PUZZLING REFLEXIVE *KENDI* IN TURKISH AND ITS IMPLICATIONS FOR THE PARSER

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PUZZLING REFLEXIVE *KENDI* IN TURKISH AND ITS IMPLICATIONS FOR THE PARSER

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This thesis investigates the Turkish reflexive *kendi* theoretically and experimentally. First, I formally examine the puzzling distribution of the bare reflexive *kendi* in Turkish focusing on its morphological person feature composition. Building on the cross-linguistic evidence that 3P is unmarked for person feature, I argue that 3P *kendi* can form a long-distance binding relation in certain sentence embeddings such as nominalized clauses via LF head-raising to matrix clause domain. Then, coindexing with any non-person referent resolves the referential deficiency for 3P reflexive. On the other hand, 1P/2P reflexives, *kendim* and *kendin*, check their referential deficiency locally in the narrow syntax with a phi-agreeing antecedent. Specifically, I propose that 1P/2P reflexives enter into the derivation with unvalued [Speaker] and [Participant] features respectively and are involved in an Agree operation with a local licensor before Spell-out, otherwise the derivation crashes. Thus, I argue that 1P/2P reflexives are local anaphors in all contexts. Then, evidence from judgment surveys is presented to shed light on the reported non-person reflexive judgments in the literature. Offline data have shown that non-local interpretation for 3P *kendi* is attested in non-finite subordinate clauses. Contrastively, speakers dominantly prefer local antecedent for 3P *kendi* in finite embedded clauses, hence it abides by Principle A of Binding Theory. The final part of the thesis investigates the real-time processing of non-person reflexive in object relative clauses and adverbial clauses, where the linear distance of potential antecedents differs. I found that the parser is susceptible to interference from the animacy matching

distractor referent (Experiment 3) as well as the linear position information of the distractor (Experiment 4). The findings suggest that semantic and surface-string information rather than syntactic information can act as retrieval cues in constructing dependency for the Turkish reflexive. Also, the evidence provides support for the *standard cue-based retrieval mechanism* (Chen et al., 2012; Jaeger et al., 2015b; Patil et al., 2016) rather than the *structured access model* (Dillon, 2011, 2013 et al.,). The online data from *kendi* fits the overall real-time dependency resolution in various syntactic domains such as subject-verb agreement, filler-gap, and NPIs, as formulated in *content addressable memory* architecture (McElree, 2000, 2003)

BIOGRAPHICAL SKETCH

Hasan Sezer was born in Isparta, Turkey in 1986. He completed his primary, secondary and high school education in his home town. In 2004, he entered Anadolu University, Turkey to study Teaching English as a Second Language. He finished his BA degree from Anadolu University in the summer of 2008. In 2009, he moved to the USA to pursue his graduate studies. In the Fall of 2009, he started his MA program in Linguistics at the University of Texas at El Paso. He received his Master of Arts degree in December 2012 as an outstanding graduate student. After completing his MA program, he joined to Ph.D. program in Linguistics at Cornell University in August 2013.

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LIST OF ABBREVIATIONS

ABIL	Ability
ABL	Ablative
ACC	Accusative
ADJ	Adjective
ADJP	Adjective phrase
AGR	Agreement
AOR	Aorist tense
BT	Binding Theory
C-command	Constituent command
CFC	Complete Functional Complex
C(OMP)	Complementizer
CP	Complementizer phrase
DAT	Dative
DO	Direct Object
DP	Determiner phrase
ECM	Exceptional case-marking
ERP	Event-related potential
EV(ID)	Evidential
FCC	Finite complement clause
FUT	Future tense
GEN	Genitive
GRND	Gerund
HR	Hearer
IND	Indicative

INF	Infinitival
IO	Indirect Object
LD	Long-distance
LF	Logical form
LOG	Logarithmic
LR	Likelihood Ratio
MP	Minimalist Program
MS	Millisecond
NEG	Negation
NMZ	Nominalizer
NOM	Nominative
NP	Noun phrase
O	Object
Op	Operator
PART	Participant
PERF	Perfective
PF	Phonological Form
PIC	Phase Impenetrability Condition
POSS	Possessor
PP	Prepositional Phrase
PROB	Probability
PRO	Pronoun
PAST	Past tense
PROG	Present progressive
P600	Positive600
P300	Positive300

REF	Referential
REP	Reported
S	Subject
SPEC	Specifier
SPK	Speaker
SUBJ	Subjunctive
TAM	Tense-Aspect-Mood
T	Tense
TP	Tense phrase
Q	Question (Particle)
V	Verb
VP	Verb phrase
WM	Working memory
1SG	First person singular
2SG	Second person singular
3SG	Third person singular
1PL	First person plural
2PL	Second person plural
3PL	Third person plus

CHAPTER 1

Introduction

Over the years, a dichotomy between linguists and psycholinguists has been stressed if not overtly. The research questions, the tools, and methodologies in each field have shown variation. For instance, linguists' data collection mostly involves few informants, including their judgments, whereas the psycholinguists need a generous sampling of data and statistical analyses to test their hypotheses. A widespread conception of linguistics and psycholinguistics is that the former is to offer constructs for human language. At the same time, the latter is perceived as the investigation of the psychological construal of the constructs provided by linguists. Despite the given differences and the division of labors, Philips and Wagers (2007) emphasize that both fields study the same cognitive system and show a great amount of commitments. Hence, a *mutually beneficial interaction* should be proven. Building on Philips and Wager's observation, the use of psycholinguistic methodologies is becoming a more common practice among linguists. Thus, a central task in this thesis is to benefit from two seemingly distinct disciplines to investigate human sentence comprehension mechanisms in the light of Turkish reflexive pronoun *kendi* 'self'.

A peculiarity of the human species is the use of language which surfaces in two phases: encoding and decoding linguistic information. Interpreting a message or an input, irrespective of the modality or channels of the language, requires substantial mental effort. Further, human language is abundant with linguistics elements that

complicate this mental process, such as non-adjacent words that are 'somehow' dependent on each other for an interpretation. The linguistic enterprise has substantially contributed to describing or formulating such language dependencies, among other things. That is, formal analysis of human language focuses on the structure of the language and describes rules and constraints that speakers of the language know even unconsciously, which leads to successful encoding and decoding. One form of dependency in natural languages is anaphoric expressions that require referents for a successful interpretation as in (1) below:

(1) John learned that he had a speeding ticket last week.

The pronoun *he* in (1) is an instance of an anaphor that can only be understood with other linguistic units in the communication. The sentence in (1) contains the pronoun 'he' that is a placeholder for 'John' or any male contextual referent. Hence, the successful interpretation of clauses such as in (1) requires the resolution of anaphoric dependency, here a pronominal dependency. Language users consult anaphors to make their communication as economical as possible. This tendency is a manifestation of Grice's Maxim of Quantity, which requires that language users should make their communication as informative as possible without any redundancy (Grice, 1975). While pronouns reduce the repetition of previously mentioned entities in speech or writing, the message may become noisy for recipients with respect to which referents are intended when introduced to two or more referential units:

(2) John told Mike that Terry called him at midnight.

In (2), there are three potential antecedents. How do language users identify who or what is being referred to in structures like (2)? Linguists' endeavor to research anaphora involves defining the constraints on co-reference for nominal expressions within a syntactic domain. Co-reference constraints are formal analyses of structural relations between an anaphor and its antecedent. Numerous accounts have been put forward on licensing conditions of anaphoric units. A well-known set of principles in this pursuit is the Binding Principles (Chomsky, 1981)[1]. NPs in the Binding Principles are in three forms: R-expressions (i.e., referring to an entity in the real world like proper names and common nouns such as *Mary*, *John*, *blue car*), pronouns (e.g., him, it, she, they) and reflexives and reciprocals (e.g., himself, herself, themselves, each other). Further, three terms are critical for formally defining the distribution of nominals: co-indexing, c-command, and locality. Co-indexing is the assignment of identical indexes to two NPs if they refer to the same entity (e.g., Mary_k bought a blue purse for herself_k versus Mary_k bought a blue purse for her_j). Co-indexed nominals are co-referring units. Constituent-command is an abstract and hierarchical formulation of sentences using parse tree representation beyond the word-level (i.e., phrases, heads). C-command is about the relationship between a node in a tree and its sibling nodes. Finally, the locality in a simple version is about whether the antecedent and the reflexive appear within the same

[1] Besides structural constraints, there are also predicate-based theories that attempt to define the distribution of NPs (Pollard & Sag, 1922; Reinhard & Reuland, 1993). As Binding Principles (BT) is the common formalism in discussing distribution and online processing of anaphors, the current study will follow this mainstream approach.

domain, where it can be a clause or DP/NP. Based on this, the Binding Principles distinguish the distribution of NPs as follows:

Principle A: A reflexive must be bound (i.e., be co-indexed and c-commanded) within its clause (e.g., Jane_j thinks that Mary_k admires $\text{herself}_{*j/k}$).

Principle B: A pronoun must be free (not bound) within its clause (e.g., Jane_j thinks that Mary_k admires $\text{her}_{j/*k}$).

Principle C: An R-expression must be free all the time. In other words, an R-expression cannot be co-indexed with a pronoun that c-commands it (e.g., He_{*k} thinks that Nick_k is very boring)

Past research on sentence comprehension has provided evidence that in the search for an antecedent, the human parser benefits not only from structural or syntactic information like Binding Principles but also from non-structural cues such as morphological and semantics. Nicol and Swinney (2003) describe sources of information while parsing an anaphoric dependency, which are provided in (3):

(3)

i. *Syntactic position information.* This is about whether an NP is a subject or an object, whether it is the head of a phrase or part of a modifier.

ii. *Co-reference constraints.* Such constraints include the requirement that the antecedent of a *reflexive* is the subject of the clause in which the reflexive appears, the antecedent of an *object pronoun* must be some NP other than the subject NP, and the antecedent of a *subject pronoun* must be found outside the clause having the pronoun. These constraints are captured formally and in greater detail by the Binding Principles (Chomsky 1981).

iii. *Gender, number, and animacy features:* In establishing a link between a referential unit and its antecedent(s), these expressions should match in gender, number, and animacy features. In short, a referential expression and a candidate antecedent must be congruent in these features for successful comprehension.

iv. *Prominence in memory:* Depending on the syntactic position, certain linguistic expressions last longer in memory, hence are easier to retrieve (e.g., subject NP vs. object NP)

v. *Semantic and pragmatic constraints:* Syntactic and feature rules do not always eliminate all but one antecedent. Often, other factors come into play; these include knowledge about how the world works (e.g., in *Sam told Bill that he struck/saw/liked Mary*, *he* refers to *Sam, or someone else* because *Sam* would be unlikely to inform *Bill* about *Bill's* activities or states of mind).

Nicol and Swinney (2003) further identify three possibilities for when these constraints modulate resolving pronominal dependency as provided in (4) below:

(4) i. None of these constraints affect the initial candidate set: all NPs before the proform are initially considered as possible antecedents.

ii. Only a subset of constraints modulates the initial candidate set: some NPs are initially considered.

iii. All constraints affect the initial candidate set: only the correct antecedent is ever considered.

To what extent these factors influence online reflexive processing and in which temporal order has been debated for decades, and many proposals have been made consequently. Recent research on dependency processing, including reflexives, has addressed the issue as a memory access problem. Considering the sequential flow of the linguistic information, two dependents (e.g., the surgeon and himself in (5) are temporally separated. Thus, to retrieve the antecedent s*urgeon* from memory, memory access is a mandatory process. In other words, linking two non-adjacent words in a sentence necessitates maintaining some memory of the past.[2] As an illustration, see the following frequently attested item in online sentence processing work:

(5) The surgeon who treated Jonathan had tricked himself with a used syringe.

[2] Whether there is a unique and separate memory system for language processing in contrast to a domain general memory architecture remains a discussion in the literature (Marcus, 1980; Lewis &Vasishth, 2005).

In (5), *the surgeon* is the grammatical antecedent of the reflexive i.e., c-command condition between the antecedent and the anaphor is maintained. The gender-matched intervening distractor noun *Jonathan* is ineligible to syntactically license the reflexive being in a structurally inaccessible configuration (i.e., the absence of c-command relation between the two linguistic forms). When presented with sentences like (5), language users must keep the antecedent representations in their memory passively (see Kaiser, 2003; Foraker and McElree, 2007 for pronouns and Nicol, 1988 for reflexives) so that mental load can be decreased to engage in different processing tasks. Hence, the resolution of such a dependency mandates restoring or retrieving the antecedents to an active state, a reactivation process. The findings on sentence comprehension, including reflexives, have suggested that memory access for a previously processed linguistic unit (e.g., antecedent) deploys certain features as retrieval cues, a line of work framed as *cue-based search mechanism* (McElree, 2000; McElree et al., 2003; Lewis et al., 2006; Van Dyke, 2007; Martin and McElree, 2008, 2009; Van Dyke and McElree, 2011).[3] Focusing in greater detail on the cue-based retrieval mechanism, the parser is sensitive to the content of the memory (i.e., linguistic information) to be restored. That is, memories are indexed and restored based on the content of their representation. The content or cues of linguistic information (e.g., memories) can be either lexical features (e.g., morphological, semantic) or a relational feature such as c-command. Content-addressable memory access architecture has two computational properties: Direct access and retrieval interference. Direct access refers to immediately retrieving the

[3] See MacDonald et al. (1994) for an alternative memory system for sentence processing, which is constraint-based-parsing.

target content in the memory instead of searching every possible memory without the target cue. Encoding interference assumes that not only the desired memory but any memory with the target content can be retrieved if multiple memories are encoded with the target content. This interference from undesired memory with target content may induce a restoring difficulty for the desired memory. In short, the cue-based memory access predicts inference from task-irrelevant items in memory, which have identical features with the probe's retrieval cues.

However, the theory of content-addressable memory access has not been able to find a uniform answer regarding the weight of cues in accessing the memory for reflexives. Two main views have been offered in the literature: structured access and feature-based access model. The structured access posits that the feature content of the inaccessible antecedent has no influence on the antecedent-reflexive construction as the structural information gates the memory access (Nicol and Swinney, 1989; Sturt, 2003; Philips et al., 2011, Dillon et al., 2013; Kush and Philips, 2014). In this view, the syntactic cue has priority in accessing linguistic memory. The feature-based access, on the other hand, offers that the parser is open to intrusion from the feature-matching inaccessible antecedents.[4] That is, antecedent retrieval for reflexives requires the equal utilization of all linguistic information (Lewis&Vasishth, 2005; Chen, 2012; Jaeger, 2015b; Patil et al., 2016). The two memory models have distinct predictions for parsing structures similar to (5). If structural cues exclusively guide the retrieval, the distractor noun *Jonathon,* which is not a syntactic binder of the reflexive, does not affect the

[4] *Feature based memory access* is also labeled as *standard cue-based, or mixed cue memory model* in the literature. Throughout the thesis, I will use *the standard-cue based access* to emphasize its contrast with *the structured access*.

processing of the reflexive-antecedent link despite its gender congruence with *himself*. If any cues, besides structural ones, are accessed by the parser, we would expect an *interference effect* from the distractor noun. This intervention consequently may surface in temporary processing difficulty during the parse. However, existing works in the literature report inconsistent findings, as will be detailed in the next chapter.

To recapitulate, research on online sentence comprehension, particularly reflexives, still has many open questions regarding the cues that guide the parser in retrieving antecedents for reflexive pronouns. One of the goals of the current thesis is to replicate eye-tracking experiments reported in the literature while investigating a novel reflexive form, Turkish reflexive *kendi* 'self'. Considering much of our understanding of real-time reflexive processing consists of data from a handful of languages, the eye-tracking findings from the Turkish reflexive will aim to broaden our knowledge. To the present day, the absence of eye-tracking data from the Turkish anaphor is no coincidence; the licensing conditions and interpretation of the bare reflexive *kendi* have been subject debates since Sezer (1979). Hence, any eye-tracking evidence without sorting the puzzling judgments, or licensing mechanisms of the reflexive *kendi* would then be far from conclusive. Following on this, the initial question that I will seek to answer is whether *kendi* is a local anaphor like the English reflexive or a long-distance anaphor like Chinese *ziji*. For this, data from offline judgment surveys will be provided. Finally, the current work will offer a formal analysis to account for the distribution of the Turkish reflexive and argue for a split the reflexive licensing mechanism based on the person feature systems.

The organization of the dissertation is as what follows. Chapter 2 will provide a comprehensive background to the thesis. Initially, I will overview existing proposals on antecedent search mechanisms for reflexives cross-linguistically. Mostly, I will report data from eye-tracking works on English reflexives. However, a few eye-movement results from non-English reflexives will also be part of this chapter. Then, the rest of Chapter 2 will discuss the facts in Turkish. First, I will introduce anaphoric systems in Turkish and conclude that the bare reflexive *kendi* is the most plausible anaphor in Turkish to investigate realtime reflexive processing. Further, I will report controversial views on *kendi* interpretation in the literature, which are mainly due to several subordination mechanisms in the language. Thus, sentence embeddings in Turkish will also be included in the chapter along with reported reflexive binding in these domains.

In Chapter 3, I will offer a formal approach to *kendi* regarding its long-distance interpretation in certain syntactic configurations in the light of data presented in Chapter 2. I will argue that the reported non-local reference assignment for the bare reflexive in Turkish is limited to third person bare reflexive, *kendi*. In contrast, first and second person reflexives, which are *kendim,* and *kendin,* should be strictly local. Following person feature systems in the literature, I will propose that 3P bare reflexive is non-person reflexive and it bears interpretive deficiency only. On the other hand, 1P and 2P reflexives involve [Participant] feature but are unvalued in [Speaker] and [Addressee] features, respectively. Thus, *kendim* and *kendin* need to get a valuation in the narrow syntax from a local licensor via Agree operation before Spell-out. Non-person reflexive *kendi*, however, does not require feature valuation. Rather, it can be co-referential with

non-person antecedents via co-indexation. For its long-distance interpretation, I will assume that non-person reflexive undergoes to head-raising to the matrix T-head at LF.

Chapter 4 will bring systematically collected offline data on judgments of the Turkish reflexive in two distinct subordinate domains: finite and non-finite embedded clauses. Considering the facts in Chapter 2 and the formal analysis in Chapter 3, I expect that the long-distance interpretation of the non-person reflexive *kendi* is limited to the nominalized embedded clauses. The literature provides a few systematically collected data on non-person *kendi,* which mostly include nominalized embedded clauses as test items. The main goal in Chapter 3 will be to extend the existing experimental work on reference assignment for this anaphor. Specifically, I will report results from two judgment surveys: Experiment 1 is testing offline *kendi* interpretation in nominalized subordiante clauses with distinct nomimalizers, Experiment 2 is testing speaker judgments in finite embedded clauses with distinct complementizer types and case markings on the embedded subjects. The aim is to gain insight into the Turkish speakers' final interpretation of the reflexive in such domains. In a nutshell, the results from two experiments showed that non-person *kendi* may select antecedents locally and non-locally in non-finite nominalized embedded clauses. Contrastively, finite embedded clauses are the local domain for *kendi* licensing except for ECM clauses.

In Chapter 5, eye-tracking data will be presented, and the results from the two experiments will be provided. The main research question in this chapter is to what extent non-structural information such as animacy feature and string locality can be used as a retrieval cue during realtime *kendi* processing. Existing works on antecedent retrieval for English reflexives report that the parser is, for the most part, sensitive to

only structural information of antecedents and rules out inaccessible ones during the early stages of processing. However, a few works on English reflexives and non-English reflexives provide data supporting that non-structural information such as animacy feature can be used as a retrieval cue in accessing to antecedents that were syntactically illicit configuration. Thus, the experiments in Chapter 5 will test which search mechanism the parser carries on in accessing linguistic memory for the Turkish reflexive *kendi*. For this, as Turkish is gender-neutral, animacy feature on potential antecedents will be manipulated. Further, Experiment 3 will include test items with object relative clauses where the grammatical antecedent is linearly closer to the reflexive. Experiment 4 will consist of adverbial clauses as test materials that the binding accessible antecedent is linearly distant to the reflexive. The aim is to understand the cues that guide the antecedent search for the anaphoric form in question. Briefly, the overall results from two experiments show that in the early stage processing, the parser is sensitive to animacy feature (i.e., Experiment 3) and string locality and animacy information (Experiment 4) in retrieving antecedents for *kendi*. These findings are incompatible with structured memory access mechanism; rather, they provide support for cue-based antecedent search mechanism for reflexives. Chapter 6 will conclude the dissertation.

Chapter 2

Background

This chapter serves to several goals. Firstly, I will present an overview of existing research on the antecedent retrieval processes cross-linguistically. Many of the reports will be on English reflexives using eye-tracking during reading. Also, I will touch upon a few past works on processing Chinese reflexive ziji, which is a long-distance anaphor. Further, findings on antecedent retrieval mechanisms for reciprocals in Hindi, which is an SOV language will briefly be provided. Secondly, a brief discussion on two forms of reflexive pronouns (e.g., the bare reflexive *kendi* and the inflected on *kendisi*) will be presented. I will show that the binding domain for the bare reflexive *kendi* is clearly defined than the inflected counterpart *kendisi*; hence the bare form is an ideal anaphor to investigate online anaphor processing in Turkish. However, the bare reflexive is still open to questions for its local and non-local interpretations which, arise from the existence of a range of subordinate clauses in Turkish. Thus, a thorough survey of sentence embeddings in Turkish will take part in this chapter.

2.1 Antecedent search mechanisms for reflexives

This section will provide an overview of the psycholinguistic literature on the reflexive pronoun processing in real-time. In general, memory access for sentence comprehension

proceeds with content-addressable, cue-based memory information retrieval (McElree, 2000, 2003; McElree et al., 2003; Martin and McElree, 2008). Over the years, the overall research findings leave in question the nature of the cues deployed during the online processing of reflexive-antecedent dependency and how they are weighted in accessing memory. Given this, two major proposals have been offered accordingly. One line of thought suggests that syntactic cues are given priority over non-structural features in antecedent retrieval for reflexive pronouns; hence structurally illicit antecedents or distractors remain immune to the parser despite their semantic, pragmatic and morphological concord with the reflexive (Nicol and Swinney 1989; Sturt, 2003; Xiang et al., 2009; Phillips et al., 2011; Dillon, 2011; Dillon et al. 2013; Kush and Philips, 2014). On the other hand, several studies have argued that reflexive resolution involves the integration of a variety of linguistic sources (i.e., semantic and morphological) due to the parser's sensitivity to the non-structural information encoded on the binding inaccessible noun (Badecker and Straub, 2002; Chen et al., 2012; Jaeger et al., 2015b; Patil et al., 2016). The experiments in the literature designed to tease apart the role of cues that govern the reflexive processing have a common schema as in (6). They included a local antecedent and binding inaccessible.[5] To test the interference effect, the feature on either the inaccessible noun or both nouns was manipulated (e.g., gender, person or animacy) like the following template in (6):

(6) NP{-/+ non-syntactic feature}.....[NP{-/+ non-syntactic feature}].....reflexive

[5] Alternative terms in the literature for referents that c-command the reflexive in local configuration are antecedent, accessible, grammatical, or local antecedent. Similarly, referents that do not syntactically bind the reflexive are labeled as distractor, interference, or inaccessible antecedent.

