballer

6.

a. **Accessible Match - Inaccessible Match:** Tommy felt tired after arriving the station. He thought that the porter would upset himself quite a lot about all the luggage. Travelling isn't always fun.
b. **Accessible Match - Inaccessible Mismatch:** Sally felt tired after arriving the station. She thought that the porter would upset himself quite a lot about all the luggage. Travelling isn't always fun.
c. **Accessible Mismatch - Inaccessible Match:** Sally felt tired after arriving the station. She thought that the porter would upset herself quite a lot about all the luggage. Travelling isn't always fun.
d. **Accessible Mismatch - Inaccessible Mismatch**: Tommy felt tired after arriving the station. He thought that the porter would upset herself quite a lot about all the luggage. Travelling isn't always fun.

Who would be upset about the luggage?

a. the porter
b. Tommy (Sally)

7.

a. **Accessible Match - Inaccessible Match:** Bruce found the court case a new experience. He reported that the judge disciplined himself very carefully all the time. The wig looked pretty ridiculous, though.
b. **Accessible Match - Inaccessible Mismatch:** Julia found the court case a new experience. She reported that the judge disciplined himself very carefully all the time. The wig looked pretty ridiculous, though.
c. **Accessible Mismatch - Inaccessible Match:** Julia found the court case a new experience. She reported that the judge disciplined herself very carefully all the time. The wig looked pretty ridiculous, though.
d. **Accessible Mismatch - Inaccessible Mismatch:** Bruce found the court case a new experience. He reported that the judge disciplined herself very carefully all the time. The wig looked pretty ridiculous, though.

Who was disciplined?

a. the judge
b. Bruce (Julia)

8.

a. **Accessible Match - Inaccessible Match:** Peter was having trouble with the new boiler. He said that the engineer convinced himself that the valve was faulty. Heating systems can be quite frustrating.
b. **Accessible Match - Inaccessible Mismatch:** Nancy was having trouble with the new boiler. She said that the engineer convinced himself that the valve was faulty. Heating systems can be quite frustrating.
c. **Accessible Mismatch - Inaccessible Match:** Nancy was having trouble with the new boiler. She said that the engineer convinced herself that the valve was faulty. Heating systems can be quite frustrating.

d. **Accessible Mismatch - Inaccessible Mismatch:** Peter was having trouble with the new boiler. He said that the engineer convinced herself that the valve was faulty. Heating systems can be quite frustrating.

Who got convinced about the valve?
a. the engineer
b. Peter (Nancy)

9.

a. **Accessible Match - Inaccessible Match:** Gordon visited the building site yesterday morning. He realized that the builder lied about himself damaging the tools in the shed. This was going to become complicated.
b. **Accessible Match - Inaccessible Mismatch:** Rachel visited the building site yesterday. She realized that the builder lied about himself damaging the tools in the shed. This was going to become complicated.
c. **Accessible Mismatch - Inaccessible Match:** Rachel visited the building site yesterday. She realized that the builder lied about herself damaging the tools in the shed. This was going to become complicated.
d. **Accessible Mismatch - Inaccessible Mismatch:** Gordon visited the building site yesterday. He realized that the builder lied about herself damaging the tools in the shed. This was going to become complicated.

Who did the builder lie about?
a. the builder
b. Gordon (Rachel)

10.

a. **Accessible Match - Inaccessible Match:** Timothy renewed the pre-war wiring in the flat. He felt that the electrician owed himself another attempt to solve the problem. A patient attitude was all that was needed.
b. **Accessible Match - Inaccessible Mismatch:** Miranda renewed the pre-war wiring in the flat. She felt that the electrician owed himself another attempt to solve the problem. A patient attitude was all that was needed.
c. **Accessible Mismatch - Inaccessible Match:** Miranda renewed the pre-war wiring in the flat. She felt that the electrician owed herself another attempt to solve the problem. A patient attitude was all that was needed.
d. **Accessible Mismatch - Inaccessible Mismatch:** Timothy renewed the pre-war wiring in the flat. He felt that the electrician owed herself another attempt to solve the problem. A patient attitude was all that was needed.

Who was owed another attempt?
a. the electrician
b. Timothy (Miranda)

11.

a. **Accessible Match - Inaccessible Match**: Andrew had fun at the army barracks. He entertained that the soldier had awarded himself the top prize in the pub quiz. The alcohol flowed freely.

b. **Accessible Match - Inaccessible Mismatch:** Sheila had fun at the army barracks. She entertained that the soldier had awarded himself the top prize in the pub quiz. The alcohol flowed freely.
c. **Accessible Mismatch - Inaccessible Match:** Sheila had fun at the army barracks. She entertained that the soldier had awarded herself the top prize in the pub quiz. The alcohol flowed freely.
d. **Accessible Mismatch - Inaccessible Mismatch:** Andrew had fun at the army barracks. He entertained that the soldier had awarded herself the top prize in the pub quiz. The alcohol flowed freely.

Who got the top prize in the pub quiz?
a. the soldier
b. Andrew (Sheila)

12.

a. **Accessible Match - Inaccessible Match:** Donald moved to the countryside. He was aware that the farmer had paid for himself to join the local fox hunt. Rural life takes a bit of getting used to.
b. **Accessible Match - Inaccessible Mismatch:** Louise moved to the countryside. She was aware that the farmer had paid for himself to join the local fox hunt. Rural life takes a bit of getting used to.
c. **Accessible Mismatch - Inaccessible Match:** Louise moved to the countryside. She was aware that the farmer had paid for herself to join the local fox hunt. Rural life takes a bit of getting used to.
d. **Accessible Mismatch - Inaccessible Mismatch:** Donald moved to the countryside. He was aware that the farmer had paid for herself to join the local fox hunt. Rural life takes a bit of getting used to.

Who was going to join the foxhunt?
a. the farmer
b. Donald (Louise)

13.

a. **Accessible Match - Inaccessible Match:** Alice found the surgery very busy yesterday. She was surprised that the nurse criticized herself for being late for the appointment. The traffic can be terrible these days.
b. **Accessible Match - Inaccessible Mismatch:** Roger found the surgery very busy yesterday. He was surprised that the nurse criticized herself for being late for the appointment. The traffic can be terrible these days.
c. **Accessible Mismatch - Inaccessible Match:** Roger found the surgery very busy yesterday. He was surprised that the nurse criticized himself for being late for the appointment. The traffic can be terrible these days.
d. **Accessible Mismatch - Inaccessible Mismatch:** Alice found the surgery very busy yesterday. She was surprised that the nurse criticized himself for being late for the appointment. The traffic can be terrible these days.

Who did the nurse criticize?
a. Alice (Roger)

b. the nurse

14.

a. **Accessible Match - Inaccessible Match:** Laura had strange stories about the hotel. She confirmed that the receptionist almost killed herself in early May for no reason. Tourism suffered after that.
b. **Accessible Match - Inaccessible Mismatch:** James had strange stories about the hotel. He confirmed that the receptionist almost killed herself in early May for no reason. Tourism suffered after that.
c. **Accessible Mismatch - Inaccessible Match:** James had strange stories about the hotel. He confirmed that the receptionist almost killed himself in early May for no reason. Tourism suffered after that.
d. **Accessible Mismatch - Inaccessible Mismatch:** Laura had strange stories about the hotel. She confirmed that the receptionist almost killed himself in early May for no reason. Tourism suffered after that.

Who was almost killed?

a. Laura (James)
b. the receptionist

15.

a. **Accessible Match - Inaccessible Match:** Julia never forgot visiting the council offices. She recalled that the secretary had treated herself to several cakes with pink icing. Not very good for the teeth apparently.
b. **Accessible Match - Inaccessible Mismatch:** Barry never forgot visiting the council offices. He recalled that the secretary had treated herself to several cakes with pink icing. Not very good for the teeth apparently.
c. **Accessible Mismatch - Inaccessible Match:** Barry never forgot visiting the council offices. He recalled that the secretary had treated himself to several cakes with pink icing. Not very good for the teeth apparently.
d. **Accessible Mismatch - Inaccessible Mismatch:** Julia never forgot visiting the council offices. She recalled that the secretary had treated himself to several cakes with pink icing. Not very good for the teeth apparently.

Who ate the cakes?

a. Julia (Barry)
b. the secretary

16.

a. **Accessible Match - Inaccessible Match:** Kate really enjoyed the show business party. She revealed that the ballet dancer introduced herself to all the stars from Hollywood. Fame can be very seductive.
b. **Accessible Match - Inaccessible Mismatch:** Greg really enjoyed the show business party. He revealed that the ballet dancer introduced herself to all the stars from Hollywood. Fame can be very seductive.

c. **Accessible Mismatch - Inaccessible Match:** Greg really enjoyed the show business party. He revealed that the ballet dancer introduced himself to all the stars from Hollywood. Fame can be very seductive.
d. **Accessible Mismatch - Inaccessible Mismatch:** Kate really enjoyed the show business party. She revealed that the ballet dancer introduced himself to all the stars from Hollywood. Fame can be very seductive.

Who met all the famous people?
a. Kate (Greg)
b. the ballet dancer

17.

a. **Accessible Match - Inaccessible Match:** Victoria had problems as a single parent. She knew that the babysitter would blame herself for the children's bad diet. Health is so important.
b. **Accessible Match - Inaccessible Mismatch:** Nicholas had problems as a single parent. He knew that the babysitter would blame herself for the children's bad diet. Health is so important.
c. **Accessible Mismatch - Inaccessible Match:** Nicholas had problems as a single parent. He knew that the babysitter would blame himself for the children's bad diet. Health is so important.
d. **Accessible Mismatch - Inaccessible Mismatch:** Victoria had problems as a single parent. She knew that the babysitter would blame himself for the children's bad diet. Health is so important.

Who would be blamed for the children's bad diet?
a. Victoria (Nicholas)
b. the babysitter

18.

a. **Accessible Match - Inaccessible Match:** Jessica had staff problems at the fashion salon. She accepted that the beautician disliked herself quite a lot and was unhappy. If only there was an easy solution.
b. **Accessible Match - Inaccessible Mismatch:** Richard had staff problems at the fashion salon. He accepted that the beautician disliked herself quite a lot and was unhappy. If only there was an easy solution.
c. **Accessible Mismatch - Inaccessible Match:** Richard had staff problems at the fashion salon. He accepted that the beautician disliked himself quite a lot and was unhappy. If only there was an easy solution.
d. **Accessible Mismatch - Inaccessible Mismatch:** Jessica had staff problems at the fashion salon. She accepted that the beautician disliked himself quite a lot and was unhappy. If only there was an easy solution.

Who was disliked?
a. Jessica (Richard)
b. the beautician

19.

a. **Accessible Match - Inaccessible Match:** Sarah wanted to succeed in the clothing business. She saw that the dressmaker familiarised herself with all the modern styles. It's important to be up to date.
b. **Accessible Match - Inaccessible Mismatch:** Frank wanted to succeed in the clothing business. He saw that the dressmaker familiarised herself with all the modern styles. It's important to be up to date.
c. **Accessible Mismatch - Inaccessible Match:** Frank wanted to succeed in the clothing business. He saw that the dressmaker familiarised himself with all the modern styles. It's important to be up to date.
d. **Accessible Mismatch - Inaccessible Mismatch:** Sarah wanted to succeed in the clothing business. She saw that the dressmaker familiarised himself with all the modern styles. It's important to be up to date.

Who was familiarised with the styles?

a. the dressmaker
b. Sarah (Frank)

20.

a. **Accessible Match - Inaccessible Match:** Polly found the police station quite an eye-opener. She saw that the sex-worker cut herself with a rusty razor blade. These things are worrying.
b. **Accessible Match - Inaccessible Mismatch:** Jason found the police station quite an eye-opener. He saw that the sex-worker cut herself with a rusty razor blade. These things are worrying.
c. **Accessible Mismatch - Inaccessible Match:** Jason found the police station quite an eye-opener. He saw that the sex-worker cut himself with a rusty razor blade. These things are worrying.
d. **Accessible Mismatch - Inaccessible Mismatch:** Polly found the police station quite an eye-opener. She saw that the sex-worker cut himself with a rusty razor blade. These things are worrying.