In most studies, the distractor noun linearly intervenes between the binding accessible noun and the reflexive. However, reversing the linear distance of the antecedent candidate is also attested in the literature where locality or syntactic accessibility of possible referents was manipulated via c-command of the reflexive. Non-syntactic features are mostly in the form of a person, number, gender (i.e., morphological cue). A few researchers used also animacy feature (i.e., for Chinese *ziji*). The test designs in the existing works mostly utilized the following conditions:

(7) a. Antecedent match/distractor match

b. Antecedent match/distractor mismatch

c. Antecedent mismatch/distractor match

d. Antecedent mismatch/distractor mismatch

2x2 factorial designs included an antecedent and distractor as distinct predictors, each with a match-mismatch condition. An a priori question in most studies probes to gauge the effect of the distractor and antecedent on the parser's antecedent search strategy. The structured retrieval mechanism predicts no influence from the distractor noun on the processing even though it carries identical content with the reflexive. In contrast, the standard cue-based search mechanism predicts the opposite, that the feature matching distractor influences the parser. The effect of the distractor noun can be evidenced in antecedent match conditions (i.e., (7a) vs. (7b)), and antecedent mismatch conditions (i.e., (7c) vs. (7d). The nature of interference could be either faciliatory (i.e., processing

speed-up due to the presence of a feature matching distractor) or inhibitory (i.e., processing slowdown due to a feature matching distractor). The exact nature of interference has been central to an ongoing debate because the existing works report mixed results. Given this background, what follows will report the literature on reflexive processing in the literature.

Nicol and Swinney (1989) investigated the time course of the influence of grammatical constraints on the online co-reference assignment using a lexical priming technique. Participants therein listened to sentences as in (8), then they performed a lexical decision task on a visual probe that appeared immediately following the reflexive (or the pronoun in their original stimuli).

(8) The boxer told the skier that the doctor for the team would blame *himself/(him)* for the recent injury.

The design of the target probes was constructed in a way that there was a semantic relation for each probe to one of the three referents preceding the pronoun, e.g., glove, snow, or nurse. They found that immediately after the reflexive pronoun *himself*, there was significant priming for the *doctor*, but not for *boxer* and *skier*. Similarly, the results for the pronoun sentence revealed no priming for the *doctor*, but instead for *boxer* and *skier*. Based on these findings, they suggested that *activation of a candidate set of antecedents occurs in compliance with syntactic binding constraints*. Crucially, they proposed that structural constraints like the Binding Principles filter out inaccessible antecedents from the earliest stages of processing, and syntactic constraints remain

operative in subsequent phases of interpretation, a view known as "Initial Filter" hypothesis.

Using eye-tracking experiments, Sturt (2003) partially aligned with the findings from Nicol and Swinney (1989) and argued that binding principles act as an Initial Filter. In addition to gender feature manipulation on anaphors, he used gender stereotype NPs for binding-accessible antecedents such as a surgeon, pilot, and bricklayer, an example of which is reported in (9):

(9) {Jonathan/Jennifer} was pretty worried at the City Hospital. {He/She} remembered that the surgeon had pricked {himself/herself} with a used syringe needle. There should be an investigation soon.

He discussed the results regarding early processing and late processing. He reported faster reading times in first fixation and first-pass measures, which are the earliest timestamp in processing when the gender of the anaphor matched the stereotype of the accessible antecedent (e.g., surgeon…himself) than when they did not (e.g., surgeon…herself). On the other hand, first fixation times and first-pass reading times did *not differ reliably as a function of whether the inaccessible antecedent matched the anaphor.* In late processing, however, he observed that binding constraints at an early stage might be violated when there is a discourse BT-incompatible antecedent. Sturt (2003) proposed a process of two-stage anaphor processing. That is, Binding constraints apply initially ruling out inaccessible antecedent, then non-structural cues are involved in processing, and the parser considers the binding inaccessible noun.

Sturt (2003) undertook a follow-up study to his first experiment to investigate the proposed late-stage integration of non-structural constraints. In this second experiment, participants performed a sentence-by-sentence self-paced reading task that was followed by a question probing for the antecedent of the reflexive. The results of this task showed that participants had more ungrammatical interpretations when there was a gender match between the inaccessible antecedent and the reflexive. He suggested that grammatical constraints modulate the parser early during the processing, while the interference from inaccessible antecedent emerges at a later stage as a recovery strategy.

In his second experiment, Sturt (2003) tested whether the processing effects of binding constraints in the early stage were due to the linear position of antecedents and pronouns. Putting it differently, he asked whether the results in his first experiment were due to priming for an accessible antecedent and suppression of inaccessible antecedents. He used test items such as the following:

(10) {Jonathan/Jennifer} was pretty worried at the City Hospital. The surgeon who treated Jonathan/Jennifer had pricked {himself/herself} with a used syringe needle. There should be an investigation soon.

The linear positions of accessible and inaccessible antecedents are reversed in (10) to test if early processing of the reflexive was due to the linear string information or configurational properties of the syntactic context. Their results showed that in the early stage of processing, only the accessible antecedent modulated the reading times of

participants. That is, the readers showed a significant latency when the reflexive's gender marking did not match the binding accessible antecedent's stereotypical gender.

More recent studies on online reflexive comprehension report findings parallel with Nicol and Swinney's (1989) claim that reflexive dependency is resolved using syntactic constraints only (Dillon et al., 2013; Philips et al., 2011; Xiang et al., 2009). These recent investigations, however, approached the reflexive dependency to understand the theories of the memory architecture of the sentence processor as antecedent search for an anaphoric reflexive is a memory retrieval problem (i.e., recalling the previously processed information). Xiang et al., (2009), for instance, undertook an ERP experiment with English speakers using gender-stereotyped nouns as in (11):

(11) a. *Congruent:* The tough soldier that Fred treated in the military hospital introduced himself to all the nurses.

b. Incongruent: The tough soldier that Fred treated in the military hospital introduced herself to all the nurses.

c. Intrusive: The tough soldier that Katie treated in the military hospital introduced herself to all the nurses.

They tested the effects of the intrusive and incongruent licensor on the processing of the reflexive pronoun. They found that incongruent conditions, where there was no licit antecedent for the reflexive, elicited a P600 component. Further, structurally illicit intrusive conditions yielded the same P600 signals. The idea that the intrusive licensor

would intervene and act as an illusory licenser, and hence reduce P600 signals was not confirmed in their study. In sum, they concluded that syntactic constraints prevent the intrusive antecedent from influencing the reflexive resolution.

Dillon et al. (2013) also found that binding principles or syntactic cues act as a filter in antecedent selection for English reflexives. They compared the processing of reflexive-antecedent and subject-verb agreement dependencies in English by conducting two eye-tracking experiments. Their main objective was to explore whether a single set of general principles or a retrieval mechanism modulates memory retrieval in sentence processing for diverse linguistic relations (e.g., subject-verb agreement, filler-gap processing, referential processing). They compared the impact of *structurally illicit noun phrases* on the computation of reflexive dependency and subject-verb agreement despite the fact that each dependency is associated with its own grammatical and interpretive constraints. They based their investigation on the superficial similarity of reflexive-antecedent and subject-verb agreement dependencies' requiring a *local subject* to license, or to maintain morphological feature concord. In sum, they tested whether the grammatical function of dependency (e.g., reflexive or subject-verb agreement) determines the use of cues for retrieval. They manipulated person and number features on structurally inaccessible nouns. The following examples are instances of their material design:

(12) a. The new executive who oversaw the middle manager(s) apparently was/were* dishonest about the company's profits.

b. The new executive who oversaw the middle manager(s) apparently doubted

themselves/himself on most major decisions.

The question that they asked was whether syntactically illicit but feature-matching distractors in relative clauses affect forming dependency at the point of retrieval of the local subject. They found in two experiments that there was no impact of the distractor noun on the processing of reflexive dependencies. However, there was a favorable impact of feature matched ungrammatical distractor on the processing of agreement patterns; processing speed up occurred more in plural verb than in singular verb when the relative clause subject was plural. Based on this, they suggested that retrieval of the reflexive's antecedents is guided solely by syntactic cues without any intrusion of morphological cues on the structurally illicit antecedent, unlike subject-verb dependency.

Considering the overwhelming amount eye-movement from data English reflexives favoring the structural cues over the non-structural cues, Philips et al. (2011) concluded that:

> *English argument reflexives are immune to the interference from the structurally inaccessible antecedents because antecedents are retrieved only from structural cues. We suggest that the person, gender, and number features of reflexives like himself, herself, and themselves play no role in the search for antecedents and are thus equivalent to the feature-neutral reflexives in closely related Germanic languages, like Dutch zich or German sich.*

In contrast to the past research reported so far, Badecker and Straub (2002) suggested in their SPR study that structurally illicit antecedents may interfere in resolving English reflexives when there is a gender match between the two. Manipulating the gender feature of antecedents as in (11), Badeceker and Straub (2002) observed that participants showed reading latency when BT-inconsistent but gender-matching antecedents were available. That is, mean reading times in the inaccessible match conditions were significantly longer than in the inaccessible mismatch conditions for the region following the reflexive.

(13) *Accessible-match, inaccessible-mismatch*

Jane thought that Bill owed himself another chance to solve the problem

Accessible-match, inaccessible-match

John thought that Bill owed himself another chance to solve the problem

Badecker and Straub (2002) rejected Binding Principles as an "Initial Filter" idea. They proposed that anaphor resolution proceeds with the interactive-parallel-constraint model *in which multiple weighted constraints (including constraints on binding) simultaneously influence the net activation of a candidate during preselection stages of antecedent evaluation*. That is, binding incompatible candidates can interfere with antecedent selection for the reflexive if the two show a gender-number match.

Cunnings and Felser (2013) reported results from two eye-tracking studies investigating how working memory capacity differences (i.e., high working memory and low working memory) affect the online reflexive processing. In their first

experiment, their findings showed that structural constraints guided the parsing early in the processing for both groups. At the same time, the non-structural cues became involved in at a later stage of processing (i.e., processing difficulty, or longer reading times in inaccessible match conditions than in inaccessible mismatch conditions). However, they found evidence for the early effect of distractor nouns in the low WM group in their second experiment as well as the early impact of the accessible antecedent. The distinction between the two experiments was the linear proximity of the distractor to the reflexive as (14) below illustrates:

(14) *James/Helen* has worked at the army hospital for years. The soldier that *he/she* treated on the ward wounded *himself/herself* while on duty in the Far East. Life must be difficult when you are in the army.

Based on this, Cunnings and Felser (2013) reasoned for the findings in their second experiment that syntactic cue such as Principle A competes with the string position information of the inaccessible noun. For the intrusion of the inaccessible noun, they remarked that the distractor noun was discourse prominent as being a subject of the object relative clause and was a pronoun rather than a proper name. Then the distractor had prominence over the grammatical antecedent for the low memory span group, and hence this group became susceptible to intrusion. Although their primary research motivation was to compare processing capacities in different working memory groups, they reported results supporting the use of non-structural cues in the early stage of online reflexive resolution.

Patil et al. (2016) reported results from an eye-tracking during reading with test items similar to (14). They found an early effect of interference from distractor noun in accessible match conditions. Participants showed a higher number of first pass regressions from the reflexive when inaccessible noun matched the gender of the reflexive in contrast to conditions where there was no gender match between distractor and the reflexive. They reported a marginal significance of interference from the distractor noun in antecedent mismatch conditions as well. Finally, and more interestingly, their study showed a main effect of the accessible noun at a later stage of processing. That is, they reported that the subjects had longer reading times when the accessible noun did not share a gender feature with the reflexive. Their findings suggest that the parser is sensitive to non-structural as well during the early stage of processing.

Until now, I have reviewed existing work examining online resolution English reflexives, which are, for the most part, follow the Principle A of BT. Cross-linguistic eye-movement data for the processing of reflexives has also yielded mixed results. The Chinese reflexive pronoun *ziji*, for instance, is a well-investigated exemplar within psycholinguistic studies. Unlike English reflexives, *ziji* may resolve its referential deficiency with a cross-clausal antecedent if the candidate antecedent is in the subject position c-commanding *ziji*-clause, and it is animate and sentient (Huang et al., 2009; Huang and Liu, 2001). Although local and non-local antecedents can bind *ziji*, comprehenders prefer or have less processing difficulty with local antecedents over non-local ones (Liu, 2009; Li and Zhou, 2010). However, I will report studies testing the interference from the ungrammatical antecedent during *ziji*-processing. Chen et al. (2012), for example, undertook a self-paced reading experiment. Note that inanimate

NPs are not possible antecedents for *ziji*. In the experiment, they manipulated the animacy feature on candidate referents. See the following examples reported from Chen et al., (2012):

(15) a. *Long-distance dependency; inanimate interposed NP*

The opposition leader said that this announcement warned his (ziji) party members when the protest was out of control.'

b. *Long-distance dependency; animate interposed NP*

The opposition leader said that this announcement warned his (ziji) party members when protesters were out of control.'

c. *Local dependency; inanimate interposed NP*

This announcement said that the opposition leader warned his (ziji) party members when the protest was out of control.

d. *Local dependency; animate interposed NP*

This announcement said that the opposition leader warned his (ziji) party members when the protesters were out of control.

The test items, such as (15) included three possible referents. The noun in the adverbial clause was the binding inaccessible one while the other nouns (i.e., the local and non-local) were in a syntactically licit configuration. They found that the readers had shorter reading times in local antecedent conditions in contrast to non-local antecedent conditions. Also, they reported interference from the distractor noun. That is, the participants had processing difficulty in conditions with an interfering distractor noun

(e.g., protestors in (15)). Consequently, they concluded that the human parser uses non-structural cues such as animacy in completing *ziji*-dependency. Similarly, Jager et al. (2015b) provided eye-tracking evidence to argue that animacy match between *ziji* and distractor subjects cause interference in real-time processing of *ziji* in adverbial clauses. A sample of their test items is given in (16) below:

(16) When the team *leader/media* exerted great pressure, *the athlete/kayak* outperformed *ziji* in three times in total.

They manipulated the animacy feature on antecedent candidates. Their main predictors were the same, following the literature with a slight terminological modification. The antecedent is the grammatical binder of the reflexive, which has match and mismatch conditions. The interference is the binding inaccessible distractor noun with a match and mismatch level. Their results in Experiment 1 showed a main effect of interference from the inaccessible antecedent or distractor noun. In particular, the subjects had longer reading times in antecedent mismatch conditions (i.e., inaccessible distractors) when the inaccessible antecedent was a match with the reflexive in comparison to the inaccessible mismatch conditions. For the main effect of the inaccessible noun, they argue that the parser showed a slowdown in processing the dependency when encountered with the inaccessible match in contrast to inaccessible mismatch, which is an evidence for an *inhibitory interference*. No interference effect was found in antecedent match conditions. Dillon et al. (2014), on the other hand, report findings favoring a structured access mechanism for the antecedent retrieval for Chinese ziji. Namely, the structural information exclusively guides the interpretation of *ziji*, hence comprehenders consider

only c-commanding subjects in object relative clauses. In other words, the structurally inaccessible noun does not interfere in the processing of *ziji* even if there is a feature match between the two.

Kush and Philips (2014) undertook a self-paced study to examine the cue selection mechanism for reciprocals in Hindi, an SOV language. Their primary aim was to test the lack of faciliatory effect of the inaccessible antecedent for reflexive processing, as reported in the literature. They hypothesized that the lack of interference was due to a confounding of test design with SVO languages in that anaphors are post-verbal units. They included items like (17) below, which were obtained by manipulation of morphological number features on candidate antecedents that precede the verb:

(17) a. *Grammatical-No Interference*

[Subject]+PL...[Distractor]+SG...[NP3]+SG... [Reciprocal]+PL

b. *Grammatical-Interference*

[Subject]+PL...[Distractor]+PL...[NP3]+SG... [Reciprocal]+PL

c. *Ungrammatical-No Interference*

[Subject]+SG...[Distractor]+SG...[NP3]+SG... [Reciprocal]+PL

d. Ungrammatical-Interference

[Subject]+SG...[Distractor]+PL...[NP3]+SG... [Reciprocal]+PL

In (17), the subject was the syntactic binder of the reciprocal, while the distractor noun was the binding inaccessible noun. They report that subjects had longer reading times

when the accessible antecedent had a number mismatch with the reciprocal. As for the interference, they found no faciliatory effect in antecedent match conditions. Rather, they found a marginal inhibitory effect in antecedent mismatch conditions in post-anaphor regions that subjects had slower reading times when the inaccessible antecedent was a match than when there was no distractor mismatch. The nature of the interference was inhibitory rather than facilitatory. They concluded that their findings led to support for the cue-based antecedent retrieval; however, the interference was a late repair strategy following the antecedent retrieval.

A cursory overview of the literature has shown that the majority of accounts provide evidence for a structured-access mechanism to antecedent retrieval for reflexives in that syntactic cues weight more in contrast to morphological and semantic cues. A handful of results, on the contrary, provide support for the standard cue-based retrieval in that the parser is sensitive to non-structural information of the structurally inaccessible noun, hence the parser is susceptible to interference from feature-matching ungrammatical antecedents.

The next section will be an overview of the Turkish facts and the existing views on the bare reflexive *kendi* 'self'.

2.2 Anaphors and subordinate clauses in Turkish

This section introduces a review of anaphoric system and subordinate clauses in Turkish. For the latter topic, data from existing work on types of subordinate clauses and on binding facts within these domains will be reported. Specifically, the

subordination in Turkish is defined on finiteness; however, some of the constructions have varying acceptability among linguists. Thus, this section provides sources of judgment variations for embedded clauses, which will be useful in designing test materials to be used in the acceptability surveys. Before I move on to the review, I will briefly introduce basic facts about Turkish that will set the background for what comes next.

Turkish is an agglutinative and a head-final language that arguments and adjuncts precede the head in unmarked sentences. Although the canonical word order is SOV, scrambling is frequently attested in the language. Turkish has an overt case-marking system with the exception of the nominative form, which is phonologically null. As the language is inflectionally rich, pro-drop is a common phenomenon in Turkish where non-emphatic, non-contrastive subjects can be dropped. The agreement on the verb or the noun head carries the relevant information of unpronounced pronouns (e.g., geldi-**m** 'I came' and araba-**m** 'my car'). The following examples illustrate these facts:

(18) a. (Sen) ev-den (benim) kulaklığ-ım-ı getir-di-n mi?
(You-NOM) home-ABL (my) headphone-1SG-POSS-ACC bring-PAST-2SG Q

b. Getir-di-n mi (sen) ev-den (benim) kulaklığ-ım-ı ?
bring-PAST-2SG Q (You-NOM) home-ABL (my) headphone-1SG-POSS-ACC
'Did you bring my headphone from the home?'

In (18a), the word order is the canonical SOV while it is VSO in (18b). We also see in (18) that the subject of the clause *sen* is optional as well as the possessor *benim* as the agreement on the verb head, and the noun head respectively carries this information. In (18a), the arguments (i.e., objects and the possessor) precede the relevant heads (i.e., the verb and the noun). Finally, all nominals are overtly marked for case except the subject NP. With this backdrop, I can move to discuss anaphors and subordination in Turkish.

2.2.1 Anaphoric system in Turkish

As introduced in Chapter 1, the Binding Principles (Chomsky, 1981) offer sets of constraints to define the licensing conditions for anaphoric elements. Principle A of the Binding Theory posits a structural constraint on reflexive pronouns in obtaining referential interpretation. As such, the antecedent must c-command the reflexive from a configurationally *local* position. Principle B, in contrast, bans a pronoun to be locally bound by an antecedent; instead, the pronouns must be *locally* free. The formalization of *locality* in Principle A of BT has undergone revisions over the years. Because reflexives across languages have been argued to violate Principle A. Examples of long-distance reflexives include but are not restricted to *sig* in Icelandic, *ziji* in Chinese, *zich* in Dutch, *seg* in Norwegian, *zibun* in Japanese. The anaphoric system in Turkish also poses a challenge to the Binding Principles, specifally to Principle A. That is, Turkish consists of three types of anaphors, which are the pronoun *o* 'he/she/it' and the reflexives *kendi* 'self' and *kendisi* 'self+3SG' as the following data demonstrate:

(19) a. Zehra$_i$ [Mehmet'in$_j$ o-nu$_{i/*j/k}$ beğen-diğ-i]-ni düşün-üyor.

Zehra Mehmet-GEN he/she/it-3SG-ACC like-NOM-3POSS-ACC think-PROG

'Zehra thinks that Mehmet likes her/*him.

b. Zehra$_i$ [Mehmet'in$_j$ kendi-si-n-i$_{i/j/k}$ beğen-diğ-i]-ni düşün-üyor.

Zehra Mehmet-GEN self-3SG-ACC like-NOM-3POSS-ACC think-PROG

'Zehra thinks that Mehmet likes himself/her.' (Sezer, 1979)

c. Zehra$_i$ [Mehmet'in$_j$ kendi-ni$_{i/j/k}$ beğen-diğ-i]-ni düşün-üyor.[6]

Zehra Mehmet-GEN self-ACC like-NOM-3POSS-ACC think-PROG

'Zehra thinks that Mehmet likes himself/her.' (Sezer, 1979)

In (19a), the third person pronoun *o* in the argument position of the embedded clause. We observe that Principle B constraints its distribution; co-reference with a local referent, Mehmet, is ruled out. On the other hand, co-indexing with a non-local nominal, Zehra, is permitted in (19a). Also, the pronoun can pick up a contextual antecedent. In result, Turkish pronoun *o* follows Principle B of the Binding Theory (Göksel and Kerslake, 2005; Kornfilt, 1997; Underhill, 1976).

[6] In Turkish, when a vowel initial suffix (e.g., accusative case marker) is suffixed to the root/stem, a buffer consonant is inserted to avoid hiatus as in *kendi-**n**-i*.

The reflexive pronouns in (19b-c) are *kendi* 'self' and *kendi-si* 'self-3SG'. The distinction between the two is that the second form is inflected with a possessive suffix to agree with the person and number features of its possessor. Both linguistic elements have the anaphoric [+anaphor] property in that they lack a referential deficiency. For this, they need a local licensor to resolve their deficiency. For the inflected reflexive *kendi+si* 'self+3SG' in (19b), the existing judgments for this anaphor are uniform; it can be anteceded by a local, non-local, and contextual antecedent (Enç, 1989; Gürel, 2002, 2004; Kornfilt, 2000). In (19b) above, the reflexive *kendisi* can co-refer with the matrix subject, *Zehra,* besides the local referent Mehmet. Importantly, as the indexing of *k* indicates in (19b), inflected reflexive in Turkish can be co-referential with a contextual antecedent. Therefore, it behaves like a personal pronoun, *o* 'she/he/it'. Data in (19b) shows that the inflected *kendisi* obeys neither Principle A as a reflexive nor Principle B as a pronoun, yielding a paradoxical distribution. Several formal analyses have been proposed to account for the given behavior of *kendisi*. Enç (1989) argues that a standard classification of pronouns as [+/-anaphor] and [+/-pronoun] falls short in accounting for Turkish binding facts; thus she proposes *semantic binding* by introducing additional features such as 'binder' [+/-B], 'licensor' [+/-L], and [+/-ID]. The binder, [B], feature value is set based on whether an NP needs to be bound by a sentence internal semantic binder. Both semantic and syntactic antecedents can satisfy [B] feature for an NP. The feature [L] is to mark if an NP needs to be licensed or not. Having a [+L] feature on an NP entails that it is a reflexive pronoun. Finally, [+/-ID] feature encodes whether a pronominal's binder and licensor are co-indexed. She claims that the given features are

absent in the Binding Principles, and they can account for a variety of NPs in natural languages that are unexpected in BT. Additional proposal for licensing *kendisi* comes from Kornfilt (2000). She argues that *kendisi* has a null pronominal in Spec position, and this reflexive is an Agreement Phrase (i.e., [$_{AgrP}$ pro [$_{Agr'}$ –si [$_{NP}$ kendi-]]]). The reflexive is a local anaphor because the pro can bind it in the Spec position. Similarly, the null pro is also free within AgrP and hence can be co-referential with a local, non-local and contextual antecedent as in (19b). Finally, Gürel (2002, 2004) observes that the null *pro* and *kendisi* act similarly in certain properties, and both have anaphoric and pronominal characteristics violating the Binding Principles. Thus, she argues that pro is the null form of the reflexive rather than the overt pronoun, *o* 'he/she/it'. To conclude, the inflected reflexive in Turkish has a dual property of pronominal and anaphor, and syntactic constraints of Principle A and Principle B fall short in accounting for its distribution. Given this, *kendisi* has a special status for being a syntactically-unconstrained anaphor.

Finally, the bare reflexive in (19c) has been subject to discussion in the literature regarding its binding facts. In some accounts, the reflexive is a local anaphor, hence can resolve its referential deficiency with a local antecedent within the same domain (Enç, 1989; George and Kornfilt, 1981; Göksel and Kerslake, 2005; Gračanin-Yuksek et al., 2017; Kornfilt, 2001; Rudnev, 2008). However, numerous work report that the bare reflexive can co-refer with a non-local antecedent in addition to a local antecedent Cem Değer, 1996; Meral, 2010, 2013; Özbek and Kahraman, 2016; Sezer, 1980). Among those proposing a formal analysis to the long-distance reading of *kendi*, Sezer (1979), for instance, argues that the non-local interpretation is available only with a logophoric

antecedent using the concept of empathy. He makes a distinction regarding the narrator's psychological distance to the person in the context. That is, the reporter may be outside of the situation as an observer, or the reporter can put himself in the mind of the person he is narrating about. In the second case, the narrator is reporting the internal feelings of the character in the event by becoming someone else. In (19c), Sezer (1979) accepts a co-reference with the matrix subject, because the author of the sentence is narrating the feeling of *Zehra*, rather than the narrator's observation. Meral (2013), on the other hand, proposes a syntactic analysis for the long-distance interpretation of *kendi*. He claims that the reflexive binding is an instance of an operator-variable chain. Therein, the empty operator (Op) merges with the anaphor then the operator undergoes A-bar movement to C domain licensing the anaphor stranded behind. The lexical antecedent of the anaphor is trivial in licensing *kendi* because the Op is responsible for the binding in Meral (2013).

As evident so far, the inflected reflexive *kendisi* in (19b) has a dual characteristic, a pronoun and reflexive. Due to its paradoxical licensing conditions within the Binding Principles, it is not tenable to examine to what extent the structural constraints apply during its real-time resolution. Thus, I rule out how the parser processes this anaphor. On the other hand, the bare reflexive *kendi* in (19c) has relatively well-defined distribution. Nonetheless, this anaphor shows some judgment variation in embedded structures, which must go beyond (19) above. Therefore, an overview of embedded constructions will be provided in the following section. Meanwhile, existing judgments of the bare reflexive in these domains will be presented.

2.2.2 Subordination in Turkish

In Turkish, there are several ways to construct subordinate clauses. At the outset, I need to emphasize that I will adopt the labeling for subordination clauses that originate in the traditional literature and reference grammars. That is, subordinate clauses are mostly categorized as 'finite' or 'non-finite'.[7] Further, finiteness is often defined as having a fully-fledged TP layer. The T-head is eligible for structural case-checking on nominals in contrast to T found in nominalized non-finite embedded clauses. Finiteness is also entitled to the tense specification, agreement on the embedded verb, and opacity in binding. Based on this, what defines a clause as finite or non-finite is still open to the theoretical discussion, which will be out of this thesis' scope. Instead, I aim to demonstrate unstable *kendi* judgments in various sentence embeddings. Thus, I will remain neutral to formalizations of subordination and finiteness in Turkish.

2.2.2.1 Finite Complement Clauses

In Turkish, finite complement clauses (FCCs) are distinguished depending on whether an overt or a null complementizer heads the sentence embedding. The following sentences exemplify FCCs headed by an overt complementizer:

(20) a. Ali duy-du-Ø [ki Ayşe araba al-mış-Ø]

[7] I use 'finiteness' regarding whether the embedded verbal has a non-finite, or nominal property unlike its counterpart found in a root clause. See Aygen (2002) and Kornfilt (1981) among others for alternative proposals.

Ali hear-PAST-3SG COMP Ayşe car buy-EVID.PAST-3SG

'Ali heard that Ayşe bought a car.'

b. Ali [Ayşe araba al-mış-Ø diye] duy-du-Ø.

Ali Ayşe car buy-PAST-3SG COMP hear-EVID.PAST-3SG

'Ali heard that Ayşe bought a car.'

In (20), *ki* and *diye* respectively head the subordinate clause. The embedded verbal domain in (20) exploits the full tense and agreement morphology, as found in that of the matrix verbal domain. Many works propose that the matrix subject cannot antecede the reflexive pronoun in (20) due to its full clausal property. However, full-finite clauses with *diye* as in (20b) may have other forms. See the following from Şener (2008):

(21) a. Pelin [sen-i Timbuktu-ya git-ti-n diye] bil-iyor-muş.

Pelin you/you-ACC Timbuktu-DAT go-PAST-2SG COMP know-PROG-EV.PAST

'Pelin thought that you went to Timbuktu.'

b. Pelin [sen-i Timbuktu-ya git-ti diye] bil-iyor-muş.

Pelin you/you-ACC Timbuktu-DAT go-PAST COMP know-PROG-EV.PAST

'Pelin thought that you went to Timbuktu.'

(Şener, 2008:2)

Unlike (20), the embedded subjects in (21) bear accusative markings; hence they are ECM clauses with *believe*-type verbs. Also, both clauses in (21) have a tense marking -DI. Finally, the agreement on the embedded verb is optional (cf. (21a) and (21b). However, structures like (21) are sources of judgment variation. As reported in Şener (2008), Knecht (1985) contends that only (21a) is grammatical, while Pullum (1975) notes that (21a) is ungrammatical, yet (21b) is acceptable in Turkish. Kornfilt (1977) also claims that they do not belong to the same dialect. Aygen (2002), Kural (1993), and Zinadi-Eroglu (1997) argue that both structures are well-formed in Turkish. To Şener (2008), both readings are available among speakers of standard Turkish (i.e., Istanbul dialect). Finally, Özgen&Aydın (2016) share the same judgment with Şener (2008) that both are acceptable in Turkish:

(22) a. Murat [sen-i midye ye-di diye] bil-iyor.
Murat you-ACC mussel eat-PERF COMP know-PROG
'Murat thinks that you have eaten mussels.'

b. Murat [sen-i midye ye-di-n diye] bil-iyor.
Murat you-ACC mussel eat-PAST-2SG COMP know-PROG
'Murat thinks that you have eaten mussels.'

As in (21), subordinate clauses in (22) have an overt CP layer and tense marking on the embedded verb while they differ in agreement marker on the embedded verb. Özgen&Aydın (2016) argue that ECM clauses in (22) bear a defective T^0 despite the T

head being selected by C^0. This is due to the lack of tense marking on the embedded verb. Note that the agreement marker does not modulate the ECM status of these structures. Erguvanlı-Taylan (1996) and Uzun (1998) propose that {-(I)yor, {-DI}, and {-AcAk} are not genuine tense markers hence their function may be ambiguous if they are not preceded by any other tense or modality marker:

(23) a. Erkin [sen-i İstanbul-a gid-iyor diye] bil-iyor
Erkin you-ACC İstanbul-DAT go-PROG COMP know-PROG
'Erkin knows that you are going to İstanbul.'

b. Erkin [sen-i İstanbul-a git-ti diye] bil-iyor.
Erkin you-ACC İstanbul-DAT go-PERF COMP know-PROG
'Erkin knows that you have gone to İstanbul.'

c. Erkin [sen-i İstanbul-a gid-ecek diye] bil-iyor.
Erkin you-ACC İstanbul-DAT go-PROB COMP know-PROG
'Erkin knows that you will go to İstanbul.'

(24) a. *Erkin [sen-i İstanbul-a gid-iyor-du diye] bil-iyor.
Erkin you-ACC İstanbul-DAT go-PROG-PAST COMP know-PROG
'(intended) Erkin knows that you were going to İstanbul.

b. *Erkin [sen-i Istanbul-a git-ti-ydi/git-miş-ti diye] bil-iyor.

Erkin you-ACC İstanbul-DAT go-PERF-PAST/go-EVID-PAST COMP know-PROG

'(intended) Erkin knows that you had gone to İstanbul.'

c. *Erkin [sen-i İstanbul-a gid-ecek-ti diye] bil-iyor.

Erkin you-ACC İstanbul-DAT go-PROB-PAST COMP know-PROG

'(intended) Erkin knows that you would go to İstanbul.'

In (23) and (24), there is no overt agreement on the embedded verbs. They differ in whether they bear tense marking or not. Due to lack of genuine tense on the embedded verbal domain in (23), the T-heads are defective; hence the structures are ECM clauses. The authors also note for (24) that these clauses are not marked for agreement; hence the full phase head, C^0, is defective. However, they are still not ECM clauses. Based on this, they conclude that it is not the phase head, C^0, but the T-head that determines whether a binding domain is defective or not. To recap, they propose that ECM clauses have a defective T-head, where a C-head may or may not be complete.

Now, I will move on to null FCCs. In these subordinate clauses, the complementizer is phonologically null as the data in (25) demonstrate:

(25) a. Ali [ben araba al-dı-m] san-ıyor.

Ali I car buy-PAST-1SG think-PROG-3SG

'Ali supposes that I bought a car.'

b. Ali [ben-i araba al-dı-m] san-ıyor.

Ali I-ACC buy-PAST-1SG think-PROG-3SG

'Ali supposes that I bought a car.'

c. Ali [ben-i araba al-dı] san-ıyor.

Ali I-ACC car buy-PAST think-PROG-3SG

'Ali supposes that I bought a car.'

Although the complementizer is null, we still observe the same morpho-syntactic similarities in (25) with as in full-finite clauses. That is, the agreement between the embedded subject and the verb may be optional, and the embedded subject may be in the nominative or accusative case. Again, these differences are reflected in judgment variations. Zidani-Eroğlu (1997) and Kornfilt (1997) reject the availability of (25b-c) within the same dialect (i.e., no data in Zidani-Eroğlu (1997) that is like (25b)). They suggest that finiteness in Turkish is licensed by overt agreement morphology on the predicate assigning the subject case. In both accounts, (25a) is a finite clause where the *Agr* on the embedded verb licenses nominative case to the subject. However, (25b) is problematic because the embedded subject has an accusative case despite the presence of agreement with the embedded verb. On the other hand, Şener (2008) and Özgen&Aydın (2016) propose that (25b), which is an ECM clause, is also an acceptable sentence. According to them, it is not the agreement marking but the availability of tense encoding on the embedded verb that determines the opacity of the clause. See the following from Özgen&Aydın (2016):

(26) a. Erkin [sen-i İstanbul-a gid-iyor-sun] bil-iyor.

Erkin you-ACC İstanbul-DAT go-PROG-2SG know-PROG

'Erkin supposes that you are going to İstanbul.'

b. Erkin [sen-i İstanbul -a git-ti-n/git-miş -sin] bil-iyor.

Erkin you-ACC İstanbul-DAT go-PERF-2SG/go-EVID-2SG know-PROG

'Erkin supposes that you have gone to İstanbul.'

c. Erkin [sen-i İstanbul-a gid-ecek-sin] bil-iyor.

Erkin you-ACC İstanbul-DAT go-FUT-2SG know-PROG

'Erkin supposes that you will go to İstanbul.'

(27) a. *Erkin [sen-i İstanbul-a gid-iyor-du-n] bil-iyor.

Erkin you-ACC İstanbul-DAT go-PROG-PAST-2SG know-PROG

'*(intended)* Erkin supposes that you were going to İstanbul.'

b. *Erkin [sen-i İstanbul -a git-ti-ydi-n/git-miş-ti-n] bil-iyor.

Erkin you-ACC İstanbul-DAT go-PERF-PAST-2SG/go-EVID-PAST-2SG know-PROG

'*(intended)* Erkin supposes that you had gone to İstanbul.'

c. *Erkin [sen-i İstanbul-a gid-ecek-sin] bil-iyor

Erkin you-ACC İstanbul-DAT go-FUT-2SG know-PROG

'*(intended)* Erkin supposes that you would go to İstanbul.'

(Özgen&Aydın, 2016, 15-16)

The availability of an agreement marker on embedded verbs in (26) does not result in ungrammaticality for Özgen&Aydın (2016) although they have complete C-heads. Instead, it is the tense marking on the embedded verbal domain that governs the opacity of the embedded clause as the contrast in (26) and (27) shows. Based on this, they argue that ECM clauses are non-phases irrespective of the complete C-heads; hence they are transparent for binding. The following data is adopted from Özgen&Aydın (2016):

(28) a. Ali$_i$ [biz-i$_j$ kendi-n-den$_{i/j}$ kork-uyor] san-ıyor.

Ali we-ACC self-3SG-ABL frighten-PROG consider-PROG

'Ali considers us to be afraid of him.'

b. Ali$_i$ [biz-i$_j$ kendi-n-den$_{i/j}$ kork-uyor-uz] san-ıyor.

Ali we-ACC self-3SG-ABL frighten-PROG-1PL consider-PROG

'Ali considers us to be afraid of him.'

c. *Ali$_j$ [biz kendi-n-den$_j$ kork-uyor-du-k] san-ıyor

Ali we self-3SG-ABL frighten-PROG-PAST-1PL consider-PROG

'(literal) *Ali considers that we were afraid of himself.'

(28a-b) are ECM constructions while (28c) is a finite clause in Özgen&Aydın (2016). In (28a-b), binding of *kendi* with the matrix subject is possible, which shows that the clause is defective hence transparent for operation from a higher clause due to lack of the tense encoding. Note that the LD-reading of *kendi* is available despite the agreement between the embedded subject and the verb in (28b). In (28c), on the other hand, *kendi* cannot be bound by the matrix subject as the embedded clause has full CP and full TP as found in a root clause.

Meral (2013) reports data similar to (28), where he accepts the long-distance interpretation of *kendi* in ECM type null FCCs. I provide relevant data in (29):

(29) a. Ali$_i$ [kendin-i$_i$ İstanbul-a gid-iyor] san- ıyor.
Ali self-ACC Istanbul-DAT go-PROG] think-PROG
'Ali considers himself to be going to Istanbul.'

b. ?Ali$_i$ [ben-i kendin-e$_i$ gül- üyor-um] san-dı.
Ali I-ACC self-DAT laugh-PROG-1SG think-PAST
'Ali considered me to be laughing at him.'

c. Ali$_i$ [kendin-i$_i$ başbakan] san- ıyor.
Ali self-ACC prime.minister think-PROG
'Ali considers himself prime minister.'

(Meral, 2013:58, 19)

The long-distance binding of *kendi* is possible in (29). Note that (29b) has an agreement on the embedded predicate, and the reflexive is the second argument of the predicate, unlike (29a). He still finds (29b) acceptable although the acceptability is degraded, in comparison to (29a) and (29c).

On the other side, George and Kornfilt (1981) propose that the binding effects are only relevant in cases where the ECM clause cannot bear overt subject-verb agreement as the following illustrate:

(30) a. *Sen$_i$ [kendin$_i$ başarı-ya ulaş-mış-sın] san-ıyor-sun.
you-NOM yourself-NOM success-DAT reach-EVID. PAST-2SG believe-PROG.2SG
'You believe yourself to have succeeded.'

b. Sen$_i$ [kendin-i$_i$ başarı-ya ulaş-mış] san-ıyor-sun.
you-NOM yourself-ACC success-DAT reach-EVID. PAST believe-PROG.2SG
'You believe yourself to have succeeded.'

George and Kornfilt (1981, 121)

The given contrast to the authors is because (30a) has the property of a full clause through case licensing and agreement marker on the embedded verb. (30b), on the other hand, is an ECM clause with no overt agreement marker on the embedded verb. In Kornfilt (2007), (30a) is a finite verbal complement clause, where (30b) is an ECM clause. She suggests that finite embedded clauses with nominative subject and agreeing predicate as in (30a) are opaque for binding operations, while those with accusative subjects and non-agreeing predicates, which she analyzes as ECM clauses, are transparent as in (30b).

Özsoy (2001) analyzes null finite embedded clauses, where she does not allow a long-distance interpretation in those including ECM clauses, except certain one. She distinguishes null FCCs with respect to case marking and agreement as the following template illustrates:[8]

(31) a. $[[DP_{ACC}\ XP_{-AGR}]\ V]$

b. $[[DP_{NOM}\ XP_{+AGR}]\ V]$

c. $[[DP_{ACC}\ XP_{+AGR}]\ V]$

The configurations in (31) are representation of the data that haven been reported so far. However, she describes constructions similar to (31) as bare complement clauses. In Özsoy (2001), only a subset of the structures in (31a) allows a long-distance interpretation of the reflexive *kendi* based on the embedded predicate type. That is, for constructs like (31a), the embedded predicate can have a Tense-Aspect-Mood marker;

[8] See Bošković & Şener (2014) for the discussion that Turkish does not have DP, but NP. In this thesis, I use both labels interchangeably to mark nominals while remaining neutral on the issue.

nonetheless, it is deficient in Agr on the predicate. Then, she categorizes the type of embedded predication (i.e., XP) in (31) as VP, AdjP, DP, or PP. Accordingly, the author claims an opaque binding domain for VP/AdjP type predication and a transparent domain for DP/PP predicates. See the following examples from Özsoy (2001):

(32) a. Biz [siz-i biz-den/*kendi-miz-den bahsed-iyor] san-ıyor-du-k.
we you(PL)-ACC we-ABL/self-1PL.POSS-ABL talk.about-PROG consider-PROG-PAST-1PL
'We considered you to be talking about us/*ourselves.'

b. Ben [sen-i bana/*kendi-m-e kız-gın] san-ıyor-du-m.
I you-ACC me/self-1POSS-DAT angry consider-PROG-PAST-1SG
'I considered you angry at me/*myself.'

c. Sen[ben-i kendi-n-e/sana yakın] san-ıyor-sun.
you I-ACC self-2POSS-DAT/you close consider-PROG-2SG
'You considered me (to be) close to yourself/*you.'

d. Biz [sen-i kendi-miz-in/*biz-im] san- ıyor-du-k.
we you-ACC self-1PL.POSS-GEN/we-GEN consider-PROG-PAST-1PL
'We considered you to be our own.'

(Özsoy 2001, 222:19-20)

Özsoy (2001) proposes small clause analysis for VP/AdjP constructions in (32a-b). On the other hand, DP/ PP predication in (32c-d) is reanalyzed to form a complex predicate with the matrix verb *san-* 'consider'. For this, an accusative-marked DP is placed in the matrix clause, following a Larsonian VP-shell approach. The re-analysis results in the expansion of the binding domain to the main clause in (32c-d), following Chomsky's (1986) definition of a Complete Functional Complex. As expected, long-distance anaphor binding in (32a-b) violates Principle A as the embedded clause is the minimal domain for binding. Given this, verbal complement clauses in Özsoy (2001) are the minimal domain for anaphoric relations, except a subtype of agree-deficient ECM clauses.

To summarize, finite complement clauses in Turkish can be formed with a null or an overt complementizer. The majority of reported judgments do not allow a long-distance reading for the bare reflexive except in ECM constructions. Now, I turn to non-finite subordination in Turkish.

2.2.2.2 Non-Finite Complement Clauses

The suffixation strategy in forming a non-finite complement clause in Turkish is not limited to –DIK, as provided previously. There are three more suffixes used in achieving nominalized sentence embedding: -ACAK, -MA, -MAK, illustrated below repeating –DIK:[9]

[9] These nominalizers are subject to vowel harmony, thus do come in different surface forms depending on the stem vowel.

(33) a. Ali$_j$ [Ayşe'nin$_k$ kendin-e$_{j/k}$ araba al-dığ-ı]-nı duy-du.

Ali Ayşe -GEN self-DAT car buy-NMZ-3POSS-ACC hear-PAST-3SG

'Ali heard that Ayşe bought a car for herself/him.'

b. Ali$_j$ [Ayşe'nin$_k$ kendin-e$_{j/k}$ araba al-acağ-ı]-nı duy-du.

Ali Ayşe -GEN self-DAT car buy-NMZ-3POSS-ACC hear-PAST-3SG

'Ali heard that Ayşe bought a car for herself/him.'

c. Ali$_j$ [Ayşe'nin$_k$ kendin-e$_{j/k}$ araba al-ma-sı]-nı isti-yor.

Ali Ayşe -GEN self--DAT car buy-NMZ-3POSS-ACC want-PROG-3SG

'Ali wants Ayşe to buy a car for herself/him.'

d. Ali$_j$ [PRO$_j$ kendin-den$_j$ bahset-mey]-i isti-yor.

Ali self –ABL talk- NMZ-ACC want-PROG-3SG

'Ali wants to talk about himself.'

e. Ali$_j$ Ayşe'ye$_k$ [kendin-den$_{j/k}$ bahset-mek] isti-yor.

Ali Ayşe- DAT self –ABL talk- NMZ want-PROG-3SG

'Ali wants to talk to Ayşe about himself/her.'

These nominalized non-finite embedded clauses bear a genitive subject. Also, the agreement on the embedded verb follows the nominal agreement paradigm (i.e., possessive agreement marker). However, this generalization falls short in (33d-e), which is a control clause with –MAK suffix. In (33d), there is neither a genitive subject

nor agreement on the control verb. Such a morphological difference, for instance, has let Kornfilt (2007) posit that control clauses do not have a CP layer, but they are DP structures, thus inducing transparency for anaphoric relations.[10]

Let us move on to the differences in (33a-c). Clauses formed with –DIK/-ACAK as in (33a) and (33b) are indicative clauses, while those with –MA as in (33c) are subjunctive clauses. Several works in the literature note the syntactic differences between indicative and subjunctive clauses (Borsley & Kornfilt 2000; Kornfilt 2003; Kornfilt & Whitman 2011). Subjunctive subordinate clauses do not have independent tense specifications or narrow *wh*-scope.[11] Based on these observations, subjunctive clauses with -MA are claimed to lack a CP layer, hence transparent for binding, while indicative clauses are opaque for binding.