Who was cut with the razor blade?

a. the sex-worker
b. Polly (Jason)

21.

a. **Accessible Match - Inaccessible Match:** Alison looked concerned during the football match. She thought that the cheerleader had embarrassed herself in front of the players. Sport can cause strong emotion.
b. **Accessible Match - Inaccessible Mismatch:** Trevor looked concerned during the football match. He thought that the cheerleader had embarrassed herself in front of the players. Sport can cause strong emotion.

c. **Accessible Mismatch - Inaccessible Match:** Trevor looked concerned during the football match. He thought that the cheerleader had embarrassed himself in front of the players. Sport can cause strong emotion.
d. **Accessible Mismatch - Inaccessible Mismatch:** Alison looked concerned during the football match. She thought that the cheerleader had embarrassed himself in front of the players. Sport can cause strong emotion.

Who was made to look foolish?
a. the cheerleader
b. Alison (Trevor)

22.

a. **Accessible Match - Inaccessible Match:** Angela inspired good morale at the school. She was happy that the cleaner trusted herself and really liked doing the job. The atmosphere was good.
b. **Accessible Match - Inaccessible Mismatch:** George inspired good morale at the school. He was happy that the cleaner trusted herself and really liked doing the job. The atmosphere was good.
c. **Accessible Mismatch - Inaccessible Match:** George inspired good morale at the school. He was happy that the cleaner trusted himself and really liked doing the job. The atmosphere was good.
d. **Accessible Mismatch - Inaccessible Mismatch:** Angela inspired good morale at the school. She was happy that the cleaner trusted himself and really liked doing the job. The atmosphere was good.

Who did the cleaner trust?
a. the cleaner
b. Angela (George)

23.

a. **Accessible Match - Inaccessible Match:** Barbara employed servants after becoming rich. She found that the nanny was comfortable with herself in the large remote house. The moors can beautiful sometimes.
b. **Accessible Match - Inaccessible Mismatch:** Michael employed servants after becoming rich. He found that the nanny was comfortable with herself in the large remote house. The moors can beautiful sometimes.
c. **Accessible Mismatch - Inaccessible Match:** Michael employed servants after becoming rich. He found that the nanny was comfortable with himself in the large remote house. The moors can beautiful sometimes.
d. **Accessible Mismatch - Inaccessible Mismatch:** Barbara employed servants after becoming rich. She found that the nanny was comfortable with himself in the large remote house. The moors can beautiful sometimes.

Who did the nanny feel comfortable with?

a. the nanny
b. Barbara (Michael)

24.

a. **Accessible Match - Inaccessible Match:** Maggie got on with everybody at the office. She remarked that the typist trusted herself very much with the new photocopier. Working environments can be quite delicate.
b. **Accessible Match - Inaccessible Mismatch:** Thomas got on with everybody at the office. He remarked that the typist trusted herself very much with the new photocopier. Working environments can be quite delicate.
c. **Accessible Mismatch - Inaccessible Match:** Thomas got on with everybody at the office. He remarked that the typist trusted himself very much with the new photocopier. Working environments can be quite delicate.
d. **Accessible Mismatch - Inaccessible Mismatch:** Maggie got on with everybody at the office. She remarked that the typist trusted himself very much with the new photocopier. Working environments can be quite delicate.

Who was not trusted with the new machine?

a. the typist
b. Maggie (Thomas)

APPENDIX D

ITEMS AND QUESTIONS USED IN EYE TRACKING EXPERIMENT 2:

1.

a. **Accessible Match - Inaccessible Match:** Jonathan was pretty worried at the hospital. The surgeon who treated Jonathan had pricked himself with a used syringe needle. There should be an investigation soon.
b. **Accessible Match - Inaccessible Mismatch:** Jennifer was pretty worried at the hospital. The surgeon who treated Jennifer had pricked himself with a used syringe needle. There should be an investigation soon.
c. **Accessible Mismatch - Inaccessible Match:** Jennifer was pretty worried at the hospital. The surgeon who treated Jennifer had pricked herself with a used syringe needle. There should be an investigation soon.
d. **Accessible Mismatch - Inaccessible Mismatch:** Jonathan was pretty worried at the hospital. The surgeon who treated Jonathan had pricked herself with a used syringe needle. There should be an investigation soon.

Who had been pricked with a used needle?
a. Jonathan (Jennifer)
b. the surgeon

2.

a. **Accessible Match - Inaccessible Match:** John didn't enjoy the pleasure flight at all. The pilot who scared John injured himself quite badly during the journey. It's enough to make anyone nervous.
b. **Accessible Match - Inaccessible Mismatch:** Mary didn't enjoy the pleasure flight at all. The pilot who scared Mary injured himself quite badly during the journey. It's enough to make anyone nervous.
c. **Accessible Mismatch - Inaccessible Match:** Mary didn't enjoy the pleasure flight at all. The pilot who scared Mary injured herself quite badly during the journey. It's enough to make anyone nervous.
d. **Accessible Mismatch - Inaccessible Mismatch:** John didn't enjoy the pleasure flight at all. The pilot who scared John injured herself quite badly during the journey. It's enough to make anyone nervous.

Who got injured?
a. John (Mary)
b. the pilot

3.

a. **Accessible Match - Inaccessible Match:** Henry was shaken up after the accident. The firefighter who saved Henry had cut himself on a piece of broken glass. Luckily there were no fatalities.

b. **Accessible Match - Inaccessible Mismatch:** Jenny was shaken up after the accident. The firefighter who saved Jenny had cut himself on a piece of broken glass. Luckily there were no fatalities.
c. **Accessible Mismatch - Inaccessible Match:** Jenny was shaken up after the accident. The firefighter who saved Jenny had cut herself on a piece of broken glass. Luckily there were no fatalities.
d. **Accessible Mismatch - Inaccessible Mismatch:** Henry was shaken up after the accident. The firefighter who saved Henry had cut herself on a piece of broken glass. Luckily there were no fatalities.

Who got cut?

a. Henry (Jenny)
b. the firefighter

4.

a. **Accessible Match - Inaccessible Match:** Tony found the funeral house scary. The bishop who worked with Tony whispered to himself all the time with a grimace. Not an ideal holiday job.
b. **Accessible Match - Inaccessible Mismatch:** Anne found the funeral house scary. The bishop who worked with Anne whispered to himself all the time with a grimace. Not an ideal holiday job.
c. **Accessible Mismatch - Inaccessible Match:** Anne found the funeral house scary. The bishop who worked with Anne bishop whispered to herself all the time with a grimace. Not an ideal holiday job.
d. **Accessible Mismatch - Inaccessible Mismatch:** Tony found the funeral house scary. The bishop who worked with Tony whispered to herself all the time with a grimace. Not an ideal holiday job.