Meral (2013), on the other hand, claims that the long-distance binding of *kendi* is available in subjunctive and indicative nominalized clauses. The relevant examples are provided below:

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[10] For the views that *kendi* can be a long-distance anaphor, the data mainly consist of nominalized embedded clauses. The absence of reported judgments in finite clauses may implicitly indicate that the long-distance property of *kendi* for these researchers is available only in nominalized subordination.

[11] -MA clauses depend on the matrix clause for tense interpretation while –DIK/-ACAK are independent from such restriction:

i. Ali [Ahmet'in yemek pişir-me-si]-ni iste-**di**.
Ali Ahmet-GEN food cook-SUBJ-3POSS-ACC want-**PAST**
'Ali asked Ahmet to cook the food.'

ii. Ali [Ahmet'in yemek pişir-me-si]-ni iste-**yecek**.
Ali Ahmet-GEN meal cook-SUBJ-3POSS-ACC want-**FUT**
'Ali is going to ask Ahmet to cook the food.

It is not obvious from the subordinate clause when the 'cooking' takes place.

iii. [*yemeğ-i **kim**-in pişir-**me**-sin]-i söyle-di-m.
food-ACC Who-GEN cook-SUBJ-3POSS-ACC tell-PAST-1SG
'I asked who should cook the food.' (Kornfilt, 2003)

In (iii), the question interpretation with narrow scope is ungrammatical.

(34) a. Ahmet$_i$ [pro$_i$ kendin-i$_i$ ihbar ed-eceğ-in]-i söy-le-di.

Ahmet self-ACC denounce- NMZ-3SG-ACC tell-PAST

'Ahmet told that he would denounce himself.'

b. Ali$_i$ [Ahmet'in$_k$ kendin-e$_{i/k}$ gül-düğ-ün]-ü san-dı.

Ali Ahmet-GEN self-DAT laugh-NMZ-3SG-ACC think-PAST

'Ali though that Ahmet laughed him/himself.'

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

Ahmet self-DAT a.suit buy- NMZ-1SG-ACC want-PROG

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

d. Ahmet$_i$ [PRO$_i$ kendin-e$_i$ bir takım elbise al-mak] ist-iyor.

Ahmet self-DAT a.suit buy- INF want-PROG

'Ahmet wants to but a suit for himself.'

(Meral, 2013)

In (34), Meral (2013) finds all of the subordinate clauses grammatical, irrespective of the distinct nominalizer morphemes.

The overview of non-finite nominal clauses also reveals no uniform analysis as to what extent *kendi* forms a dependency with a non-local antecedent. Now, I will move on to a final caveat of the unstable *kendi* interpretation that stems from person feature specifications.

2.2.3 Person feature on *kendi*

In Turkish, *kendi* may take person and number features following the possessive agreement paradigm, which is illustrated below:

	1st Person	**2nd Person**	**3rd Person**
	kendi-m	kendi-n	kendi-∅/-si[12]
Singular	self-1SG	self-2SG	self-3SG
	'myself'	'yourself'	'himself/herself'
	kendi-miz	kendi-niz	kendi-leri
Plural	self-1PL	self-2PL	self-3PL
	'ourselves'	yourselves'	themselves'

Two studies in the literature report data that 1P and 2P reflexive pronouns can co-refer to a non-local antecedent. The following examples were adopted from Meral (2013):

(35) Ahmet$_i$ [pro$_m$ kendin-e$_i$ bir takım elbise al-ma-m$_m$]-ı ist-iyor.
Ahmet self-DAT a.suit buy- NMZ-1SG-ACC want-PROG
'Ahmet wants me to buy a suit for him.'

(Meral, 2013:55, 14c)

[12] As discussed in Chapter 2, *kendi+si* displays a paradoxical distribution, thus it is a syntactically unconstrained anaphor. Thus, only data for the bare reflexive *kendi* will be reported here.

In (35), the long-distance binding of 3P-*kendi* crossing over 1P and 2P DP is permissible. As noticed, the intervening embedded subject is not a lexical DP, but a null *pro*. However, the non-local interpretation of 3P-*kendi* remains acceptable.

Meral (2013) also provides data with a non-local interpretation of 1P- and 2P-*kendi* in a postpositional phrase of an indicative embedded clause where the intervening pronoun is indefinite. Consider the following:

(36) a. Ben$_i$ [herkes-in kendi-**m**-e$_i$ bağlı ol-ma-sın]-ı ist-iyor-um.
I everyone-GEN self-1POSS-DAT be.loyal-NMZ-3POSS-ACC want-PROG-1SG
'I want everyone to be loyal to me.'

b. Sen$_i$ [herkes-in kendi-**n**-e$_i$ bağlı ol-ma-sın]-ı ist-iyor-sun.
you everyone-GEN self-1POSS-DAT be.loyal-NMZ-3POSS-ACC want-PROG-2SG
'You want everyone to be loyal to you.'

(Meral, 2013:57, 18b-c)

The structures in (36) are subjunctive nominalized clauses, and the author claims a non-local reading for *kendim* and *kendin*.[13][14] Palaz (2013) also shares the same judgments as Meral (2013), where non-local antecedence for the reflexive is not restricted to third-person *kendi*. Consider the following:

[13] These constructions are judged opaque for binding in some studies (Kornfilt & Whitman, 2011).
[14] Wurmbrand (2001) proposes that predicates can be distinguished in allowing reconstruction. To her, 'want' is a reconstructing verb whose complement is subject to reconstruction, even at LF. Within her analysis, the long-distance reading for *kendi* is expected in (36).

(37) a. Ben [kendim-i akıllı] san- ıyor-um.

I self-1SG-ACC clever consider-PROG-1SG

'I consider myself clever.'

b. Ben [Ali-yi kendim-e gül-üyor] san-dı-m

I Ali-ACC self-1SG-DAT laugh-PROG think- PROG-1SG

'I thought Ali was laughing at me.'

(Palaz, 2013: 109, 68&69)

Note that these two clauses are finite, or verbal complement clauses with a null complementizer. As detailed formerly, the ECM clause in (37a) is an instance of AdjP predication, and *kendi* therein is in the embedded subject position. The ECM clause in (37b) is a VP-type predication, and *kendi* is an embedded verb argument.

To conclude, this chapter has reviewed existing syntactic configurations of the reflexive that have been reported in the literature. Although great variation exists on the phenomenon, a broader generalization still can be made. That is, long-distance binding is permitted mostly in nominalized, non-finite embedded clauses while finite subordinate clauses do not display such pattern unless it is an ECM structure. Further, only two works report long-distance binding for non-third person reflexives, *kendim, and kendin*, albeit in relatively limited and controversial configurations. The next chapter will offer a formal analysis based on the picture that has emerged so far.

Specifically, I will discuss the long-distance reading for the bare reflexive only in third-person form but not in first- and the second-person.

CHAPTER 3

Person feature analysis to reflexive *kendi*

This chapter addresses a syntactic approach to the locality asymmetry available in different realizations of person features on Turkish reflexive pronoun, namely *kendim*, *kendin* and *kendi*. We observe in Chapter 2 that in nominalized embedded clauses, the long-distance binding of the reflexive *kendi* is available whereas finite embedded clauses exhibit only local binding except ECM type predicates. Further in these constructions, the non-local reading is mostly attested when the reflexive is in 3P form *kendi* but not in 1P and 2P reflexives, *kendim* and *kendin*. To account for this binding asymmetry with Turkish reflexives, I will propose that 3P *kendi* is used to mark the absence of the person encoding unlike *kendim* and *kendin* adopting well-documented cross-linguistic observations regarding person feature systems.[15] Local interpretation of person inflected reflexives e.g., *kendim* and *kendin* derive from the assumption that they enter to the derivation with a specified person [Participant] feature, yet they are unvalued for [Speaker] and [Addressee], respectively Hence, the two anaphors involve in an Agree operation before Spell-out. I suggest that the licensing of *kendim* and *kendin* can be maintained with the closest agreeing T-head, or indirect object. The person unmarked reflexive *kendi*, on the other hand, does not engage in any syntactic operation to obtain a referential deficiency. Rather, non-person *kendi* obtains the interpretive

[15] 3P reflexive and non-person reflexive will be used interchangeably throughout the thesis.

feature via indexing within its domain similar to pronouns. Concisely, the core of the analysis builds on the distinct feature composition for reflexives and on the phi-feature agreement between the antecedent-reflexive chain as a prerequisite of Agree operation. This said, what comes next will provide a backdrop for the analysis.

3.1 Cross-linguistic long-distance reflexives

As detailed previously, Turkish consists of two forms of reflexive pronouns: a bare reflexive *kendi* 'self' and its inflected form *kendi-si* 'self-3Poss'. See (38) below as an illustration:

(38) a. Zehra$_i$ [Mehmet'in$_j$ kendi-si-ni$_{i/j}$ beğen-diğ-i]-ni düşün-üyor.
Zehra Mehmet-GEN self-3POSS-ACC like-NMZ-3POSS-ACC think-PROG
'Zehra thinks that Mehmet likes himself/him'

b. Zehra$_i$ [Mehmet'in$_j$ kendi-ni$_{i/j}$ beğen-diğ-i]-ni düşün-üyor.
Zehra Mehmet- GEN self-ACC like-NMZ-3POSS-ACC think-PROG
'Zehra thinks that Mehmet likes himself/him'

It is uncontroversial in the literature that *kendisi* in (38a) may be co-indexed with a local and non-local antecedent (Enç, 1989; Gürel, 2002, 2004; Kornfilt, 2000). In (38b), however, Kornfilt (2000) and Rudnev (2008) argue that *kendi* is strictly a local anaphor, hence abides by the Principle A, while Sezer (1979) and Meral (2013) argue that *kendi*

may be bound by a non-local antecedent as well as a local antecedent. See the example form Sezer (1979) below:

(39) Orhan$_i$ [Mehmet'in$_j$ kendi-ne$_{i/j}$ palto al-ma-sı] -na sevin-di.
Orhan Mehmet-GEN self-DAT coat buy-GRND-3POSS-DAT please-PAST
'Orhan was pleased that Mehmet bought him/himself a coat.'
(Sezer, 1979:753)

Sezer (1979) states that the non-local DP *Orhan* in (39) can be the antecedent for reflexive *kendine*, if " [h]e is more important, or closer to the speaker than" the local antecedent *Mehmet*. Although Sezer (1979) discusses the issue at hand within a logophoric framework, it is of our interest here with respect to two readings that *kendi* may obtain. The Turkish reflexive *kendi* is not alone in challenging the framework of the Binding Theory. That is the literature is abundant with empirical evidence that calls for revisions to the BT. See the Icelandic reflexive *sig* for an illustration:

(40) Jón$_k$ segir að María elski sig$_k$.
John said that Maria loves self
'John said that Maria loves him.'

The embedded sentence in (40) is a subjunctive clause as reported in the literature due to the subjunctive embedded verb, and hence the matrix subject *Jón* can antecede the argument reflexive of the subjunctive verb. Similarly, many Romance languages allow

long-distance binding of a reflexive pronoun in subjunctive subordinate clauses as found in the following Italian data:

(41) [Quel dittatore]$_k$ spera che i notiziari televisivi parlino a lungo delle proprie$_k$ gesta.

That dictator hopes that the news TV talk$_{SUBJ}$ for a long time about self deed.

'That dictator hope that the TV news will talk about his deeds for a long time.'

(Giorgi, 1983)

Korean and Malay, on the other hand, permit non-local binding of a reflexive by a subject if the sentence embedding is an instance of indicative clause. See the following:

(42) Malay

Siti$_j$ mengingatkan Mohamed$_k$ yang saya tahu dirinya$_{j/k}$ seorand penjenayah.

Siti remind Mohamed that I know self$_{3SG}$ one criminal

'Siti reminded Mohamed that I know he/she is a criminal.'

(Cole and Hermon, 2005)

(43) Korean

Cheolsu-nun$_i$ Youngshik-i$_j$ caki-lul$_{i/j/k}$ coaha-nun-keot-ul Youngsu-ka$_k$ alkoitta-ko saengkakha-n-ta.

Cheolsu-TOP Youngshik-NOM self-ACC like-ASP-COMP-ACC Youngsu-NOM know-COMP think-ASP-DEC

Cheolsu thinks that Youngsu knows that Youngshik likes himself.'

(Choi, 1997)

Binding of a reflexive pronoun by a matrix subject in Danish small clauses is another piece of evidence contrasting with the BT:

(44) Larsen$_k$ betragter Jorgen some farlig for sig$_k$.

'Larsen considers Jorgen dangerous for self.'

The Chinese anaphor *ziji* is also an exemplar of a long-distance reflexive.

(45) a. Zhangsan$_k$ juede Lisi zai piping ziji$_k$.

Zhangsan think Lisi at criticize self

'Zhagnsan thinks that Lisi is criticizing him.'

It has been a common line of reasoning in the literature to account for LD-reflexives in a non-syntactic, specifically pragmatic, approach as they pose challenges to the standard anaphor binding where anaphors must be bound within their governing categories (Huang 1984; Reinhart&Reuland, 1993; Huang and Liu, 2001). Huang and Liu (2001), for instance, offer a pragmatic approach to LD-binding of *ziji* by bringing evidence from blocking effects. Let us review the blocking effects discussed in their study:

(46) a. Zhangsan$_i$ juede wo zai piping ziji$_{*i}$

Zhangsan think I at critize self

'Zhangsan thinks that I am criticizing self'

b. Zhangsan$_i$ renwei [ni$_j$ hen ziji$_{*i/j}$]

Zhangsan think you hate self

'Zhangsan thinks that you hate yourself.'

In (46), the matrix subject is in 3P and the embedded subjects are in 1P and 2P, respectively. The reflexive *ziji* is an argument of the embedded verb. Note that the long-distance reading of *ziji* with a 3P non-local antecedent is not allowed in both structures. Huang and Liu (2000) argue that the blocking effects in (46) arise to avoid perspective conflicts if we put sentences in the context of direct speech following direct discourse representation of Kuno (1972). The structures in (46), for instance, has the following underlying forms:

(47) a. Zhangsan juede "wo zai piping wo".

Zhagsan thinks "I am criticizing me".

b. Zhangsan renwei "ni hen wo".

Zhangsan thinks "you hate me."

In (47a), *wo* in the embedded subject refers to the external speaker of the entire sentence, and the second occurrence of *wo* in the embedded object position refers to the internal speaker of the direct discourse complement (namely, Zhangsan) hence the underlying structure causes a perspective conflict, hence the ungrammaticality arises. In (47b), *ni*

is the addressee, which is the external source, while *wo* is the internal source i.e., Zhangsan. These underlying representations causes a conflict between the internal Source and the external Source under Kuno's terminology.

On the other hand, the blocking effects do not hold for the intervening 3P nouns, even if the matrix subject is a first person, or second person noun as in (48b-c). See the following:

(48) a. Zhangsan juede Lisi zai piping ziji.
Zhangsan think Lisi at criticize self
'Zhagnsan thinks that Lisi is criticizing him.'

b. wo juede Lisi zai piping ziji.
I think Lisi at criticize self
'I think that Lisi is criticizing me'

c. ne juede Lisi zai piping ziji
You think Lisi at criticize self
'You think that Lisi is criticizing you.'

According to the authors, the successful long-distance interpretation of *ziji* in (48) is achieved with the fact that a third-person noun is not anchored to an external speaker but to the internal speaker. Thus, the underlying direct discourse complement in (48) is

"Lisi zai piping wo" which results in *wo* referring to the matrix subject, an internal speaker, despite the distinct person feature that the matrix subject has in (48b-c).

In summary, the given distribution of *ziji* in (46-48) has the following configuration with respect to blocking effects:

Blocking effect for ziji

(49) i) *[$_{CP}$ DP3 [$_{CP}$ DP1/DP2 ziji]]

ii) [$_{CP}$DP1/2/3 [$_{CP}$ DP3 ziji]]

(49i) corresponds to (46) in that *ziji* does not allow a construal with a distant third-person antecedent if the intervening pronouns are 1st and 2nd person pronouns. On the other hand, in structures like (49ii) the long-distance binding of *ziji* with distant 1/2/3-person DP is possible if the intervening nominal is in third-person form. Given this, Huang and Liu (2001)'s pragmatic, or discourse-oriented approach may account for the distribution of the Chinese reflexive *ziji*.

The Turkish reflexive *kendi* differs from its Chinese counterpart in two respects: it can be marked for the person (and number) feature and it does not display the blocking effect. Thus, I will propose an alternative analysis for Turkish facts. Now, consider the following data:

(50) a. Ayşe$_k$[ben-im$_j$ kendi-ni$_{k/*j}$ hiç düşün-me-diğ-im]-i söyle-di.

Ayşe I-GEN kendi-ACC never think-NEG-NMZ-1POSS-ACC tell-PAST

'Ayşe told that I never think of her'

b. Ali$_k$ [ben-im$_j$ her zaman kendi-ni$_{k/*j}$ takdir et-tiğ-im]-i bil-iyor.

Ali I-GEN always self-ACC appreciate-NMZ-1POSS-ACC know-PROG

'Ali knows that I always appreciate him'

c. Ali$_k$ [siz-in her zaman kendi-ni$_k$ takdir et-tiğ-iniz]-i biliyor.[16]

Ali you-GEN always self-ACC appreciate-NMZ-2PL.POSS-ACC know-PROG

'Ali knows that you always appreciate him'

d. Aslı$_k$ [siz-in kendini$_k$ sev-diğ-iniz]-i duy-muş.

Aslı you- GEN self- ACC like- NMZ-2PL.POSS-ACC hear-PAST

'Aslı heard that you like her'

In (50), we observe that *kendi* can be bound by the non-local antecedent, the matrix subject, despite the intervening pronouns with distinct person features in the embedded subject position. Hence, change of perspective, which rules-out Chinese non-local *ziji* in configurations similar to (49i) will incorrectly rule-out (50). The state of affairs in (50) has revealed that *kendi* can have a construal with a non-local third person antecedent despite the intervening 1st and 2nd person pronouns. This is an unexpected observation from a pragmatic analysis.

[16] Due to syncretism in accusative marked 2P and 3P reflexives (*kendin+i* '2Pself+Acc'; *kendi+n+i* '3Pself+Acc'), I utilize 2P plural reflexive, *siz*.

The Turkish facts also bring another distribution of *kendi* which contradicts the Chinese results in (49ii) showing that *ziji* can go over the third-person DP and co-refer to non-local 1st and 2nd person antecedents:

(51) a. *Ben$_k$ [Aslı'nın asla kendi-m-i$_k$ düşün-me-diğ-in]-i duy-du-m.
I Aslı-GEN kendi-1POSS-ACC think-NOM-3POSS-ACC hear-PAST-1SG
*'I heard that Aslı never thinks of me.' (Intended, ungrammatical meaning)

b. *Siz$_k$ [Ali'nin (her zaman) kendi-niz-i$_k$ beğen-diğ-i-ni] bil-iyor mu-sunuz?
You-PL Ali-GEN self-2PL.POSS like-NMZ-3POSS-ACC know-PROG Q-2PL.
*'Do you know that Ali always likes you?' (Intended, ungrammatical meaning)

In (51), we have a third-person DP in the embedded subject positions. However, a first-person occupies the subject position in (51a) and a second-person pronoun is found in (51b). As seen, if *kendi* is marked either with the first-person, or second-person feature, we cannot have the distant reading for *kendi*, which is, again, inconsistent within a pragmatic approach as provided earlier in (49ii)[17]. In sum, the distribution of *kendi* can be summarized as in (52):

[17] Meral (2013) brings contrasting data where non-local binding of *kendim/kendin* is allowed noting a dialectical difference. However, the intervening pronouns in his data is an indefinite pronoun whose verbal agreement is the same with 3rd singular noun as well as the subordinate clause is the type of non-finite subjunctive clause with -MA.

(52) i) *[$_{CP1}$ DP1…[$_{CP2}$ DP3 kendim]….]

ii) *[$_{CP1}$ DP2 [$_{CP2}$ DP3 kendin]….]

iii) [$_{CP1}$ DP3….[$_{CP2}$ DP1/DP2….kendi]…]

As seen in (52i-ii), third-person DP blocks the long-distance binding of 1st and 2nd person inflected reflexive *(kendim* and *kendin,* respectively). On the other hand, the long-distance binding of *kendi* in (52iii) is accomplished irrespective of DP1/DP2 occurring between the antecedent and reflexive pronoun.

To account for the facts in (52), I will propose a syntactic analysis. For this, the person feature specifications on *kendi* are taken into consideration. Specifically, a feature compositional distinction will be made between 1st and 2nd person versus 3rd person inflected *kendi*. Before moving on to the next section, I will provide again the person and number paradigm of *kendi* in Turkish:

(53)

1st Person	**2nd Person**	**3rd Person**
kendi-m	kendi-n	kendi-∅

---

i. Ben$_i$ [**herkes-in$_k$** [$_{PP}$ kendi-m-e$_{i-}$ bağlı] ol-ma-**sı$_k$**]-nı ist-iyor-um.
I want everyone to be loyal to me.'

ii. Sen$_i$ [**herkes-in$_k$** [$_{PP}$ kendi-n-e$_{i-}$ bağlı] ol-ma-**sı$_k$**]-nı ist-iyor-sun.
'You want everyone to be loyal to you.'

(Meral, 2013: 57)

Singular	self-1SG	self-2SG	self-3SG
	'myself'	'yourself'	'himself/herself'
	kendi-miz	kendi-niz	kendi-leri
Plural	self-1PL	self-2PL	self-3PL
	'ourselves'	yourselves'	themselves'

As seen in (53), the reflexive in Turkish can be inflected with possessive agreement suffixes, and hence bear full phi-features.

So far, I have shown that LD-reflexives seem to challenge Principle A. A case study of Chinese *ziji* was brought to the discussion to show that researchers have attempted to account for the phenomenon within a pragmatic/discourse framework. However, Turkish facts cannot be accounted with blocking effects, thus they call for an alternative approach. Accordingly, this chapter will offer a syntactic analysis for the distribution Turkish reflexive. This will be maintained once we consider the person specifications on the antecedent and the anaphor, which is the topic of the next section.