Who did the bishop whisper to?

a. Tony (Anne)
b. the bishop

5.

a. **Accessible Match - Inaccessible Match:** Harry enjoyed walking in the sports ground. The footballer who talked to Harry taught himself to paint the lines on the pitch. It was a nice location.
b. **Accessible Match - Inaccessible Mismatch:** Helen enjoyed walking in the sports ground. The footballer who talked to Helen taught himself to paint the lines on the pitch. It was a nice location.
c. **Accessible Mismatch - Inaccessible Match:** Helen enjoyed walking in the sports ground. The footballer who talked to Helen taught herself to paint the lines on the pitch. It was a nice location.
d. **Accessible Mismatch - Inaccessible Mismatch:** Harry enjoyed walking in the sports ground. The footballer who talked to Harry taught herself to paint the lines on the pitch. It was a nice location.

Who learned to paint the lines?

a. Harry (Helen)
b. the footballer

6.

a. **Accessible Match - Inaccessible Match:** Tommy felt tired after arriving the station. The porter who met Tommy would upset himself quite a lot about all the luggage. Travelling isn't always fun.
b. **Accessible Match - Inaccessible Mismatch:** Sally felt tired after arriving the station. The porter who met Sally would upset himself quite a lot about all the luggage. Travelling isn't always fun.
c. **Accessible Mismatch - Inaccessible Match:** Sally felt tired after arriving the station. The porter who met Sally would upset herself quite a lot about all the luggage. Travelling isn't always fun.
d. **Accessible Mismatch - Inaccessible Mismatch**: Tommy felt tired after arriving the station. The porter who met Tommy would upset herself quite a lot about all the luggage. Travelling isn't always fun.

Who would be upset about the luggage?

a. the porter
b. Tommy (Sally)

7.

a. **Accessible Match - Inaccessible Match:** Bruce found the court case a new experience. The judge who impressed Bruce disciplined himself very carefully all the time. The wig looked pretty ridiculous, though.
b. **Accessible Match - Inaccessible Mismatch:** Julia found the court case a new experience. The judge who impressed Julia disciplined himself very carefully all the time. The wig looked pretty ridiculous, though.
c. **Accessible Mismatch - Inaccessible Match:** Julia found the court case a new experience. The judge who impressed Julia disciplined herself very carefully all the time. The wig looked pretty ridiculous, though.
d. **Accessible Mismatch - Inaccessible Mismatch:** Bruce found the court case a new experience. The judge who impressed Bruce He reported that the judge disciplined herself very carefully all the time. The wig looked pretty ridiculous, though.

Who was disciplined?

a. the judge
b. Bruce (Julia)

8.

a. **Accessible Match - Inaccessible Match:** Peter was having trouble with the new boiler. The engineer who visited Peter convinced himself that the valve was faulty. Heating systems can be quite frustrating.
b. **Accessible Match - Inaccessible Mismatch:** Nancy was having trouble with the new boiler. The engineer who visited Nancy convinced himself that the valve was faulty. Heating systems can be quite frustrating.

c. **Accessible Mismatch - Inaccessible Match:** Nancy was having trouble with the new boiler. The engineer who visited Nancy convinced herself that the valve was faulty. Heating systems can be quite frustrating.
d. **Accessible Mismatch - Inaccessible Mismatch:** Peter was having trouble with the new boiler. The engineer who visited Peter convinced herself that the valve was faulty. Heating systems can be quite frustrating.

Who got convinced about the valve?
a. the engineer
b. Peter (Nancy)

9.

a. **Accessible Match - Inaccessible Match:** Gordon visited the building site yesterday morning. The builder who helped Gordon lied about himself damaging the tools in the shed. This was going to become complicated.
b. **Accessible Match - Inaccessible Mismatch:** Rachel visited the building site yesterday. The builder who helped Rachel lied about himself damaging the tools in the shed. This was going to become complicated.
c. **Accessible Mismatch - Inaccessible Match:** Rachel visited the building site yesterday. The builder who helped Rachel lied about herself damaging the tools in the shed. This was going to become complicated.
d. **Accessible Mismatch - Inaccessible Mismatch:** Gordon visited the building site yesterday. The builder who helped Gordon lied about herself damaging the tools in the shed. This was going to become complicated.

Who did the builder lie about?
a. the builder
b. Gordon (Rachel)

10.

a. **Accessible Match - Inaccessible Match:** Timothy renewed the pre-war wiring in the flat. The electrician who phoned Timothy owed himself another attempt to solve the problem. A patient attitude was all that was needed.
b. **Accessible Match - Inaccessible Mismatch:** Miranda renewed the pre-war wiring in the flat. The electrician who phoned Miranda owed himself another attempt to solve the problem. A patient attitude was all that was needed.
c. **Accessible Mismatch - Inaccessible Match:** Miranda renewed the pre-war wiring in the flat. The electrician who phoned Miranda owed herself another attempt to solve the problem. A patient attitude was all that was needed.
d. **Accessible Mismatch - Inaccessible Mismatch:** Timothy renewed the pre-war wiring in the flat. The electrician who phoned Timothy owed herself another attempt to solve the problem. A patient attitude was all that was needed.

Who was owed another attempt?

a. the electrician
b. Timothy (Miranda)

11.

a. **Accessible Match - Inaccessible Match**: Andrew had fun at the army barracks. The soldier who drank with Andrew awarded himself the top prize in the pub quiz. The alcohol flowed freely.
b. **Accessible Match - Inaccessible Mismatch:** Sheila had fun at the army barracks. The soldier who drank with Sheila awarded himself the top prize in the pub quiz. The alcohol flowed freely.
c. **Accessible Mismatch - Inaccessible Match:** Sheila had fun at the army barracks. The soldier who drank with Sheila awarded herself the top prize in the pub quiz. The alcohol flowed freely.
d. **Accessible Mismatch - Inaccessible Mismatch:** Andrew had fun at the army barracks. The soldier who drank with Andrew awarded herself the top prize in the pub quiz. The alcohol flowed freely.

Who got the top prize in the pub quiz?

a. the soldier
b. Andrew (Sheila)

12.

a. **Accessible Match - Inaccessible Match:** Donald moved to the countryside. The farmer who spoke to Donald had paid for himself to join the local fox hunt. Rural life takes a bit of getting used to.
b. **Accessible Match - Inaccessible Mismatch:** Louise moved to the countryside. The farmer who spoke to Louise had paid for himself to join the local fox hunt. Rural life takes a bit of getting used to.
c. **Accessible Mismatch - Inaccessible Match:** Louise moved to the countryside. The farmer who spoke to Louise had paid for herself to join the local fox hunt. Rural life takes a bit of getting used to.
d. **Accessible Mismatch - Inaccessible Mismatch:** Donald moved to the countryside. The farmer who spoke to Donald had paid for herself to join the local fox hunt. Rural life takes a bit of getting used to.

Who was going to join the foxhunt?

a. the farmer
b. Donald (Louise)

13.

a. **Accessible Match - Inaccessible Match:** Alice found the surgery room very busy yesterday. The nurse who interviewed Alice criticized herself for being late for the appointment. The traffic can be terrible these days.
b. **Accessible Match - Inaccessible Mismatch:** Roger found the surgery room very busy yesterday. The nurse who interviewed Roger criticized herself for being late for the appointment. The traffic can be terrible these days.

c. **Accessible Mismatch - Inaccessible Match:** Roger found the surgery room very busy yesterday. The nurse who interviewed Roger criticized himself for being late for the appointment. The traffic can be terrible these days.
d. **Accessible Mismatch - Inaccessible Mismatch:** Alice found the surgery room very busy yesterday. The nurse who interviewed Alice criticized himself for being late for the appointment. The traffic can be terrible these days.

Who did the nurse criticize?
a. Alice (Roger)
b. the nurse

14.
a. **Accessible Match - Inaccessible Match:** Laura had strange stories about the hotel. The receptionist who called Laura almost killed herself in early May for no reason. Tourism suffered after that.
b. **Accessible Match - Inaccessible Mismatch:** James had strange stories about the hotel. The receptionist who called James almost killed herself in early May for no reason. Tourism suffered after that.
c. **Accessible Mismatch - Inaccessible Match:** James had strange stories about the hotel. The receptionist who called James almost killed himself in early May for no reason. Tourism suffered after that.
d. **Accessible Mismatch - Inaccessible Mismatch:** Laura had strange stories about the hotel. The receptionist who called Laura almost killed himself in early May for no reason. Tourism suffered after that.

Who was almost killed?
a. Laura (James)
b. the receptionist

15.
a. **Accessible Match - Inaccessible Match:** Julia never forgot visiting the council offices. The secretary who amused Julia had treated herself to several cakes with pink icing. Not very good for the teeth apparently.
b. **Accessible Match - Inaccessible Mismatch:** Barry never forgot visiting the council offices. The secretary who amused Barry had treated herself to several cakes with pink icing. Not very good for the teeth apparently.
c. **Accessible Mismatch - Inaccessible Match:** Barry never forgot visiting the council offices. The secretary who amused Barry had treated himself to several cakes with pink icing. Not very good for the teeth apparently.
d. **Accessible Mismatch - Inaccessible Mismatch:** Julia never forgot visiting the council offices. The secretary who amused Julia had treated himself to several cakes with pink icing. Not very good for the teeth apparently.

Who ate the cakes?
a. Julia (Barry)

b. the secretary

16.

a. **Accessible Match - Inaccessible Match:** Kate really enjoyed the show business party. The ballet dancer who invited Kate introduced herself to all the stars from Hollywood. Fame can be very seductive.
b. **Accessible Match - Inaccessible Mismatch:** Greg really enjoyed the show business party. The ballet dancer who invited Greg introduced herself to all the stars from Hollywood. Fame can be very seductive.
c. **Accessible Mismatch - Inaccessible Match:** Greg really enjoyed the show business party. The ballet dancer who invited Greg introduced himself to all the stars from Hollywood. Fame can be very seductive.
d. **Accessible Mismatch - Inaccessible Mismatch:** Kate really enjoyed the show business party. The ballet dancer who invited Kate introduced himself to all the stars from Hollywood. Fame can be very seductive.

Who met all the famous people?
a. Kate (Greg)
b. the ballet dancer

17.

a. **Accessible Match - Inaccessible Match:** Victoria had problems as a single parent. The babysitter who cheated Victoria would blame herself for the children's bad diet. Health is so important.
b. **Accessible Match - Inaccessible Mismatch:** Nicholas had problems as a single parent. The babysitter who cheated Nicholas would blame herself for the children's bad diet. Health is so important.
c. **Accessible Mismatch - Inaccessible Match:** Nicholas had problems as a single parent. The babysitter who cheated Nicholas would blame himself for the children's bad diet. Health is so important.
d. **Accessible Mismatch - Inaccessible Mismatch:** Victoria had problems as a single parent. The babysitter who cheated Victoria would blame himself for the children's bad diet. Health is so important.

Who would be blamed for the children’s bad diet?
a. Victoria (Nicholas)
b. the babysitter

18.

a. **Accessible Match - Inaccessible Match:** Jessica had staff problems at the fashion salon. The beautician who mistrusted Jessica disliked herself quite a lot and was unhappy. If only there was an easy solution.
b. **Accessible Match - Inaccessible Mismatch:** Richard had staff problems at the fashion salon. The beautician who mistrusted Richard disliked herself quite a lot and was unhappy. If only there was an easy solution.
c. **Accessible Mismatch - Inaccessible Match:** Richard had staff problems at the fashion salon. The beautician who mistrusted Richard disliked himself quite a lot and was unhappy. If only there was an easy solution.

d. **Accessible Mismatch - Inaccessible Mismatch:** Jessica had staff problems at the fashion salon. The beautician who mistrusted Jessica disliked himself quite a lot and was unhappy. If only there was an easy solution.

Who was disliked?

a. Jessica (Richard)
b. the beautician

19.

a. **Accessible Match - Inaccessible Match:** Sarah wanted to succeed in the clothing business. The dressmaker who employed Sarah familiarised herself with all the modern styles. It's important to be up to date.
b. **Accessible Match - Inaccessible Mismatch:** Frank wanted to succeed in the clothing business. The dressmaker who employed Frank familiarised herself with all the modern styles. It's important to be up to date.
c. **Accessible Mismatch - Inaccessible Match:** Frank wanted to succeed in the clothing business. The dressmaker who employed Frank familiarised himself with all the modern styles. It's important to be up to date.
d. **Accessible Mismatch - Inaccessible Mismatch:** Sarah wanted to succeed in the clothing business. The dressmaker who employed Sarah familiarised himself with all the modern styles. It's important to be up to date.