3.1 Person feature geometry

Research on the grammatical marking of person for nominals and pronouns has shown that 1st and 2nd person are fundamentally different than 3rd person. Forchheimer (1953) lists a variety of morphological generalizations illustrating that 3rd person is quite different than 1st and 2nd person. Further he illustrates that 3rd person is unmarked when

compared to 1st and 2nd person. Below, I have included the morphological differences identified in Forchheimer (1953):

(54) a. 3rd person agreement is often zero, 1st and 2nd person agreement is overt.

b. Many languages have no 3rd person pronoun, or at least no nominative form

c. Many languages have distinct 1st and 2nd person pronouns only; for 3rd person they use demonstratives

d. Closely related languages often have cognate 1st and 2nd person pronouns but 3rd person pronouns, which are not obviously related

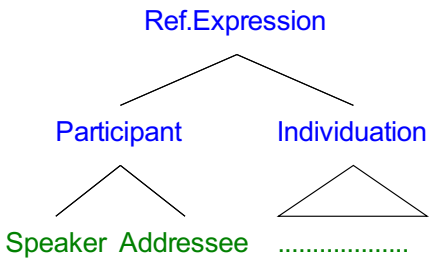
e. 1st and 2nd person are often similar in form and inflection but dissimilar from that of 3rd person

f. 3rd person is much more subject to objective subdivisions such as class, gender and location

(Forchheimer 1953:6)

Benveniste (1965) also notes similar observation by stating that " [P]erson belongs only to *I/you* and is lacking in *he*" (Benveniste, 1971:217). Relatively recent studies report similar observation. Of such is Harley& Ritter (2002) that offers a feature geometric analysis to person and number systems in pronominal paradigms. They argue that all nominals have [REFERENTIAL] feature and [PARTICIPANT] represents 1st and 2nd person i.e., [Speaker] and [Addressee] respectively. However, the 3rd person is not overtly marked for person.

(55)



Harley and Ritter, 2002:486

The feature geometry in (55) represents features in a privative fashion rather than a binary one. As seen in (55), [Participant] feature marks both 1st and 2nd person. Further, [Speaker] and [Addressee] specification encode the presence of 1st and 2nd person in the person inventory, respectively. Crucially, 3rd person is not specified in the feature geometry, hence unmarked for person feature.

Bobaljik (2008) also investigates morphological universals and proposes Universal Feature Inventory. He notes that within the three traditional person features (e.g., 1P-2P-3P) it is possible to express a seven-way contrast within the dimension of person, disregarding any other feature such as number, which is given in (56):

(56) *The seven meta-persons*

1+2	speaker(s) and hearer(s); no other(s)
1+2+3	speaker(s), hearer(s) and other(s)
1	speaker(s) only
1+3	speaker(s) and other(s); hearer(s) excluded
2	hearer(s) only
2+3	hearer(s) and other(s)
3	other(s) only

Given (56), he contends that the non-occurrence of certain morphological distinctions in world-languages, and proposes that the actual attested contrast displays a four-way distinction, given in (57):

(57)

a. Possible	b. Attested	c. Binary
1+2	"inclusive"	[+spk +hr]
1+2+3		
1	"exclusive"	[+spk -hr]
1+3		
2	"second person"	[-spk +hr]
2+3		
3	"third person	[-spk -hr]

He sums the facts in (56) and (57) as "[t]raditional three-value person system over-generates, allowing the expression of universally unattested distinctions". Whereas a binary feature system as in (57c), lacking a third-person, "[a]dmits of all and only the attested person distinctions in the world's languages" (Bobaljik 2008; 207).[18]

[18] See Nevins (2007) for an argument against the absence of 3P in the feature system in which he formalizes the system as in follows:

(1) a. [+Author, +Participant] = 1st person
b. [-Author, +Participant] = 2nd person
c. [-Author, -Participant] = 3rd person

Nevins (2007) binary person system also can explain Turkish data in that [-Participant] is not contrastive in [Author] feature value, thus once we have [-Participant] in hand it will be 3P by default.

The proposals on representing person feature, specifically on the asymmetry between 1st and 2nd person versus 3rd person, have implications for Turkish. One evident case of this is Turkish morphology. That is, the plural marking on pronouns reveals that 3P pronoun uses the plural marker of nominals, while 1P and 2P pronouns employ distinct pronominal morphology. See the following:

(58)

Singular		Plural	
a. Ben	'I'	Biz	'we'
b. Sen	'you'	Siz	'you-PL'
c. O	's-he/it'	o-n-lar	'they'
d. kitap	'book'	kitap-lar	'books'

In (58a-b), plural forms of *ben* 'I' and *sen* 'you' are *biz* 'we' and *siz* 'you-PL'. On the other hand, in (58c) third person pronoun *O* 'she/he/it' is suffixed with *-lar* for plural meaning, which is parallel with nominal pluralization as in (58d). Hence, it is evident in (58) that 3rd person pronoun displays number marking characteristics that are distinct from that of 1st and 2nd person pronouns.

The person feature asymmetry in Turkish can also be evidenced in copular structures. The copular agreement in Turkish is sensitive only to 1st person and 2nd person encoding while it is insensitive to 3rd person:[19]

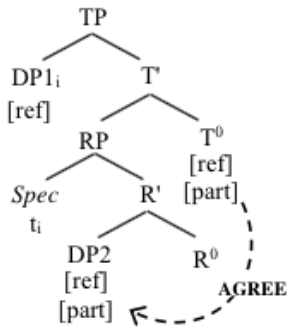
(59) a. Ben Ali'yim. b. Sen Ali'sin. c. Ali ben-im. d. Ali sen-sin.

I Ali-1SG You Ali-2SG Ali I-1SG Ali you-2SG

'I am Ali.' 'You are Ali.' 'Ali is me.' 'Ali is you.'

The contrast between (59a-b) and (59c-d) shows that licensing copular verbs in Turkish is ensured with the 1st and 2nd person pronouns only. Ince et al. (2012) hence offer an analysis in the feature geometry framework of Harley and Ritter (2002). Therein, T^0, the probe, has an uninterpretable [Participant] feature to be checked before Spell-out and only the first- and second-person DPs are specified for relevant person feature. See the following derivation for copular structures below:

(60)



[19] The data is partially due to Ince et al., (2012).

The empirical evidence from Turkish is parallel with the cross-linguistic observation that 3rd person is the absence of the person feature. For the analysis offered in the next section, I will adopt the feature geometry of Harley&Ritter (2002) where the 1st and 2nd person pronouns share [PARTICIPANT] feature value yet differ in [Speaker] and [Addressee] value. On the other hand, 3rd person is not marked for person feature at all.

3.3 A two-partite reflexive licensing in Turkish

In the previous section, the person feature composition for reflexive pronoun has been detailed. In this section, I will suggest that reflexive binding for *kendim* and *kendin* is an instance of an Agree operation in the narrow syntax which requires a local licenser. The licensor of the reflexive can be either the subject in Spec, TP or indirect object in ditransitive constructions. The licensing of person marked reflexives follows the assumption that these referential units enter into the derivation with a [Participant] feature specification yet they have unvalued [Speaker] or [Addressee] features, respectively. Hence, they need to check their unvalued features against a goal before Spell-out. Then, they receive their referential interpretation from the goal as a byproduct of Agree. If person marked reflexives fail to have valuation for the relevant features due to the absence of local licensor, the derivation crashes at the interface level. On the other hand, person unmarked *kendi* does not involve in a syntactic operation in contrast to *kendim* and *kendin* due to the proposal that *kendi* is unspecified for a person feature.

It is not uncommon in the literature to account for reflexive binding within an Agree-based feature checking mechanism (Hasegawa, 2005; Reuland, 2005, 2011; Hicks, 2009).[20] The proposals differ in how Agree between the antecedent and the reflexive is established (i.e., postulating a variable feature or Agree as a byproduct of phi-feature agreement). The following is a sketch of the workings of Agree operation as formulated in Chomsky (2000, 2001):

(61) *Standard Agree*

i. X carries at least one unvalued and uninterpretable feature and Y carries a matching interpretable and valued feature

ii. X c-commands Y

iii. Y is the closest goal to X

iv. Y bears an unvalued uninterpretable feature

Agree, in essence, is a syntactic operation between a lexical unit and a feature in the same domain. Chomsky (2000, 2001, 2004, 2008) introduces the Phase theory as the domain of the Agree. The phase theory follows that the derivation of sentences is maintained in smaller chunks (i.e., sub-Lexical Array) and cyclically rather than the

[20] Kayne (2002) and Zwart (2002), on the other hand, propose the co-constituency account for anaphoric relations in that the antecedent and the anaphor initially merge together. See the following instance for a pronoun binding from Kayne(2002) as an illustration:

John$_i$ thinks he$_i$ is smart.

thinks [John he] is smart => John$_i$ thinks [t_i he] is smart.

Lexical Array for the whole sentence being selected at once. These smaller chunks are maintained in active memory and computation of each smaller unit(s) is achieved before the next chunk, sub-LA, is introduced. What defines a syntactic category as a phase depends on its proposionality as proposed in Chomsky (2001). CP and vP are phases in Chomsky (2001). Because CP contains a full set of force features and vP includes a full argument structure except those in unaccusative and passive constructions. As for the timing of the derivation, he proposes the Phase Impenetrability Condition, which I report the latest version below:

(62) *Phase Impenetrability Condition* (2001:14)

In a strong phase HP, in the configuration [$_{ZP}$ Z…[$_{HP}$ α [H YP]]], ZP the next strong phase:

a. The domain of H i.e., YP is not accessible to operations at ZP, but only H and its edge

b. Interpretation/evaluation for HP is ZP

According the formulation in (62), CP and vP are phases and the complement of them (e.g., TP and VP, respectively) transferred to Spell-out as soon as the next phase head is merged. Internal arguments of a phase are closed off to operations with external elements, while elements in phase-edge positions are open to such interactions. Phase edges in MP are also defined as its defining head, the specifiers of the head, and adjoined material(s) (Chomsky 2000, 2001). To illustrate, v and Spec,vP of vP-phase are left behind when the next phase merges into the derivation hence open to syntactic

operations. Similarly, C and Spec,CP are the residue of CP in the merge of the next phase head. Once a phase is complete, it gets sent to Spell-out for Logical Form interpretation. If the phase contains an element with unvalued feature at LF, which is dependent on phase-external materials, the derivation does not converge, hence inducing ungrammaticality.

The view regarding standard Agree holding that the probing is hierarchically downward faces some empirical problems (Baker, 2008; Hicks, 2009; Rezac, 2004; Zeijlistra, 2012 among others). Zeijlistra (2012), for instance, proposes that probing is also possible in upward fashion. She argues that Negative Concord where multiple negative elements provide a single semantic interpretation, is an evidence for Upward Agree, as shown below:

(63) a. Gianni non ha deto *niente* a *nessuno* Italian

Gianni NEG has said n-thing to n-body

'Gianni did not say anything to anybody'

b. [Gianni non$_{[iNEG]}$ -ha [ditto neinte$_{[uNEG}$] a nessuno$_{[uNEG]}$]]

(64) a. Dnes *nikdo* *(*ne*)vola *nikomu* Czech

Today n-body NEG.calls n-body

'Today nobody is calling anybody'

b. [Dnes Op_$_{[iNEG]}$ [$_{TP}$ nikdo$_{[uNEG]}$] nevola$_{[uNEG]}$ nikoho$_{[uNEG]}$]]

Zeijlistra 2012: 21, examples (50-51)

To Zeijlistra (2012), both negative elements (i.e., *ni* and *ne*) in (63-64) in isolation can make a sentence negative whereas co-occurrence of them in a single structure does not yield to an iterative reading with two semantic negations. Then she proposes that the negative elements, n-words within her terminology, carry an uninterpretable negative feature [uNEG] and the negative head, *non* in Italian and an abstract *Op(erator)* in Czech, carry [iNEG] where the goal c-commands the probe. A crucial consequence in this claim is that it is not the phase head that triggers Agree operation, even if n-words appear in argument positions. This is contrasting with Agree operation in Chomsky (2005, 2006) that all uninterpretable features (Agree features) belong to the phase heads, hence only phase heads can trigger syntactic operations[21].

Given the empirical facts in (63-64), proponents of Upward Agree propose an alternative description of Agree as provided below:

(65) *Upward (Reverse) Agree*

A feature F:_ on X is valued by a feature F: val on Y, iff

i) Y c-commands X

ii) There is no Z with a valued interpretable feature F such that Z c-command X and c-commanded by Y.

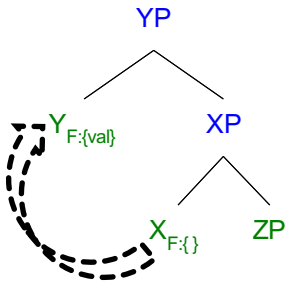
iii) X is accessible to Y (not spelled out)

A consequence of Upward Agree is in yielding the direct Agree relations with no appeal to intermediary feature sharing unlike the standard Agree (see (61iv) above).

[21] The given challenge will remain consistent in capturing Turkish reflexive binding facts.

Furthermore, the feature deficiency is on the lower element as shown in the following tree:

(66)



Hicks (2009) also assumes upward Agree in deriving binding relations. He proposes a variable feature [VAR] which is unvalued on the reflexive while valued on the antecedent i.e., referential elements as in (67) below:

(67) Mary$_{[VAR:x]}$ likes herself$_{[VAR:_]}$ NUMBER

Hicks (2006) further suggests that phi-features of the probe and goal must match for checking to take place. In his account, the postulated feature valuation between the probe and goal should operate in phase while the relation between the probe and the goal is reversed contrary to Phase theory. He reasons for the reverse probing that if no goal is available within the search space of the probe i.e., c-commanding, then upward probing is the likely operation.

To account for Turkish binding facts for person marked reflexives, I will adopt the Upward Agree mechanism. See the following structures for an illustration:

(68) a. Ben$_k$ kendi-m-i$_k$ sev-iyor-um.

I self-1POSS-ACC like-PROG-1SG

'I like myself.'

b. Ben$_k$ Zeynep'e kendim-i$_k$ daha iyi anlat-abil-ir-di-m.

I Zeynep-DAT self-1SG-ACC better explain-ABIL-AOR-PAST-1SG.

'I could have explained Zeynep myself better.'

c. Sanki onlar ban-a$_k$ kendi-m-i$_k$ anlat-ıyor-lar-dı.

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

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

(Göksel&Kerslake 2005: 268, example 34)

d. * Ahmet kendi-m-i sev-iyor.

Ahmet self-1SG-ACC like-PROG-3SG

*'Ahmet likes myself'.

The structures in (68) include *kendim* 'myself' as a verb complement. All instances of reflexive in (68) merge into the derivation with a [Participant] feature value, yet the reflexive bears unvalued [Speaker]. The following representations illustrate the derivations in (68):

(69) a. [CP...[vP Ben [v' [VP kendim V^0] v^0]]]

b. [CP...[vP onlar [v' [VP bana [V' kendim V^0]] v^0]]]

c. [CP...[vP Ben [v' [VP Zeynep [V' kendim V^0]] v^0]]]

d. *[CP...[vP Ahmet [v' [VP kendim V^0] v^0]]]

For each derivation in (69), the reflexive probes upward for a goal with a matching [Participant] feature in vP phase to obtain valuation of [Speaker]. In (69a-c), there exists 1st person pronominal with [Participant; Speaker] feature composition hence feature checking via Agree succeeds at this phase. The next phase head C merges into the derivation then, the vP chunk is sent off to the interface. As the reflexive bears no unvalued feature at LF, the derivation converges. In (69d), however, no phi-agreeing antecedent for *kemdim* is available in vP, hence the reflexive cannot maintain a feature valuation before Spell-out, hence the derivation crashes.

I will turn to derivations in nominalized embedded clauses where the long-distance binding for *kendim* and *kendin* is disallowed:

(70) *a. Ben$_k$ [Aslı'nın asla kendi-m-i$_k$ düşün-me-diğ-in]-i duy-du-m.
I Aslı-GEN never kendi-1SG-ACC think-NMZ-3POSS-ACC hear-PAST-1SG
'I heard that Aslı never thinks of me.'

a'. [CP...[$_{vP}$ Ben.. [$_{CP}$ …[$_{vP}$ Aslı [$_{VP}$ kendimi V^0] v^0]…]v^0]]

*b. Ben$_k$ [sen-in asla kendi-m-i$_k$ düşün-me-diğ-in]-i duy-du-m.
I you-GEN never kendi-1SG-ACC think-NMZ-3POSS-ACC hear-PAST-1SG
'I heard that you never think of me.'

b'. [CP...[$_{vP}$ Ben.. [$_{CP}$ …[$_{vP}$ Sen [$_{VP}$ kendimi V^0] v^0]…]v^0]]

In (70a) the phase consists of the reflexive *kendim* and 3rd person *Aslı* when the arguments of the embedded vP are selected from the Lexicon. Again, the reflexive

kendim is unvalued for [Speaker]. It probes upward for a phi-agreeing nominal; however, no feature-matching goal exists. On the next phase, CP merges into the derivation and the embedded vP phase is sent off to the interface with an unvalued reflexive *kendim*, which consequently yields the crash of the derivation. A similar procedure applies to the structure in (70b) where the intervening embedded subject bears [Participant: Addressee] feature composition. Although the probe and goal share [Participant] feature, the probe further needs a licensor with [Speaker] feature value. As no phi-agreeing nominal is available at this stage, the reflexive was sent to Spell-out without getting a proper valuation, inducing ungrammaticality.

Now, I offer a distinct mechanism for licensing non-person reflexive, *kendi*. See the following examples below:

(71) a. Ahmet$_k$ kendi-ni$_k$ sürekli eleştir-iyor.
Ahmet self-ACC constantly criticize-PROG.
'Ahmet is criticizing himself constantly.'

b. Müfit$_j$ Zafer$_k$'e saatlerce kendi$_{j/k}$-ni anlat-tı.
Ahmet Zafer-DAT for-hours self-ACC talk-PAST
'Ahmet talked to Zafer about himself for hours.'

I suggest that the referential interpretation of the person unmarked reflexive, *kendi*, is achieved simply by indexing with an antecedent within the same domain.[22] As both

[22] Indexing analysis for *kendi* is parallel with pronoun interpretation while referential licensing of the reflexive requires a c-commanding antecedent, unlike pronouns.

structures in (71) include a non-person antecedent(s), the referential dependency with the reflexive is established successfully via indexing. In (71a), the subject can antecede the reflexive while in (71b) both the subject and indirect object can do so.

I now turn to the grammaticality of long-distance binding of *kendi* in nominalized embedded clauses. See the following examples:

(72) a. Ayşe$_k$ [ben-im$_j$ kendi-n-i$_{k/*j}$ hiç düşün-me-diğ-im]-i söyle-di.
Ayşe I-GEN kendi-ACC never think-NEG-NMZ-1POSS-ACC tell-PAST
'Ayşe told that I never care about her.'

b. Ayşe$_k$ [Ahmet$_j$'in kendi-n-i$_{k/j}$ hiç düşün-me-diğ-in]-i söyle-di.
Ayşe Ahmet-GEN kendi-ACC never think-NEG-NMZ-3POSS-ACC tell-PAST
'Ayşe told that Ahmet never cares about her/herself'

c. Ben Zeynep$_k$'e [Ahmet$_j$'in kendi-n-i$_{k/j}$ hiç düşün-me-diğ-in]-i söyle-di-m.
I Zeynep-DAT Ahmet-GEN kendi-ACC never think-NEG-NMZ-3POSS-ACC
tell-PAST-1SG
'I told Zeynep that Ahmet never cares about her/himself'

The reflexive has the matrix subject as antecedent in (72a), the matrix and the embedded subject in (72b) and the matrix indirect object and the embedded subject in (72c). To account for the empirical facts in (72), I will adopt a movement analysis of the reflexive

at LF, proposed in Pica (1987).[23] Briefly, Pica (1987, 1991) distinguishes reflexives based on the morphological property and argues that the Norwegian reflexive *seg* is a head anaphor, X^0, whereas English reflexives (e.g., himself) is a phrasal anaphor, XP^0. For Pica, XP reflexive can adjoin to the phrasal category they belong to or can only raise to VP at LF while X^0 reflexive moves to functional category at LF, namely I^0/T^0. That is, X^0 reflexive successive cyclically raises to matrix T^0 at LF to obtain a long-distance reading. For this movement, the embedded CP creates an escape hatch. Following Pica's movement theory, the structures in (72) will have the following derivation:

(73) a. $[_{TP}$ Ayşe $[_{CP}$ $[_{C}$ $[_{TP}$ Ahmet T^0 $[_{VP}$ kendi V^0]]…]]]

b. $[_{TP}$ Ayşe $[_{CP}$ $[_{C}$ $[_{TP}$ benim T^0 $[_{VP}$ kendi V^0]]…]]]

c. $[_{TP}$ Ben $[_{VP}$ Zeynep $[_{CP}$ $[_{C}$ $[_{TP}$ Ahmet T^0 $[_{VP}$ kendi V^0]..V^0]…]]]]

In each derivation above, *kendi* undergoes to a head-to-head raising to the matrix TP/IP at LF. In (73a-b), the reflexive's landing site at the matrix T^0 enables a c-command relation with the matrix subject, hence the identical indexing of the two lexical items enables the long-distance interpretation for the reflexive. Similarly, in (73c) the reflexive's cyclic head movement to the matrix T^0 maintains the c-command relation

[23] The idea that reflexives undergo movement dates back to Lebeaux (1983), and it has been influential among many linguists to account for cross-linguistic non-local reflexive interpretation (Chomsky, 1986a,1986b; Pica, 1987,1991; Battistella, 1989; Cole, Hermaon and Sung, 1990; Katada, 1991 among others).

between the antecedent and the reflexive. Along the way, the intermediate functional heads where the anaphor adjoins (v^0 for the direct object or $Appl^0$ for the indirect object) ensure a Spec-Head relation between the antecedent and the anaphor. Thus, for derivations similar to (73c) where *kendi* is anteceded by a direct or indirect object, the head movement at LF provides the c-command requirement.

3.4 Conclusion

This chapter addressed the peculiarities observed in distribution of Turkish bare reflexive *kendi* 'self'. The analyses offered here relies on the morphological properties of this anaphor. That is, a reflexive can be inflected with person marking as in *kendim, kendin* and *kendi*. I propose that the interpretation of *kendim* and *kendin* are strictly local anaphor while *kendi* be co-referential with a non-local antecedent in nominalized embedded clauses. Cross-linguistic evidence on person system has shown that 3rd person is not a true person in contrast to 1st and 2nd person. Further, I followed person feature geometry that 1st and 2nd person share [Participant] feature but bear distinct in [Speaker] and [Addressee] specification, respectively. Contrastively, 3rd person is to mark the absence of person feature, and hence bears no feature value. Following on this distinction, I proposed that 1st and 2nd person reflexives, *kendim* and *kendin*, are specified for [Participant] feature yet are unvalued for [Speaker] and [Addressee] while *kendi* is the absence of any person feature encoding. Given this, I assume that reflexives with the [Participant] feature need to engage in an Agree operation to obtain [Speaker] and [Addressee] valuation while a person unmarked reflexive is free from such

operation. The probing in this mechanism proceeds in an upward fashion and should take place in the phase with a local antecedent, otherwise the derivation crashes. As a consequence of phi- feature valuation, the reflexive can be bound by the antecedents acting as their goals, hence co-referentiality is maintained. I argue that person unmarked *kendi* does not involve syntactic feature checking. Rather, indexing with any non-person DP within the same domain resolves referential deficiency for the reflexive. Finally, the long-distance interpretation for non-person *kendi* is derived from the assumption that the anaphor undergoes to head-raising to Infl of matrix clause at LF due to its simplex morphology. On the other hand, person marked reflexives *kendim* and *kendin* need to be interpreted in situ in the narrow syntax.

CHAPTER 4

Judgment surveys for offline *kendi* resolution

The experiments in this chapter aim to understand the offline interpretation of *kendi* in syntactic configurations outlined in Chapter 2. First, I will sketch out existing experimental approaches on this topic. As mentioned previously, the literature reports mixed views on *kendi* interpretation, based mostly on theoretical works. To my knowledge, there are few exceptions to this (e.g., Özbek and Kahraman (2016) and Gračanin-Yuksek et al. (2017). Özbek and Kahraman (2016), for instance, used a two forced preference task to test how Turkish speakers assign reference(s) to *kendi* and *kendisi* in biased and non-biased contexts. They had test materials like the following:

(74) a. Demet [Hacer-Ø kendi-(si)-ne söz ver-di-Ø] zannet-ti-Ø.
D.NOM Hacer.**NOM** self-DAT promise-PAST-3SG think- PAST-3SG
'Demet thought that Hacer promised to her/herself.'

b. Demet [Hacer-in kendi-(si)-ne söz ver-diğ-i]-ni zannet-ti-Ø
D.NOM Hacer.**GEN** self-DAT promise-NOM-3SG-ACC think- PAST-3SG
'Demet thought that Hacer promised to her/herself.'

They tested the interpretation of both *kendi* and *kendisi*. They distinguish the clauses in (74) regarding the case marking on the embedded subject; nominative or genitive, which

are the equivalent of finite and non-finite clauses detailed previously. The forced-choice task in two experiments required participants to answer a "YES-NO" question after reading each sentence. The experiments differed as to whether the experimental items were preceded by a pragmatically biased context for the matrix subject. For the non-biased conditions where the sentences were presented in isolation, they found for the bare reflexive *kendi* that the subjects showed a slightly higher preference for the long-distance antecedent in nominalized clauses than in finite clauses (61% and 51%, respectively). As the difference was marginal, they concluded that the participants chose both local and long-distance antecedents at similar rates in both subordination types.

Gračanin-Yuksek et al. (2017) also collected systematic and formal data for judgments of Turkish speakers on *kendi* 'self', *kendi-si* 'self-3SG, and *o* 'he/she/it.' They used a judgment survey with nine experimental sentences that were presented without a context. They also measured reading time differences for these anaphors by introducing a context. In Gračanin-Yuksek et al. (2017), the test items without a prior context in their first experiment were like (75) below:

(75) Emre, Cem'in kendi-ni suçla-dığ-ı-nı bir anda anla-dı-Ø.
Emre Cem-GEN self-ACC blame- NMZ-3POSS right away realize-PAST-3SG
'Emre realized right away that Cem blames him/himself.'

They included structures similar to (75) in their study, which were all nominalized embedded clauses. They recruited seventy-three participants for the study. They reported that the participants showed a preference for both local and long-distance

antecedents; they selected a local antecedent on 94% of trials and a long-distance antecedent on 85% of trials. They concluded that their findings were unexpected from the standpoint of previous theoretical accounts.

The current study aims to extend the reported experimental results by testing reference assignment for *kendi* in extensive structural configurations. For this, two experiments were designed to find participants' judgments in isolated sentences. The first experiment tested Turkish speakers' judgments in finite complement clauses. Specifically, the test materials in Experiment 1 included manipulations of complementizer type (i.e., null or overt) and case marking on the embedded subject (i.e., nominative or accusative). In Experiment 2, I inquired into how Turkish speakers judge this linguistic form in non-finite clauses. Therein, the nominalizer morpheme on the embedded predicate was manipulated (i.e., subjunctive or indicative) to construct test items.

In both experiments, if Turkish speakers obey the syntactic constraints as argued in Underhill (1976), Enç (1989), Kornfilt (2000), Goksel and Kerslake (2005) and Rudnev (2008) for licensing *kendi,* then they should prefer only the local antecedent and disallow the non-local antecedent. If, on the other hand, the participants evaluate the anaphor as a long-distance reflexive (or a logophor) as claimed in Sezer (1979), Meral (2013), both local and non-local antecedents should be preferred.

Finally, regarding the embedded verbs used in the current study, a norming experiment was conducted with thirty-five native Turkish speakers (M=6, Mean Age=22.1, SD= 3.56). It was a fill-in the gap task in which participants were required to select *kendi* and/or a proper name to make the sentence felicitous. Further, they were

asked to scale from 1-to-7 between a reflexive pronoun and proper NP if the ‘both' response was selected. See an example item from the norming study.

(76) “Choose all that apply to make the sentence felicitous.”

Demet _____korkuyor.

‘Demet is afraid of _____.’

□ Ali □ kendi □ Both

The purpose of the norming study was to avoid bias by identifying verbs that are similarly felicitous with a reflexive and a non-reflexive interpretation (e.g., defend, praise, trust). Based on the norming study, sixteen verbs were selected for the judgment surveys that have 80% and over response rate in “both” responses. For these verbs, the mean score in the scaling session was 4.20 (Min=3.96, Max=4.48, SD=1.31). In the next section, I will move on to detail the experiments and to present the results.

4.1 Experiment 1

In this experiment, I investigated the reference assignment to the bare reflexive *kendi* in finite subordinate structures. Participants read the sentences and were asked to decide whether the anaphor referred to an extra-sentential antecedent (e.g., someone else), or two antecedents (e.g., local and non-local) mentioned in the stimuli. Importantly, they had an option to select more than one antecedent (i.e., choose any that applies). The responses, in turn, were local antecedent, distance antecedent, both, and extra-sentential

antecedents. The local antecedent was the subject of the embedded clause, while the non-local antecedent was the subject of the matrix clause. I predicted that if the participants obey the syntactic constraints proposed in the literature (i.e., BT), then participants should select only the local antecedent as the referent of *kendi*. If not, they should show a preference for both local and long-distance antecedents.

4.1.1 Methods

Participants

One-hundred and eighteen subjects were recruited for Experiment 1. All were students at Istanbul Medipol University in Turkey, except for three participants. The results from eighty-eight participants were entered into the analyses. (i.e., mean accuracy below 70% in fillers discarded). The mean age for the subjects entered into analysis was 19.92 (SD: 6.12), and 75 were female.

Materials

Sixteen experimental sentences and filler items were constructed for the experiment. For the experimental items, there were two conditions under investigation: complementizer type and case marking on the embedded subject. Hence, the experiment was designed in a 2x2 factorial way, which yielded four conditions for each experimental sentence. See the following for an illustration:

(77) *Overt Complementizer, Nominative Subject*

a. Yelda san-dı-Ø ki Zeynep-Ø kendin-e yeterince saygı duy-mu-yor-Ø.

Yelda think-PAST-3SG COMP Zeynep-NOM self-DAT enough respect-NEG-PROG

Overt Complementizer, Accusative Subject

b. Yelda Zeynep-i kendin-e yeterince saygı duy-mu-yor-Ø diye bil-iyor-Ø.[24]

Yelda Zeynep-ACC self-DAT enough respect-NEG-PR.PROG-3SG

COMP know-PROG

Null Complementizer, Nominative Subject

c. Yelda Zeynep-Ø kendin-e yeterince saygı duy-mu-yor-Ø san-dı-Ø.

Yelda Zeynep-NOM self-DAT enough respect-NEG-PR.PROG-3SG think-PAST

Null Complementizer, Accusative Subject

d. Yelda Zeynep-i kendin-e yeterince saygı duy-mu-yor-Ø san-dı-Ø.

Yelda Zeynep-ACC self-DAT enough respect-NEG-PR.PROG-3SG think-PAST

'Yelda thought that Zeynep does not respect her/herself enough.'

Question

Saygı duyulmayan kişi kimdir?

'Who was not being respected?' 'Choose all that apply.'

□ Yelda □ Zeynep □ Someone else

[24] *bilmek* 'know' carries an epistemic meaning here.

Each critical item was followed by a question probing the possible referent(s) of the anaphor. The order of experimental material was pseudo-randomized, and the materials were divided into four lists by a Latin Square design. The same filler items were used in each list. Each participant read 32 sentences in total. In each list, the order of response options was balanced (i.e., the matrix subject appears before the embedded subject in half of the trials, and after in the other half). Also, the same number of male and female proper names was used for critical trials. In each critical item, the proper names matched in gender (i.e., either male-male or female-female).

Procedure

The experiment was conducted via *Google sheets*, an online questionnaire platform. Data collection via online platforms has been a common methodology among linguists and psycholinguists such as Dillon et al, (2014) and Sprouse (2011) thus I will adopt the same approach in collecting judgment data from native Turkish speakers. In the task, the subjects were instructed to read sentences at normal speed and to answer the follow-up question. The sentences were presented in isolation, and the subjects were asked to choose all possible answers. Three practice trials preceded the critical trials so that the participants would realize that more than one answer was possible if required. There was no limitation on response time.

Analysis

For the analysis, the statistical tests were performed in R (R Core Team, 2011). I analyzed the data using mixed-effects logistic regression (Jaeger, 2008). The dependent variable was the subject response. For the responses, only 'local' and 'long-distance' choices were included in the analysis. I recoded the local antecedent as 0 and the long-distance response as 1. I examined whether the long-distance response changed as a function of case marking on the embedded subject and complementizer type. I coded the independent variables using effect coding due to the unbalanced number of observations at each factor level (Te Grotenhuis, M. et al., 2017). In model building, participants and items composed the random components of the models while complementizer and case were the fixed effects. The goodness of the fit was evaluated using likelihood ratio tests (Baayen et al., 2008).

4.1.2 Results

Participants' antecedent choice in experimental trials is visualized in Fig.4.1 below. Therein, the subjects selected local antecedents on 73% of critical items, whereas they chose long-distance antecedents on 58% trials. The extra-sentential antecedent was preferred in only 4% of trials.

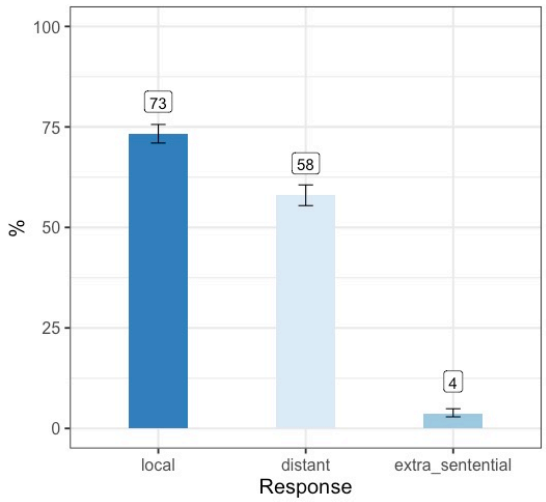


Figure 4.1 *Antecedent choices in finite subordinate clauses. As multiple responses per trial are allowed, the sum of responses is greater than 100%. Error bars represent binomial 95% CI.*

For the analysis, I started with an intercept-only model where only random components were fed into the model. Next, I included case marking as a predictor to evaluate its main effect on the response. Based on the model fit evaluation using the chi-square likelihood test, I found a reliable main effect of case ($\chi^2_{df=1}$ =6.56, p<0.05). Then I added the complementizer to the model, where both case and complementizer constituted the fixed effect components of the model. The results for goodness-of-fit in the full model revealed no main effect of complementizer type ($\chi^2_{df=1}$ =1.14, p >0.05). Because complementizer type did not show a significant main effect on the response, no interaction term was tested further. The following figure illustrates the proportions of antecedent selection in two conditions.

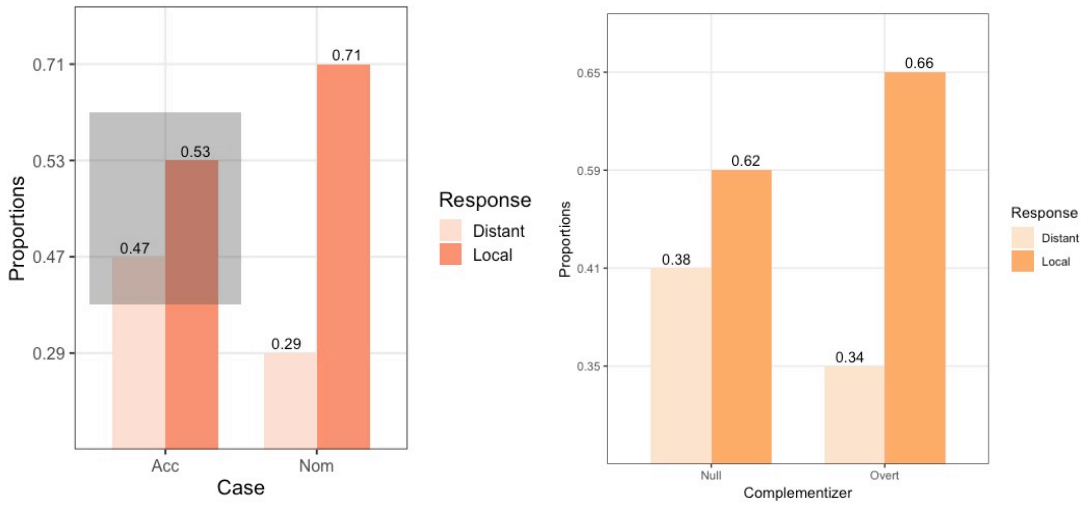


Figure 4.2 *Proportions of antecedent choice by case marking on the embedded subject (left) and complementizer (right) in finite subordinate clauses.*

The left plot in Figure 4.2 shows that the participants showed a tendency for a local referent in both accusative and nominative conditions (53% and 71%). However, the antecedent choice substantially differs by case marking of the embedded subject. That is, the subjects dominantly preferred the local antecedent in conditions with the nominative form (71%) while they preferred both referents at close rates in conditions with the accusative form. In other words, the subjects tended to prefer the long-distance antecedent in accusative conditions (47% vs. 29%).

The right plot in Figure4.2 illustrates the proportions of antecedent preference for *kendi* by complementizer type. This graph shows that participants dominantly chose local antecedents in both null and overt complementizer conditions (62% and 66%) whereas they mostly disallowed long-distance referents respectively (38% and 34%).

4.1.3 Discussion

Experiment 1 served to two goals. Initially, it tested referential possibilities for *kendi* in finite subordinate clauses. Very few syntactic accounts report judgments for this reflexive form in finite embedded clauses, and they report that this anaphor cannot be in a co-referential relation with a long-distance antecedent. Hence, this experiment served to test these claims by systematically collecting data. Another objective in Experiment 2 was to extend findings reported in Özbek and Kahraman (2016) by including finer-grained test materials with the use of complementizer type and the case marking on the embedded subject. Test materials in Özbek and Kahraman (2016) were in the form of nominative embedded subject and null complementizer. They reported for these constructions that participants preferred local and long-distance antecedents at similar rates (i.e., 49% local, 51% long-distance referent).

The findings in Experiment 1 suggest that Turkish speakers were more likely to assign a local referent to *kendi* (e.g.,73%) irrespective of the case and complementizer. Further, they did not disregard the long-distance interpretation of this anaphor; in more than half of trials, the participants preferred a long-distance antecedent (e.g.,58%). These results are compatible with findings reported in Özbek and Kahraman (2016) that Turkish speakers showed a preference for both local and long-distance antecedents. However, further inspection of the results showed that the case marking on the embedded subject plays a crucial role in participants' interpretation of the reflexive. That is, the reflexive was assigned local and non-local antecedents at similar rates when the embedded subject was in the accusative case (e.g., 53% local, and 47% long-distance). Nonetheless, the participants dominantly preferred a local referent when the case of the embedded subject was nominative (71% and 29%). Considering that the

constructions with accusative marked embedded subjects were instances of ECM clauses, the judgment variation becomes more interpretable. That is, the subjects do not allow a long-distance reading for *kendi* in finite clauses but do in ECM clauses. This finding is inconsistent with Özbek and Kahraman's (2016) results as participants in that research preferred local and long-distance antecedents at similar rates in finite embedded clauses (i.e., 49% local, 51% non-local).[25]

Finally, although complementizer type was not a statistically significant predictor on *kendi* resolution, the numerical trends indicated that subjects were inclined to prefer a local antecedent for both null and overt complementizers (62% and 66%, respectively).

Having presented the findings from Experiment 1 on the offline *kendi* resolution in finite clauses, I will move on to address offline resolution of the bare reflexive in non-finite embedded clauses in Experiment 2.

4.2 Experiment 2

Experiment 2 addressed referential possibilities for the bare reflexive in non-finite subordinate clauses. As in Experiment 1, participants were asked to read sentences and to choose possible referents for this form. The possible responses were local, long-distance, both, or extra-sentential antecedent. The local referent was in the subject

[25] The nominative condition in Özbek and Kahraman (2016) was the finite counterpart of the current study.

position of the embedded clause, while the non-local antecedent was the subject of the matrix clause. The predictions for Experiment 2 are similar to those for Experiment 1.

4.2.1 Methods

Participants

In Experiment 2, fifty-three subjects were recruited for the study, who were all students at Istanbul Medipol University in Turkey. Four subjects had accuracy below 70% in filler items; hence they were discarded. Results from forty-nine participants remained for the analysis. The mean age of subjects was 20.4 (SD= 2.1); there were 40 female and nine male subjects.

Materials

Sixteen experimental sentences and filler items were constructed for the experiment. For the experimental items, there was a single condition, nominalizer morpheme on the embedded verb. The items were manipulated as to whether the matrix verb is marked with indicative or subjunctive nominalizer. See the following experimental materials:

(78) *Indicative nominalizer*

a. Demet, Özge'nin kendin-den kork-tuğ-u-nu düşün-dü.
Demet Özge-GEN self-ABL afraid of-IND-3POSS-ACC think-PAST-3SG
'Demet thought that Özge is afraid of her/herself.'

b. Timur, Mert'in kendi-ni eleştir-eceğ-i-ni san-dı.
Timur Mert-GEN self-ACC criticize-IND-3POSS-ACC think-PAST-3SG
'Timur thought that Mert would criticize him/himself.

Subjunctive nominalizer

c. Demet, Özge'nin kendin-den kork-ma-sı-na şaşır-dı.
Demet Özge-GEN self-ABL afraid of-SUBJ-3POSS-DAT surprise-PAST-3SG
'Demet was surprised that Özge was afraid of her/herself.'

In (78a) and (78b), the indicative morpheme is used to nominalize the embedded clause. In (78c), on the other hand, the subjunctive marker was used for the same purpose.[26] Each critical item was followed by a question probing the possible referent(s) of the anaphor. The order of experimental material was pseudo-randomized, and the materials were divided into two lists by a Latin Square design. Each list consisted of eight items with indicative nominalizer (i.e., four with -DIK and four with -ACAK), and eight with subjunctive morpheme. Filler items were the same as in Experiment 1. In total, participants read 32 sentences. The same randomization of items, antecedent candidates, and response appearance in Experiment 1 was applied.

Procedure

[26] Indicative and subjunctive morphemes are also termed as "factive" and "non-factive" nominalizers in the literature.

The same procedure in Experiment 1 was followed here. (See Section 3.1.1)

Analysis

A similar analysis of data as in Experiment 1 was followed. (See Section 3.1.1)

4.2.2 Results

The figures below illustrate how participants assigned references to *kendi*. Overall performance was that participants had almost similar preferences for the local antecedent and long-distance antecedent in nominalized clauses (58% and 60%). The extra-sentential antecedent was preferred in only 4% of trials.

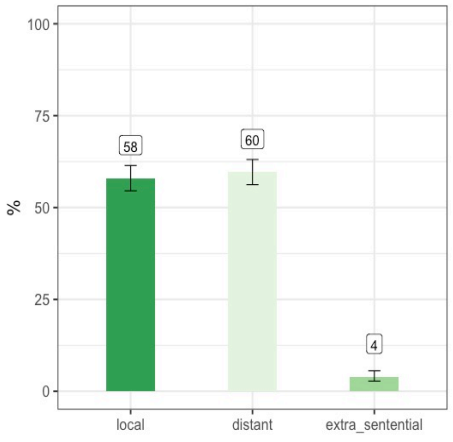


Fig.4.3 *Antecedent choices in Experiment 2. Error bars represent binomial 95% CI.*

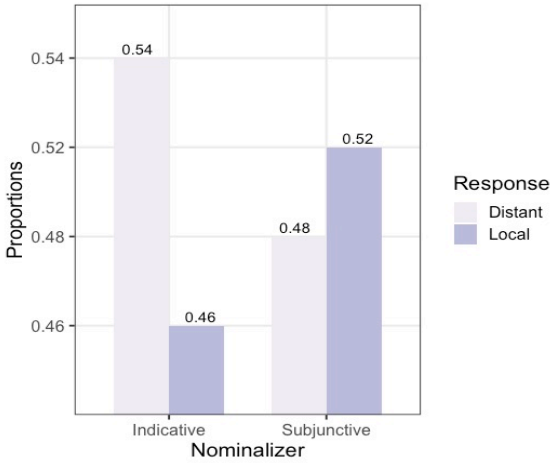


Fig.4.4 *Proportions of local and long-distance responses by nominalizer type in Experiment 2.*

Following the same procedure in Experiment 1, the intercept-only model was built initially having only random components. Then I added the nominalizer morpheme into the model as a predictor. The model comparison via the chi-square likelihood test did

not show any significant main effect of nominalizer type ($\chi^2_{df=1}$ =0.905, p>0.05). The following figure confirms this observation where responses did not show significant variation as a factor of nominalizer type.

The figures above demonstrate that participants selected local and long-distance NPs at similar rates irrespective of the nominalizer morpheme although the preference for antecedents in two conditions showed a reverse pattern (i.e., more long-distance responses in indicative nominalizer than in subjunctive).

4.2.3 Discussion

Experiment 2 tested the interpretation of the bare reflexive form in non-finite clauses. Previous studies found that Turkish speakers equally prefer local and long-distance referents for *kendi* (Özbek&Kahraman, 2016; Gračanin-Yuksek et al., 2017). Hence, the results from Experiment 2 are parallel with the existing literature. That is, I found that participants in Experiment 2 chose both local and long-distance NPs at similar rates.

Another objective in this experiment was to examine if distinct nominalizer morphemes modulated participants' antecedent selection, a research question that have not been addressed in the literature. The results suggest that participants do not distinguish nominalizer morpheme on the embedded verb in selecting antecedent for the reflexive. They chose local and non-local antecedents at similar rates in two morpho-syntactic configurations.