Who was familiarised with the styles?

a. the dressmaker
b. Sarah (Frank)

20.

a. **Accessible Match - Inaccessible Match:** Polly found the police station quite an eye-opener. The sex-worker who disliked Polly cut herself with a rusty razor blade. These things are worrying.
b. **Accessible Match - Inaccessible Mismatch:** Jason found the police station quite an eye-opener. The sex-worker who disliked Jason cut herself with a rusty razor blade. These things are worrying.
c. **Accessible Mismatch - Inaccessible Match:** Jason found the police station quite an eye-opener. The sex-worker who disliked Jason cut himself with a rusty razor blade. These things are worrying.
d. **Accessible Mismatch - Inaccessible Mismatch:** Polly found the police station quite an eye-opener. The sex-worker who disliked Polly cut himself with a rusty razor blade. These things are worrying.

Who was cut with the razor blade?

a. the sex-worker
b. Polly (Jason)

21.

a. **Accessible Match - Inaccessible Match:** Alison looked concerned during the football match. The cheerleader who stood near Alison embarrassed herself in front of the players. Sport can cause strong emotion.
b. **Accessible Match - Inaccessible Mismatch:** Trevor looked concerned during the football match. The cheerleader who stood near Trevor embarrassed herself in front of the players. Sport can cause strong emotion.
c. **Accessible Mismatch - Inaccessible Match:** Trevor looked concerned during the football match. The cheerleader who stood near Trevor embarrassed himself in front of the players. Sport can cause strong emotion.
d. **Accessible Mismatch - Inaccessible Mismatch:** Alison looked concerned during the football match. The cheerleader who stood near Alison embarrassed himself in front of the players. Sport can cause strong emotion.

Who was made to look foolish?

a. the cheerleader
b. Alison (Trevor)

22.

a. **Accessible Match - Inaccessible Match:** Angela inspired good morale at the school. The cleaner who talked to Angela trusted herself and really liked doing the job. The atmosphere was good.
b. **Accessible Match - Inaccessible Mismatch:** George inspired good morale at the school. The cleaner who talked to George trusted herself and really liked doing the job. The atmosphere was good.
c. **Accessible Mismatch - Inaccessible Match:** George inspired good morale at the school. The cleaner who talked to George trusted himself and really liked doing the job. The atmosphere was good.
d. **Accessible Mismatch - Inaccessible Mismatch:** Angela inspired good morale at the school. The cleaner who talked to Angela trusted himself and really liked doing the job. The atmosphere was good.

Who did the cleaner trust?

a. the cleaner
b. Angela (George)

23.

a. **Accessible Match - Inaccessible Match:** Barbara employed servants after becoming rich. The nanny who helped Barbara was comfortable with herself in the large remote house. The moors can beautiful sometimes.
b. **Accessible Match - Inaccessible Mismatch:** Michael employed servants after becoming rich. The nanny who helped Michael was comfortable

with herself in the large remote house. The moors can beautiful sometimes.

c. **Accessible Mismatch - Inaccessible Match:** Michael employed servants after becoming rich. The nanny who helped Michael was comfortable with himself in the large remote house. The moors can beautiful sometimes.
d. **Accessible Mismatch - Inaccessible Mismatch:** Barbara employed servants after becoming rich. The nanny who helped Barbara was comfortable with himself in the large remote house. The moors can beautiful sometimes.

Who did the nanny feel comfortable with?

a. the nanny
b. Barbara (Michael)

24.

a. **Accessible Match - Inaccessible Match:** Maggie got on with everybody at the office. The typist who insulted Maggie trusted herself very much with the new photocopier. Working environments can be quite delicate.
b. **Accessible Match - Inaccessible Mismatch:** Thomas got on with everybody at the office. The typist who insulted Thomas trusted herself very much with the new photocopier. Working environments can be quite delicate.
c. **Accessible Mismatch - Inaccessible Match:** Thomas got on with everybody at the office. The typist who insulted Thomas trusted himself very much with the new photocopier. Working environments can be quite delicate.
d. **Accessible Mismatch - Inaccessible Mismatch:** Maggie got on with everybody at the office. The typist who insulted Maggie trusted himself very much with the new photocopier. Working environments can be quite delicate.

Who was not trusted with the new machine?

a. the typist
b. Maggie (Thomas)

APPENDIX E

ITEMS AND QUESTIONS USED IN ANTECEDENT IDENTIFICATION

TASK IN ENGLISH

1.
   a. **With Context – Embedded Clause:** Jonathan was pretty worried at the hospital. He remembered that the surgeon had pricked himself with a used syringe needle.
   b. **With Context – Relative Clause:** Jonathan was pretty worried at the hospital. The surgeon who treated Jonathan had pricked himself with a used syringe needle.
   c. **No Context – Embedded Clause:** Jonathan remembered that Barry had pricked himself with a used syringe needle.
   d. **No Context – Relative Clause:** Barry who treated Jonathan had pricked himself with a used syringe needle.

   Who had been pricked with a used needle?
   a. Jonathan
   b. the surgeon / Barry

2.
   a. **With Context – Embedded Clause**: John didn't enjoy the pleasure flight at all. He claimed that the pilot injured himself quite badly during the journey.
   b. **With Context –Relative Clause:** John didn't enjoy the pleasure flight at all. The pilot who scared John injured himself quite badly during the journey.
   c. **No Context – Embedded Clause:** John claimed that Matthew injured himself quite badly during the journey.
   d. **No Context –Relative Clause:** Matthew who scared John injured himself quite badly during the journey.

   Who got injured?
   a. John
   b. the pilot / Matthew

3.
   a. **With Context – Embedded Clause:** Henry was shaken up after the accident at the factory. He mentioned that the firefighter had cut himself on a piece of broken glass.
   b. **With Context – Relative Clause:** Henry was shaken up after the accident at the factory. The firefighter who saved Henry had cut himself on a piece of broken glass.
   c. **No Context – Embedded Clause:** Henry mentioned that Thomas had cut himself on a piece of broken glass.

d. **No Context – Relative Clause:** Thomas who saved Henry had cut himself on a piece of broken glass.

Who got cut?

a. Henry
b. the firefighter / Thomas

4.

a. **With Context – Embedded Clause:** Tony found the funeral house quite scary at night. He noticed that the bishop whispered to himself all the time with a grimace.
b. **With Context – Relative Clause:** Tony found the funeral house quite scary at night. The bishop who worked with Tony whispered to himself all the time with a grimace.
c. **No Context – Embedded Clause:** Tony noticed that Michael whispered to himself all the time with a grimace.
d. **No Context – Relative Clause:** Michael who worked with Tony whispered to himself all the time with a grimace.

Who did the bishop whisper to?

a. Tony
b. the bishop / Michael

5.

a. **With Context – Embedded Clause:** Harry really enjoyed walking in the local sports ground. He was glad that the footballer had taught himself to paint the lines on the pitch.
b. **With Context – Relative Clause:** Harry really enjoyed walking in the local sports ground. The footballer who talked to Harry had taught himself to paint the lines on the pitch.
c. **No Context – Embedded Clause:** Harry was glad that George had taught himself to paint the lines on the pitch.
d. **No Context – Relative Clause:** George who talked to Harry had taught himself to paint the lines on the pitch.

Who learned to paint the lines?

a. Harry
b. the footballer / George

6.

a. **With Context – Embedded Clause:** Tommy felt very tired after arriving the station. He was sure that the porter would upset himself quite a lot about all the luggage.
b. **With Context –Relative Clause:** Tommy felt very tired after arriving the station. The porter who met Tommy would upset himself quite a lot about all the luggage.
c. **No Context – Embedded Clause:** Tommy was sure that Trevor would upset himself quite a lot about all the luggage.
d. **No Context – Relative Clause:** Trevor who met Tommy would upset himself quite a lot about all the luggage.

Who would be upset about the luggage?

a. the porter / Trevor
b. Tommy

7.

a. **With Context – Embedded Clause**: Bruce was finding the court case a new experience. He reported that the judge disciplined himself very carefully all the time.
b. **With Context – Relative Clause:** Bruce was finding the court case a new experience. The judge who impressed Bruce disciplined himself very carefully all the time.
c. **No Context – Embedded Clause:** Bruce reported that Jason disciplined himself very carefully all the time.
d. **No Context – Relative Clause:** Jason who impressed Bruce disciplined himself very carefully all the time.

Who was disciplined?

a. the judge / Jason
b. Bruce

8.

a. **With Context – Embedded Clause:** Peter was having a lot of trouble with his boiler. He said that the engineer convinced himself that the valve was faulty.
b. **With Context – Relative Clause:** Peter was having a lot of trouble with his boiler. The engineer who visited Peter convinced himself that the valve was faulty.
c. **No Context – Embedded Clause:** Peter said that Frank convinced himself that the valve was faulty.
d. **No Context – Relative Clause:** Frank who visited Peter convinced himself that the valve was faulty.

Who got convinced about the valve?

a. the engineer / Frank
b. Peter

9.

a. **With Context – Embedded Clause:** Gordon found the visit to the building site frustrating. He realized that the builder lied about himself damaging the tools in the shed.
b. **With Context – Relative Clause:** Gordon found the visit to the building site frustrating. The builder who annoyed Gordon lied about himself damaging the tools in the shed.
c. **No Context – Embedded Clause:** Gordon realized that Richard lied about himself damaging the tools in the shed.
d. **No Context – Relative Clause:** Richard who annoyed Gordon lied about himself damaging the tools in the shed.

Who did the builder lie about?

a. the builder / Richard
b. Gordon

10.

a. **With Context – Embedded Clause:** Timothy wanted to renew the pre-war wiring in the flat. He felt that the electrician owed himself another attempt to solve the problem.
b. **With Context – Relative Clause:** Timothy wanted to renew the pre-war wiring in the flat. The electrician who called on Timothy owed himself another attempt to solve the problem.
c. **No Context – Embedded Clause:** Timothy felt that Nicholas owed himself another attempt to solve the problem.
d. **No Context – Relative Clause:** Nicholas who called on Timothy owed himself another attempt to solve the problem.

Who was owed another attempt?

a. the electrician / Nicholas
b. Timothy

11.

a. **With Context – Embedded Clause:** Andrew had a good time at the pub by the army barracks. He was amused that the soldier had awarded himself the top prize in the pub quiz.
b. **With Context – Relative Clause:** Andrew had a good time at the pub by the army barracks. The soldier who drank with Andrew had awarded himself the top prize in the pub quiz.
c. **No Context – Embedded Clause:** Andrew was amused that Greg had awarded himself the top prize in the pub quiz.
d. **No Context – Relative Clause:** Greg who drank with Andrew had awarded himself the top prize in the pub quiz.

Who got the top prize in the pub quiz?

a. the soldier / Greg
b. Andrew

12.

a. **With Context – Embedded Clause:** Donald moved to the countryside to escape the city. He was aware that the farmer had paid for himself to join the local fox hunt.
b. **With Context – Relative Clause:** Donald moved to the countryside to escape the city. The farmer who spoke to Donald had paid for himself to join the local fox hunt.
c. **No Context – Embedded Clause:** Donald was aware that Roger had paid for himself to join the local fox hunt.
d. **No Context – Relative Clause:** Roger who spoke to Donald had paid for himself to join the local fox hunt.

Who was going to join the foxhunt?

a. the farmer / Roger
b. Donald

13.

a. **With Context – Embedded Clause:** Alice found the surgery very busy that morning. She was surprised that the nurse criticized herself for being late for the appointment.
b. **With Context – Relative Clause:** Alice found the surgery very busy that morning. The nurse who interviewed Alice criticized herself for being late for the appointment.
c. **No Context – Embedded Clause:** Alice was surprised that Jennifer criticized herself for being late for the appointment.
d. **No Context – Relative Clause:** Jennifer who interviewed Alice criticized herself for being late for the appointment.

Who did the nurse criticize?

a. Alice
b. the nurse / Jennifer

14.

a. **With Context – Embedded Clause:** Laura had some strange stories about the seaside hotel. She confirmed that the receptionist almost killed herself in early May for no reason.
b. **With Context – Relative Clause:** Laura had some strange stories about the seaside hotel. The receptionist who phoned Laura almost killed herself in early May for no reason.
c. **No Context – Embedded Clause:** Laura confirmed that Mary almost killed herself in early May for no reason.
d. **No Context – Relative Clause:** Mary who phoned Laura almost killed herself in early May for no reason.