4.3 General Discussion

In this chapter, I aimed to bring an experimental approach to offline reference assignment for *kendi* in varying structures. This anaphoric unit has received extensive attention in the syntactic literature due to mixed views on whether it respects to locality constraint as formulated in Principle A of Binding Theory. The majority of reported judgments on offline *kendi* resolution have come from researchers' intuitions if not from a handful of informants. Özbek&Kahraman (2016) and Gračanin-Yuksek et al., (2017) are exceptions to this in that these studies systematically collected data in evaluating existing views. The findings in Özbek&Kahraman (2016) and Gračanin-Yuksek et al., (2017) were unexpected regarding what has been commonly reported in syntactic accounts. That is, they showed that the bare reflexive can be in coreferential relation with a long-distance antecedent as well as with a local antecedent. However, the test materials in the cited work mostly include only nominalized embedded clauses. Thus, the current experiments in this chapter aimed to extend findings of Özbek&Kahraman (2016) and Gračanin-Yuksek et al., (2017) by including syntactic configurations that have not been investigated previously. To be specific, two experiments were designed to test overall *kendi* interpretation in finite and non-finite subordinate clauses separately. For finite complement clauses, I further addressed whether the complementizer type and case marking on the embedded subject in finite clauses would affect speakers' judgment. For non-finite subordinates, I tested if any judgment variation occurred depending on the nominalizer morpheme on the embedded verb.

The results from Experiment 1 showed that although the participants were more likely to choose the local antecedent for *kendi* in finite clauses they did not entirely disregard the long-distance antecedent. Nonetheless, the non-local reading of the

reflexive was mostly attested when the embedded subject had an accusative case, in other words in ECM clauses. Based on this, the findings suggest that Turkish speakers do not allow the long-distance binding of reflexive in finite embedded clause unless it is an ECM construction. Finally, this finding is inconsistent with results from Özbek&Kahraman (2016) in that they found that both local and long-distance interpretations were equally likely in finite clauses (i.e., NOM-conditions in their test items), contrary to the experimental findings reported here.

Moving on to the results from Experiment 2, I found that the findings are consistent with the experimental literature conducted using non-finite embedded clauses. Two existing experimental studies reported that Turkish speakers preferred both local and long-distance referents at similar rates in non-finite configurations. Similarly, the results from Experiment 2 showed the same pattern. Given this, the empirical evidence from Experiment 2 provided support for claims in some syntactic and pragmatic accounts that *kendi* can be coreferential with a long-distance antecedent.

Further, another objective in Experiment 2 was to test the influence of nominalizer morpheme used in constructing nominalized embedded clauses. Two morphemes were under the investigation: Indicative and subjunctive nominalizer. The results showed that both local and long-distance referents are equally possible in the given distinct nominalized subordinate clauses.

Finally, in both experiments, the participants overwhelmingly did not choose the extra-sentential antecedent (4%). This observation was consistent with existing theoretical and experimental literature on *kendi* distribution.

4.4 Conclusion

This chapter was an investigation of offline interpretation of the reflexive pronoun in Turkish by collecting systematic data. Two experiments were designed to test how native Turkish speakers assign an antecedent to the anaphor in two syntactically distinct constructions.

The overall results suggest that judgments on *kendi* show variation depending on the clause type. If the subordinate clause is finite, Turkish speakers dominantly prefer a local antecedent by ruling out the non-local antecedent. This generalization falls short if the finite embedded clause is an ECM structure. On the other hand, the long-distance construal for *kendi* is permissible in non-finite nominalized embedded clauses. The findings are consistent with reported judgments for non-finite clauses. The results can be taken as evidence for the fact that the Turkish reflexive behaves as a local anaphor like its English counterpart except in nominalized clauses. As discussed in previous chapters, nominalized clauses bear peculiarities with binding facts due to the defective CP. In result, the data presented so far fit overall syntactic generalizations in the literature. Finally, this finding will form a basis for investigating the real-time processing of the bare reflexive in Turkish, especially for constructing test materials. For the following chapter, I will assume that Turkish is a local anaphor unless it is an argument of nominalized embedded clauses.

CHAPTER 5

Eye-tracking evidence for realtime processing of *kendi*

In this chapter, I will address the antecedent retrieval mechanisms during reflexive processing in Turkish. The accurate sentence comprehension requires that human parser must link non-adjacent units in an utterance. Maintaining such a connection between linguistic units for a successful sentence comprehension requires memory access because the focus of attention is limited to one-to-four items during the parse (Cowan, 2000; McElree, 2001). This observation applies to the processing of anaphoric dependencies. Previously processed words, namely antecedents, will not be in the focus of attention when the parser encounters the reflexive form. A great amount of work claimed that sentence comprehension, including anaphoric dependencies, is subversed by a content-addressable memory architecture, which suggests that retrieval takes places if a linguistic form matches a set of retrieval cues (Martin & McElree, 2008; McElree, 2000; McElree, Foraker, & Dyer, 2003; Van Dyke, 2007; Van Dyke & McElree, 2006, 2011). The content-addressable memory model predicts that grammatically incorrect but feature matching elements can be retrieved, a similarity-based interference. In other words, non-target elements carrying a cue that matches with the dependent form can be retrieved during the processing.

Growing body of research has examined what sources of information can be the cues for activating previously encountered items in the memory. The number feature,

for instance, can be used as a cue in parsing subject-verb dependency (Wagers et al., 2009). Also, semantic and pragmatic properties can activate ungrammatical elements in Negative Polarity Items (Vasishth et al., 2008; Xiang et al., 2009). However, the parser's sensitivity to various linguistic information varies based on the dependency type that is being processed (e.g., wh-dependency, subject-verb, ellipsis, anaphors). Further, the findings on the processing reflexive dependency provide a mixed picture of sources that can be used in gating the retrieval. That is, a number of potential linguistic information in the literature are argued to act as a cue in the processing of reflexives, including gender/number agreement, discourse prominence, syntactic constraints (Badecker and Straub, 2002; Sturt, 2003; Dillon et al., 2013). As detailed in Chapter 2, the variation of research results in the literature pertains to the weight of the cues that are used during the antecedent retrieval for reflexives. The debate is mainly rooted in whether the syntactic constraints are highly weighted over non-structural cues.

As Rayner (1998) puts, the eye-tracking data help researchers gain information about the time course of the language processing at any point in a sentence, thus the two eye-tracking experiments will be conducted. The chapter aims to test the role of syntactic, semantic, and surface-string locality in retrieving the antecedent for the Turkish reflexive *kendi*. The inclusion of the semantic feature to the paradigm lays in the gender-neutral property of the Turkish language. Further, I wanted to test if the linear distance of possible antecedents plays a role in constructing dependency for *kendi*. The two cue candidates will be evaluated against the structural constraint. Namely, I will ask whether the semantic information or linear distance information of the ungrammatical antecedent induces an intrusion effect. If the binding constraint takes priority in

accessing linguistic memory, then the parser never considers the distractor referent with a matching cue.

The time course of antecedent retrieval for the Turkish reflexive *kendi* using the eye-tracking technique has not been examined previously, which may be due to the imprecise, or unclear binding domain the reflexive. The formal analysis in Chapter 3 and judgment tasks in Chapter 4 for the non-person *kendi* showed that the long-distance interpretation is attested in non-finite clauses and ECM constructions. In other contexts, this anaphoric expression requires a local antecedent, and hence it fits the formulation of Principle A of BT. This enables me to manipulate the structural distance of the potential antecedents, which are either grammatical and ungrammatical within the Binding Theory. Further, in both experiments, the animacy feature on potential antecedents is manipulated as the Turkish reflexive requires a sentient antecedent. Finally, the surface distance of the ungrammatical antecedent to the reflexive was manipulated separately. That is, the test materials in Experiment 3 consist of object relative clauses (i.e., the ungrammatical antecedent being linearly distant to the reflexive) whereas the test items in Experiment 4 are adverbial clauses (i.e., the distractor noun being in proximity to the reflexive). Manipulating the string position of the binding inaccessible NP enables to test if the parser is attentive to the recency of the information (i.e., memory) in the early stage of processing. Specifically, I ask to find whether the distractor exerts an influence on the processing due to its proximity to the reflexive despite that it is in a syntactically illicit configuration.

One final but important note regarding the test items is about the grammatical role of the potential antecedents. In describing the sources of information during

anaphor processing, Nicol and Swinney (2003) put forward that the prominence of potential antecedents modulates retrieving antecedents from the memory. As the subject role has prominence over the object role in a sentence, introducing a distractor with an object may serve as a confound in processing reflexive dependency. In this respect, two existing works in the literature can be compared. Straub (2002) found an intrusion effect from distractor, which had the subject role. The inaccessible antecedent in Sturt (2003), on the other hand, had an object role, and he failed to find an effect of distractor on the processing. This suggests that the subject role can be used as a retrieval cue as this role has more prominence over the object role. With that in mind, the binding accessible and inaccessible nouns will have the subject role in the current eye-tracking experiments to avoid a possible confound of grammatical roles on reflexive processing.

5.1 Experiment 3

This eye-tracking experiment aimed to test the role of the structural and semantic cues (e.g., animacy feature) in online reflexive processing. Two predictions can be made for this experiment. The first prediction is that if the parser gives more weight to structural cue in retrieving the antecedent for *kendi*, I expect to find a reliable effect of the accessible antecedent (i.e., processing difference occurs in local antecedent's animacy match/mismatch). In other words, the parser should remain immune to the semantic content of the inaccessible noun. On the other hand, if the antecedent retrieval is guided by structural and semantic cues, I should see significant effects of the animacy of the distractor noun (i.e., match and mismatch with the reflexive). Also, any interference

effect from the animacy matching distractor should be evidence for the idea that the parser is guided by the semantic information as well.

5.1.1 Methods

Participants

Forty members of Middle East Technical University in Ankara, Turkey participated in the eye-tracking study. Four participants were excluded due to tracking loss during the experiments. The data from the remaining thirty-six subjects were entered into analyses (Mean age=22.4, F=21). The subjects gave Cornell University's IRB informed consent. They received 25 Turkish Lira ($5) in exchange for their participation.

Materials

All of the materials were a single sentence. There were sixteen test materials based on the verbs that had been selected in the norming study. The reflexive in test items was the argument of the embedded verb. The test materials consisted of object relative clauses. The extracted object, which was the subject of the main clause, c-commanded the reflexive hence it was the only grammatical antecedent. The subject of the relative clause was the binding incompatible antecedent. The extraction from relative clauses created two subject NPs so that the possible confound of the distinct grammatical roles of antecedents on processing can be eliminated. Test items were manipulated in animacy

feature to ensure (mis)match of candidate referents. The structure of the experimental trials had a fixed format like (79) below:

(79) [*(In)animate NP* __ verb]$_{RC}$ *(In)animate NP* adverbial / *kendi* / ref.spillover / verb / verb spillover.

Critical regions in the test items were *kendi* and the words following it as the slashes indicate in (79). The reflexive spillover region consisted of either time or place adverbial while the main verb spillover was a postposition. Four Latin-squared lists were created to randomize critical items, which presented each test item in one of the four conditions below:

(80)

Accessible match/Inaccessible mismatch

a. Medyanın gösterdiği çocuk geçen hafta / kendinden / odada / korkmuş,/ ifadelere göre.

   "Last week, the kid that media reported was afraid of kendi in the room according to statements."

Accessible match/Inaccessible match

b. Öğretmenin çağırdığı çocuk geçen hafta / kendinden / odada / korkmuş,/ ifadelere göre.

   "Last week, the kid that the teacher talked to was afraid of kendi in the room according to statements"

Accessible mismatch/ Inaccessible match

c. Psikoloğun yazdığı reçete geçen hafta / kendinden / odada / korkmuş,/ ifadelere göre.

"Last week, the prescription that the psychologist wrote was afraid of kendi in the room according to statements"

Accessible mismatch/Inaccessible mismatch

d. Medyanın gösterdiği tablo geçen hafta / kendinden / odada / korkmuş,/ ifadelere göre.

"Last week, the portrait that media reported was afraid of kendi in the room according to statements"

Note that the regions after the main subject were identical to avoid potential lexical bias. I had the test items in a 2x2 factorial design (i.e., accessible match/mismatch and inaccessible match/mismatch). The frequency of each condition across the lists was identical.

To distract participants' attention from the critical items, seventy-four filler items were constructed for the experiment. The structures of fillers showed variation. Nonetheless, several fillers included postpositions, which were also part of the experimental items. The postpositions are not frequently attested in daily use, and hence attention to the experimental items was aimed to be avoided by designing fillers with them. As some of the test items were not grammatical, the fillers also included sentences that had varying grammatical violations such as agreement, case marking or animacy incongruency (i.e., one-third of total fillers). Again, the objective with this approach

was to circumvent a possible association of *kendi* with ungrammatical/infelicitous sentences (i.e., accessible mismatch/inaccessible mismatch condition). To ensure that participants would be attentive to experimental items, there occurred a follow-up comprehension question for half of the fillers including a portion of ungrammatical/infelicitous filler items. No comprehension question was asked for reflexive items to avoid priming of critical items.

Procedure

Participants were asked to read sentences at a normal reading speed and to answer comprehension questions that may follow the sentences. The stimuli were presented in Arial 18 font on the screen, which was 60cm away from the participants' eyes. The participants were instructed that the experiment would start with an empty display. To trigger the appearance of an item on the display, the subjects had to fixate their eyes to a circle on the top-left corner of the screen. Once they read an item, the next item was triggered only when they made a fixation to another circle on the bottom-right-corner of the display. If the fixations to circles were not accurate enough, the transition to the next item failed. This procedure applied to all items including those with a follow-up question. To indicate their responses to comprehension questions, the subjects used a joystick that they had in their hands during the whole experiment session. The fixation-triggered transition between items and joystick usage served to prevent any distraction that would otherwise arise by pressing keyboard buttons during the experiment. A practice session with six questions preceded the experimental session to familiarize

participants with the experiment format. The practice session included both grammatical and ungrammatical sentences and some of them were followed by a comprehension question.

Eye-movements were recorded by SR Eyelink 1000 Plus with a chin rest to stabilize the head. Data was collected from the right-eye. The sampling rate of the eye-tracker for the pupil location was 1000ms. Each experimental session started with a 9-point calibration and validation process. Participants were tested individually, where the experiment lasted between 30-45 mins.

Analysis

The experimental items consisted of a single clause. The regions of interest were the reflexive pronoun, the reflexive spillover, the main verb and the main verb spillover. Fixations below 20ms and above 1000ms for a single fixation were removed. If not a single fixation, fixations above 3000ms were discarded from data. This data cleaning process was applied to each time measure for each region separately to avoid excessive and useful data loss.

The analysis included five reading time measures: first fixation time (FFT), first-pass reading time (FPRT or gaze duration), regression path duration (RPD or go-past time), second-pass reading time (SPRT) and total fixation time (TFT). First fixation and gaze duration and go-past times are the time stamps signaling the early stage of processing while second-pass time and total fixation time are to mark the late stage of processing. *First fixation* is the duration of the very first fixation on an area of interest

that is entered from left. *First pass reading time* (or gaze duration, if it is a single word) reflects the sum of all the fixations made in a region until the fixation leaves the region either to the left or to the right. Importantly, first fixation and gaze duration are identical if there is only a single fixation to the interest area. These two measures are generally considered to be the earliest point where a disruption to processing is documented as they mark the first encounter of readers with the region of the interest. *Regression path times* (or go-past duration) is the sum of all fixations from first entering a region until leaving the region to the right. *Second pass reading time* reflects the sum of all fixations in the region following the initial first-pass fixations. *Total reading time* sums all fixations on a region on the first pass or any following reading times. This measure includes the time spent on any re-reading of the critical area excluding the regression from this region.

Results from 36 subjects were entered into the analysis. Statistical analysis consisted of building linear mixed-effects models using *lmer* package in R environment. Using a linear mixed effects model allows for subject-level and item-level variance unlike ANOVA (Baayen, 2008). The statistical computation was in the folds. Firstly, I tested the main effects of antecedent and distractor noun and their interaction. For the set of models testing main effects accessible, inaccessible nouns and their interaction were the fixed effects, while items and participants were the random components. The random units in models were in the form of random intercepts of subjects and items. The model comparison between the random intercept and random slope did not yield a significant difference, hence all linear models included by-item and by-participant random intercepts for simplicity. A stepwise regression method (e.g., forward selection)

was adopted for model fitting. With this methodology, I always started with the null model with no variables but the intercept. Then the complexity of the model incremented by adding a variable at a time, which eventually yielded four models for each region. The model with a significantly improved fit to data was selected as the best fitting-model. Likelihood ratio tests were performed for the goodness of fit of two competing models (i.e., the full model with the effect in question against the reduced model without the effect in question) and Chi-square and p-values were reported from LR tests. A Tukey HSD pairwise test was adopted for significant predictor(s) in the best fitting model.

The second phase of data analysis consisted of building a linear mixed-effects model for the effect of interference from the distractor noun, which was a nested contrast analysis. For this, I built three contrasts for the model: i) differences in match/mismatch conditions of accessible and inaccessible nouns (i.e., this component is similar to the previous modeling to find the main effect of two nouns) ii) Match interference (i.e., any interference from distractor in antecedent match conditions) iii) Mismatch interference (i.e., any interference from distractor in antecedent mismatch conditions), where the last two is of my interest. The contrasts were coded in a way that a positive coefficient means that reading times increased in distractor match conditions (i.e., inhibitory effect, or processing slow-down) while a negative coefficient means faster reading times in distractor match (i.e., facilitatory effect, or processing speed-up). In the nested contrast analysis for the interference effect, a single linear model was fit for dependent eye-measures, then the estimates with p-values from this model were reported.

Finally, for each reading-time measure at each region, outliers and normality of data were inspected visually with residual plots and histograms. Further data normality was inspected (i.e., skewness and kurtosis) using *funModeling* package (Casas, 2019). Log-transformation for the dependent variable was implemented for each time measure and critical region when any clear deviation from homoscedasticity or normality was identified. For the transformed dependent predictor, a log-linear mixed effects model was fit to data. Ad hoc tests for log-linear models reported estimates in log-values, then they were back-transformed for interpretation.

5.1.2 Results

For the comprehension questions in filler items, the mean response accuracy was 85%. The analyses included five time measures in the experiment, and the results for each time measure will be provided separately (see TableA.1 in the Appendix for raw mean reading times). As for the convenience, Table5.1 below demonstrates chi-squared results and p-values obtained from model comparisons using LR tests for all time measures per region of interest. In the table, *Accessible NP* represents the model difference between the intercept model and the model with the accessible antecedent. *Inaccessible NP* represents the addition of inaccessible NP to the previous model, *Accessible NP*. Finally, *Interaction* represents the addition of the interaction of main effects to *Inaccessible NP* model. Detailed model results will be provided separately for each reading-time measure in what follows.

Measure	Region	Factor	Chi-Square	p-value
First fixation time (FFT)	Reflexive	Accessible NP	0.09	0.76
		Inaccessible NP	0.65	0.41
		Interaction	0.08	0.77
	Reflexive spillover	Accessible NP	**4.54**	**0.03***
		Inaccessible NP	0.16	0.68
		Interaction	0.43	0.50
	Main verb	Accessible NP	0.54	0.45
		Inaccessible NP	0.61	0.43
		Interaction	2.83	0.09
	Main verb spillover	Accessible NP	0.19	0.65
		Inaccessible NP	0.25	0.61
		Interaction	1.73	0.18
First-pass reading time (FPRT, or gaze duration)	Reflexive	Accessible NP	0.52	0.47
		Inaccessible NP	0.00	0.99
		Interaction	0.65	0.41
	Reflexive spillover	Accessible NP	**12.53**	**0.001***
		Inaccessible NP	0.94	0.33
		Interaction	3.14	0.07
	Main verb	Accessible NP	0.01	0.89
		Inaccessible NP	0.30	0.58
		Interaction	1.34	0.24
	Main verb spillover	Accessible NP	0.20	0.64
		Inaccessible NP	0.14	0.70
		Interaction	0.00	0.97
Regression-path duration (RPD, or go-past)	Reflexive	Accessible NP	1.54	0.21
		Inaccessible NP	1.90	0.16
		Interaction	1.51	0.21
	Reflexive spillover	Accessible NP	**6.20**	**0.01***
		Inaccessible NP	1.60	0.20
		Interaction	3.09	0.07
	Main verb	Accessible NP	0.47	0.49
		Inaccessible NP	0.04	0.84
		Interaction	2.75	0.09
	Main verb spillover	Accessible NP	NA	NA
		Inaccessible NP	NA	NA
		Interaction	NA	NA
Second-pass reading time (SPRT)	Reflexive	Accessible NP	0.26	0.60
		Inaccessible NP	0.06	0.79
		Interaction	2.82	0.09
	Reflexive spillover	Accessible NP	0.003	0.95
		Inaccessible NP	1.03	0.30
		Interaction	1.24	0.26
	Main verb	Accessible NP	2.20	0.13
		Inaccessible NP	2.60	0.27
		Interaction	2.13	0.14
	Main verb spillover	Accessible NP	0.55	0.45
		Inaccessible NP	0.27	0.59
		Interaction	0.27	0.60
	Reflexive	Accessible NP	13.69	**0.001***
		Inaccessible NP	9.07	**0.002***
		Interaction	2.13	0.14
	Reflexive spillover	Accessible NP	23.86	**0.001***

Total fixation time(TFT)		Inaccessible NP	4.36	**0.03***
		Interaction	0.02	0.70
	Main verb	Accessible NP	23.70	**0.001***
		Inaccessible NP	4.17	**0.04***
		Interaction	0.89	0.34
	Main verb spillover	Accessible NP	12.50	**0.001***
		Inaccessible NP	0.04	0.82
		Interaction	0.36	0.54

Table 5.1 Model assessment results from likelihood-ratio tests for the main effects of antecedent, distractor and interactionat at critical regions per time measure

First Fixation Time

Figure5.1 shows the mean reading times per region of interest. For first fixation time, I found a significant main effect of Accessible NP at the reflexive spillover region ($X^2(1) =4.54$, p=0.03). No other significant main effect was found in any other region for the factors in question. Table5.2 demonstrates the results from model comparisons and estimates including p-values. The independent variables are Accessible NP, Inaccessible NP and their interaction. The table summarizes model improvement in each step. As noted earlier, I opted for the forward selection method for the model improvement evaluation. Hence, I ended up with four models: intercept, two predictors, and the interaction term. Model1 is the null model with the intercept only. Model2 represents the addition of AccessibleNP to the null model. Model3 includes InaccessibleNP and AccessibleNP as predictors. Finally, Model4 is the full model with the interaction term. The significance of predictors was assessed gradually. That is, Model2 tests whether the data fits better if AccessibleNP was entered in the model while Model3 tests only the model improvement with InaccessibleNP. Likewise, Model4 tests the significance of the interaction term. The model selection criteria were p-values of the variables. The model with the lowest p-value had the best data fit.