Who was almost killed?

a. Laura
b. the receptionist / Mary

15.

a. **With Context – Embedded Clause:** Julia would never forget visiting the council offices. She recalled that the secretary had treated herself to several cakes with pink icing.
b. **With Context – Relative Clause:** Julia would never forget visiting the council offices. The secretary who amused Julia had treated herself to several cakes with pink icing.
c. **No Context – Embedded Clause:** Julia recalled that Jenny had treated herself to several cakes with pink icing.
d. **No Context – Relative Clause:** Jenny who amused Julia had treated herself to several cakes with pink icing.

Who ate the cakes?

a. Julia
b. the secretary / Jenny

16.

a. **With Context – Embedded Clause:** Kate really enjoyed the show business party on Saturday. She revealed that the ballet dancer introduced herself to all the stars from Hollywood.
b. **With Context – Relative Clause:** Kate really enjoyed the show business party on Saturday. The ballet dancer who invited Kate introduced herself to all the stars from Hollywood.
c. **No Context – Embedded Clause:** Kate revealed that Anne introduced herself to all the stars from Hollywood.
d. **No Context – Relative Clause:** Anne who invited Kate introduced herself to all the stars from Hollywood.

Who met all the famous people?

a. Kate
b. the ballet dancer / Anne

17.

a. **With Context – Embedded Clause:** Victoria was finding life quite tough as a single parent. She knew that the babysitter would blame herself for the children's bad diet.
b. **With Context – Relative Clause:** Victoria was finding life quite tough as a single parent. The babysitter who cheated Victoria would blame herself for the children's bad diet.
c. **No Context – Embedded Clause:** Victoria knew that Helen would blame herself for the children's bad diet.
d. **No Context – Relative Clause:** Helen who cheated Victoria would blame herself for the children's bad diet.

Who would be blamed for the children's bad diet?

a. Victoria
b. the babysitter / Helen

18.

a. **With Context – Embedded Clause:** Jessica was having staff problems at the fashion salon. She accepted that the beautician disliked herself quite a lot and was unhappy.
b. **With Context – Relative Clause:** Jessica was having staff problems at the fashion salon. The beautician who mistrusted Jessica disliked herself quite a lot and was unhappy.
c. **No Context – Embedded Clause:** Jessica accepted that Sally disliked herself quite a lot and was unhappy.
d. **No Context – Relative Clause:** Sally who mistrusted Jessica disliked herself quite a lot and was unhappy.

Who was disliked?

a. Jessica
b. the beautician / Sally

19.

a. **With Context – Embedded Clause:** Sarah really wanted to do well in the clothing business. She saw that the dressmaker familiarised herself with all the modern styles.
b. **With Context – Relative Clause:** Sarah really wanted to do well in the clothing business. The dressmaker who employed Sarah familiarised herself with all the modern styles.
c. **No Context – Embedded Clause:** Sarah saw that Julia familiarised herself with all the modern styles.
d. **No Context – Relative Clause:** Julia who employed Sarah familiarised herself with the all the modern styles.

Who was familiarised with the styles?

a. the dressmaker / Julia
b. Sarah

20.

a. **With Context – Embedded Clause:** Polly found the police station quite an eye-opener. She was appalled that the sex-worker had cut herself with a rusty razor blade.
b. **With Context – Relative Clause:** Polly found the police station quite an eye-opener. The sex-worker who scared Polly had cut herself with a rusty razor blade.
c. **No Context – Embedded Clause:** Polly was appalled that Nancy had cut herself with a rusty razor blade.
d. **No Context – Relative Clause:** Nancy who scared Polly had cut herself with a rusty razor blade.

Who was cut with the razor blade?

a. the sex-worker / Nancy
b. Polly

21.

a. **With Context – Embedded Clause:** Alison was concerned at the American football match. She thought that the cheerleader had made a fool of herself in front of the players.
b. **With Context – Relative Clause:** Alison was concerned at the American football match. The cheerleader who stood near Alison had made a fool of herself in front of the players.
c. **No Context – Embedded Clause:** Alison thought that Rachel had made a fool of herself in front of the players.
d. **No Context – Relative Clause:** Rachel who stood near Alison had made a fool of herself in front of the players.

Who was made to look foolish?

a. the cheerleader / Rachel
b. Alison

22.

a. **With Context – Embedded Clause:** Angela managed to inspire good morale at the school. She was happy that the cleaner was proud of herself and really liked doing the job.
b. **With Context – Relative Clause:** Angela managed to inspire good morale at the school. The cleaner who liked Angela was proud of herself and really liked doing the job.
c. **No Context – Embedded Clause:** Angela was happy that Miranda was proud of herself and really liked doing the job.
d. **No Context – Relative Clause:** Miranda who liked Angela was proud of herself and really liked doing the job.

Who did the cleaner trust?

a. the cleaner / Miranda
b. Angela

23.

a. **With Context – Embedded Clause:** Barbara employed some servants after winning the lottery. She found that the nanny was comfortable with herself in the large remote house.
b. **With Context – Relative Clause:** Barbara employed some servants after winning the lottery. The nanny who helped Barbara was comfortable with herself in the large remote house.
c. **No Context – Embedded Clause:** Barbara found that Sheila was comfortable with herself in the large remote house.
d. **No Context – Relative Clause:** Sheila who helped Barbara was comfortable with herself in the large remote house.

Who did the nanny feel comfortable with?

a. the nanny / Sheila
b. Barbara

24.

a. **With Context – Embedded Clause:** Maggie tried to get on with everybody at the office. She remarked that the typist didn't trust herself very much with the new photocopier.
b. **With Context – Relative Clause:** Maggie tried to get on with everybody at the office. The typist who insulted Maggie didn't trust herself very much with the new photocopier.
c. **No Context – Embedded Clause:** Maggie remarked that Louise didn't trust herself very much with the new photocopier.
d. **No Context – Relative Clause:** Louise who insulted Maggie didn't trust herself very much with the new photocopier.

Who was not trusted with the new machine?

a. the typist / Louise
b. Maggie

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