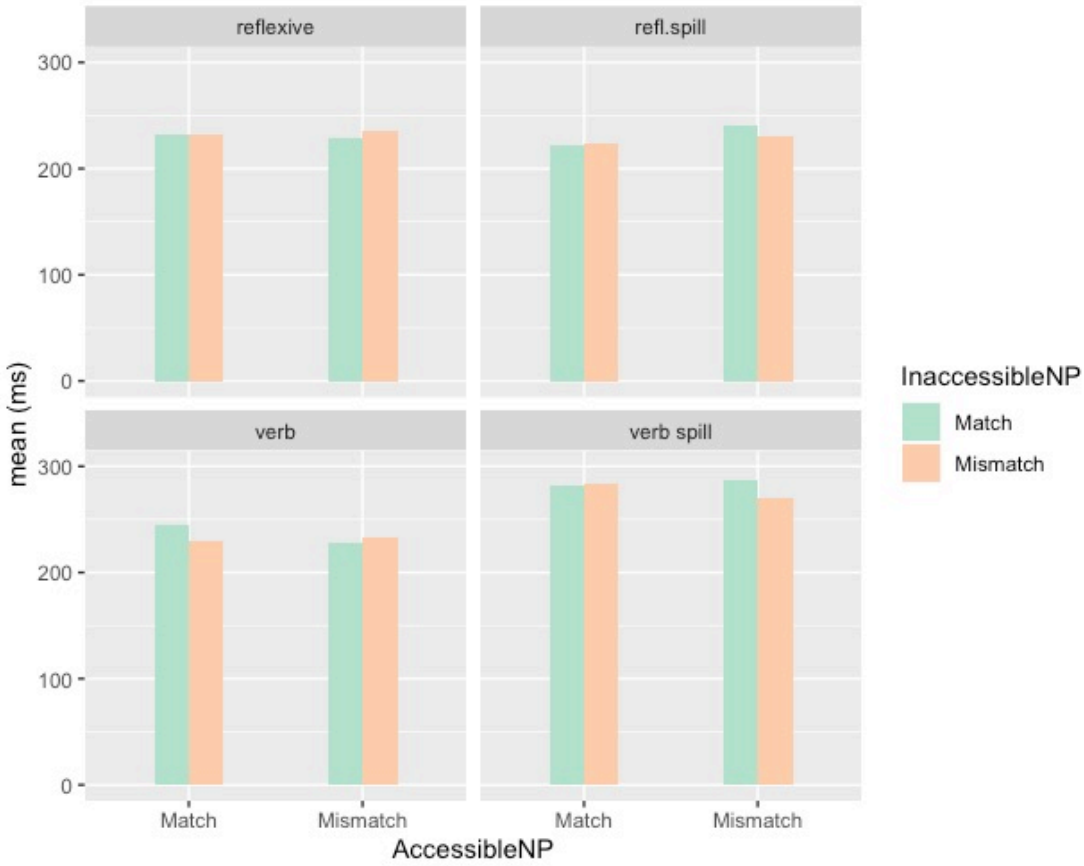


Fig.5.1 *Mean reading times for first fixation per region in Experiment 3*

		Model1		Model2		Model3		Model4	
Refl.	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.40	**<0.001**	5.39	**<0.001**	5.38	**<0.001**	5.38	**<0.001**
	Accessible NP: Mismatch			0.01	0.761	0.01	0.759	0.01	0.673
	Inaccessible NP: Mismatch					0.02	0.418	0.03	0.436
	AccessNPMismatch: InaccessNPMismatch							-0.01	0.772
Refl. Spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	230.10	**<0.001**	223.54	**<0.001**	224.77	**<0.001**	222.73	**<0.001**
	Accessible NP: Mismatch			12.90	**0.033**	12.87	**0.033**	16.88	**0.048**
	Inaccessible NP: Mismatch					-2.45	0.684	1.59	0.853
	AccessNPMismatch: InaccessNPMismatch							-8.00	0.507
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	233.12	**<0.001**	235.56	**<0.001**	238.03	**<0.001**	243.36	**<0.001**
	Accessible NP: Mismatch			-4.86	0.460	-4.85	0.460	-15.49	0.088
	Inaccessible NP: Mismatch					-5.15	0.434	-16.25	0.080
	AccessNPMismatch: InaccessNPMismatch							22.10	0.092
Verb Spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.54	**<0.001**	5.54	**<0.001**	5.55	**<0.001**	5.53	**<0.001**
	Accessible NP: Mismatch			-0.01	0.656	-0.01	0.651	0.03	0.544
	Inaccessible NP: Mismatch					-0.01	0.617	0.02	0.558
	AccessNPMismatch: InaccesNPMismatch							-0.08	0.188

Table 5.2 Stepwise regression results with p-values for first fixation

Table5.3 shows the results from post-hoc pairwise comparisons for the levels of AccessibleNP in the reflexive spillover. The mean reading time in antecedent match conditions was 223ms ± 6.91 whereas mean reading time was 236ms± 6.86 in mismatch conditions. The results from ad-hoc analysis demonstrated that reading times increased about 12ms ± 6.05 when the grammatical antecedent did not match with the reflexive in animacy.

Means	*Mean*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match	223.53	6.91	53	209.66	237.40	32.31	<0.00
Mismatch	236.43	6.86	51	222.64	250.21	34.42	<0.00
Contrast	*Estimate*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match- Mismatch	-12.89	6.05	472	-24.79	-0.99	-2.13	0.03

Table 5.3 Post hoc analysis for the levels of accessible noun at the reflexive spillover in first fixation.

Table5.4 below provides the model results from nested contrasts testing for an interference effect in antecedent match and mismatch conditions. The model did not reveal a significant interference at any critical region for first fixation. That is, the animacy of the distractor nested within animate/inanimate antecedent conditions did not induce reliable reading time differences.

Comparisons		Refl			Refl.spill			Verb			Verb spill		
		Coef	*SE*	*p*	*Coef*	*SE*	*p*	*Coef*	*SE*	*p*	*Coef*	*SE*	*p*
First	Interference (ant.match)	-0.9	8.49	0.9	-1.5	8.56	0.8	16	9.30	0.08	-.02	0.04	0.2

Fixation	Interference (ant.mismatch)	-6.8	8.52	0.4	-9.9	6.46	0.4	-5.8	9.25	0.5	0.05	0.02	0.5

Table 5.4 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in first fixation

Gaze Duration

Figure5.2 shows mean reading times per region for gaze duration.

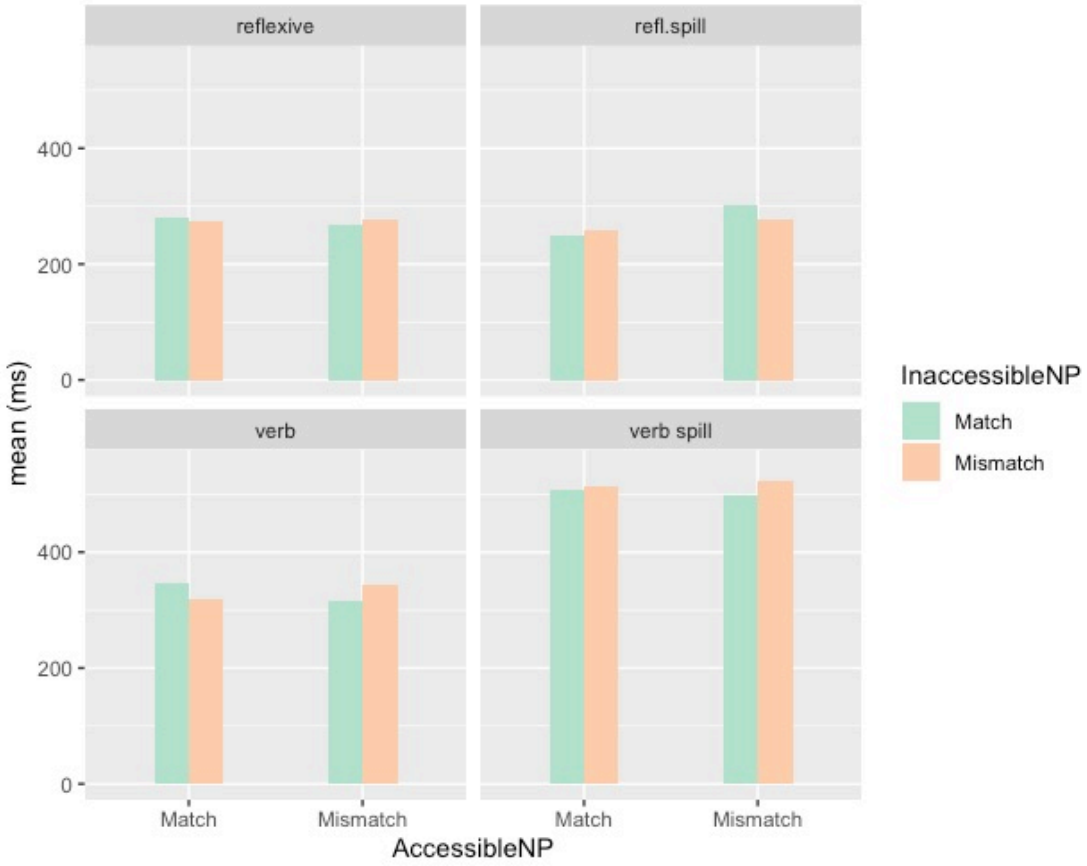


Fig.5.2 Mean reading times for gaze duration per region in Experiment 3

Table5.5 below shows the results of model estimates and p-values per critical region. In this time measure, I found a significant main effect of AccessibleNP at the reflexive

spillover region ($X^2(1)=12.53$, p=0.0003). No other factors were found to be significant at any region for gaze duration.

Regions		Model1		Model2		Model3		Model4	
Reflexive	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.40	**<0.001**	5.39	**<0.00**	5.38	**<0.00**	5.38	**<0.00**
	Accessible NP: Mismatch			0.01	0.761	0.01	0.759	0.01	0.673
	Inaccessible NP: Mismatch					0.02	0.418	0.03	0.436
	Access.NPMismatch: Inaccess.NPMismatch							-0.01	0.772
Reflexive Spill-over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	230.1	**<.001**	223.5	**<0.00**	224.7	**<0.00**	222.7	**<0.00**
	Accessible NP: Mismatch			12.90	**0.033**	12.87	**0.033**	16.88	**0.048**
	Inaccessible NP: Mismatch					-2.45	0.684	1.59	0.853
	Access.NPMismatch: Inaccess.NPMismatch							-8.00	0.507
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	233	**<0.00**	235.5	**<0.001**	238.03	**<0.001**	243.36	**<0.001**
	Accessible NP: Mismatch			-4.86	0.460	-4.85	0.460	-15.49	0.088
	Inaccessible NP: Mismatch					-5.15	0.434	-16.25	0.080
	Access.NPMismatch: Inaccess.NPMismatch							22.10	0.092
	Predictors	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.54	**<0.001**	5.54	**<0.001**	5.55	**<0.001**	5.53	**<0.001**

Verb Spill-over	Accessible NP: Mismatch			-0.01	0.656	-0.01	0.651	0.03	0.544
	Inaccessible NP: Mismatch					-0.01	0.617	0.02	0.558
	Access.NPMismatch: Inacces.NPMismatch							-0.08	0.188

Table 5.5 Stepwise regression results with p-values in gaze duration

Table5.6 shows the results from Ad-hoc contrast analysis for AccessibleNP at the reflexive spillover area. The mean reading time in match conditions was 256ms ± 9.55 whereas mean reading time was 288ms± 9.45 in mismatch conditions. The ad hoc test showed that participants showed a delay in reading by 31ms ± 9.02 in mismatch conditions.

Means	*Mean*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match	256.26	9.55	52	237.09	275.43	26.82	<0.0001
Mismatch	288.24	9.45	50	269.25	307.24	30.47	<0.0001
Contrast	*Estimate*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match- Mismatch	-31.98	9.02	478	-49.71	-14.24	-3.54	0.0004

Table 5.6 Post hoc analysis for the levels of accessible noun at the reflexive spillover region in gaze duration

Table5.7 shows that the model testing the interference effect reached the borderline significance in antecedent mismatch conditions at the reflexive spillover area (p=0.056). At this region, the interference caused a processing slowdown for 25±13ms.

	Refl	Refl.spill	Verb	Verb spill

		Coef.	*SE*	*p*	*Coef.*	*SE*	*p*	*Coef.*	*SE*	*p*	*Coef.*	*SE*	*p*
Gaze Dur.	Interference (ant.match)	-5.90	13	0.65	-7.49	12.7	0.5	27.1	18.2	0.14	-2.36	33.6	0.9
	Interference (ant.mismatch)	6.56	13	0.62	24.2	12.5	**0.056***	-30	18.2	0.1	-23.3	33.4	0.4

Table 5.7 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in gaze duration

Go-past Time

Figure5.8 shows mean reading times in each region of interest. For go-past time, I found a significant main effect of AccessibleNP in the reflexive spillover region ($X^2(1)=6.20$, p=0.01). InaccessibleNP and the interaction term were not found to be significant predictors in any region for this eye measure. Table5.8 shows the model estimates for go-past time per region.

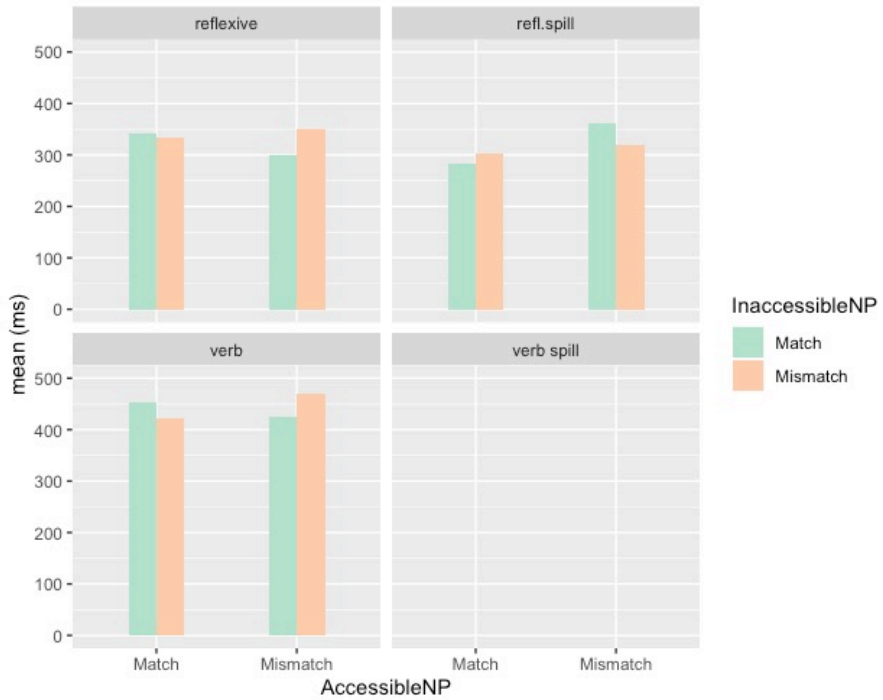


Fig.5.3 *Mean reading times for go-past time per region in Experiment 3*

		Model1		Model2		Model3		Model4	
Refl.	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.65	**<0.001**	5.68	**<0.001**	5.65	**<0.001**	5.67	**<0.001**
	Accessible NP: Mismatch			-0.05	0.212	-0.05	0.212	-0.09	0.080
	Inaccessible NP: Mismatch					0.05	0.167	0.01	0.913
	AccessibleNPMismatch: InaccessibleNPMismatch							0.09	0.217
Refl. spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*P*
	(Intercept)	5.63	**<0.001**	5.57	**<0.001**	5.60	**<0.001**	5.56	**<0.001**
	Accessible NP: Mismatch			0.10	**0.012**	0.10	**0.013**	0.18	**0.003**
	Inaccessible NP: Mismatch					-0.05	0.205	0.02	0.715
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.14	0.078
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.90	**<0.001**	5.89	**<0.001**	5.88	**<0.001**	5.92	**<0.001**
	Accessible NP: Mismatch			0.03	0.491	0.03	0.491	-0.04	0.506

	Inaccessible NP: Mismatch					0.01	0.840	-0.07	0.299
	AccessNPMismatch: InaccessNPMismatch.							0.15	0.096

Table 5.8 Stepwise regression results with p-values for go-past time

Table5.9 shows the results from the ad-hoc pairwise Tukey test for Accessible NP in reflexive spillover area. The mean reading time in antecedent match was 263ms ± 10.45 whereas mean reading time was 292ms± 11.46 in mismatch conditions. The ad hoc post analysis showed that participants showed a delay in reading by 28ms ± 10 when the accessible noun was a mismatch.

Means	*Mean*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match	263.63	10.45	53	243.48	285.45	21.87	<0.0001
Mismatch	292.36	11.46	51	270.23	316.30	22.44	<0.0001
Contrast[27]	*Ratio*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match / Mismatch	0.90	0.03	478	**NA**	**NA**	-2.48	0.013

Table 5.9 Post hoc analysis for the levels of Accessible NP in the reflexive spillover region for go-past time

Results from contrasts analysis for an interference effect in antecedent match and mismatch conditions were provided in Table5.10. We see a significant interference effect in antecedent mismatch conditions at reflexive spillover ($p<0.05$). The distractor noun induced reading slowdown for 43±21ms for gaze duration. Further, a marginally

[27] Post hoc tests were performed on log scale, then model estimates were back-transformed.

significant interference effect emerged at the reflexive region (p=0.06). However, the interference from the inaccessible noun at the reflexive area yielded a processing speed up for 50±20ms.

		Refl			**Refl.spill**			**Verb**		
		Coef	SE	p	Coef	SE	p	Coef	SE	p
Go-past time	Interference (ant.match)	-0.00	0.05	0.9	-0.02	0.05	0.7	0.06	0.06	0.3
	Interference (ant.mismatch)	-0.09	0.05	0.06	0.12	0.05	**0.03***	-0.08	0.06	0.1

Table 5.10 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in go-past time

Second-pass Reading Time

Mean reading times in this timestamp are provided in Figure5.4. For this timestamp, I had many missing data. At the reflexive region, I had 199 NAs introduced, which made up 36% of observations. At the reflexive spillover, the portion of missing data was 39%. In the verb region, I had 31% of missing data. Finally, in the verb spillover area, 43% of data were missing. This eventually decreased the statistical power of the analysis. Given this backdrop, I found no significant main effect for the antecedent, distractor, and their interaction. Also, the model did not reveal any significant interference effect. I still provide the mean reading times and model estimates below in Table11 .

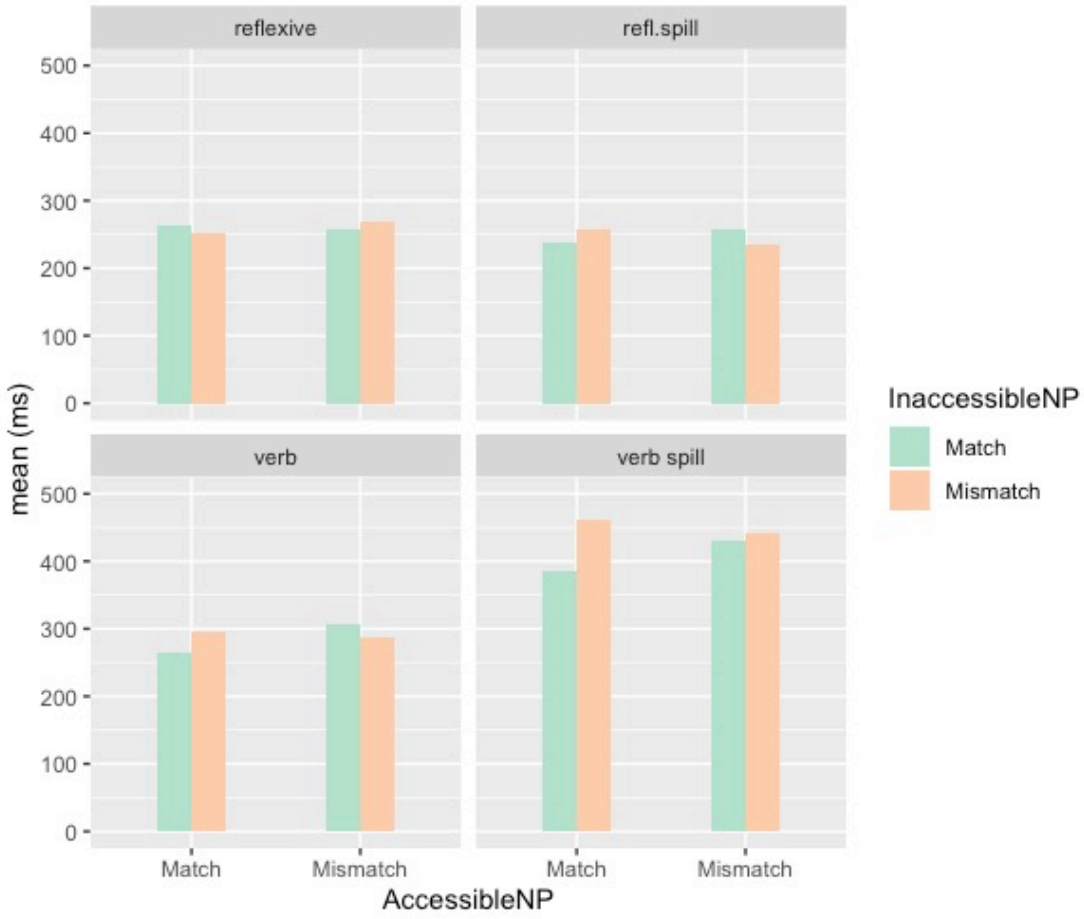


Fig.5.4 *Mean reading times for second pass time per region in Experiment 3*

Note that Model4 shows that AccessibleNP in verb region was significant. However, as highlighted previously, the forward stepwise regression method evaluates model improvement at a time thus Model4 differs from Model3 only in the interaction term. In other words, AccessibleNP did not add complexity at this step, but in Model1.

		Model1		Model2		Model3		Model4	
Refl.	*Predictors*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*
	(Intercept)	5.48	**<0.001**	5.47	**<0.001**	5.47	**<0.001**	5.50	**<0.001**
	Accessible NP: Mismatch			0.02	0.609	0.02	0.600	-0.04	0.457
	Inaccessible NP: Mismatch					-0.01	0.793	-0.09	0.149
	AccessibleNPMismatch: InaccessibleNPMismatch							0.14	0.091
Refl. Spill over	*Predictors*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*
	(Intercept)	5.43	**<0.001**	5.43	**<0.001**	5.43	**<0.001**	5.46	**<0.001**
	Accessible NP: Mismatch			-0.00	0.955	-0.00	0.994	0.05	0.439
	Inaccessible NP: Mismatch					-0.05	0.308	0.01	0.849
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.11	0.263
Verb	*Predictors*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*
	(Intercept)	5.57	**<0.001**	5.53	**<0.001**	5.52	**<0.001**	5.48	**<0.001**
	Accessible NP: Mismatch			0.07	0.137	0.07	0.142	**0.14**	**0.038**
	Inaccessible NP: Mismatch					0.03	0.526	0.11	0.128
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.14	0.144
Verb Spill over	*Predictors*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*	*Coef*	*p*
	(Intercept)	5.85	**<0.001**	5.83	**<0.001**	5.81	**<0.001**	5.79	**<0.001**
	Accessible NP: Mismatch			0.05	0.455	0.05	0.455	0.08	0.367
	Inaccessible NP: Mismatch					0.04	0.598	0.07	0.458
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.07	0.601

Table 5.11 Stepwise regression results with p-values for second-pass time

Total Fixation Time

Figure5.5 demonstrates means for total reading times in four regions. In this time stamp, I found a reliable main effect of AccessibleNP at reflexive ($X^2(1) = 13.69$, $p<0.001$), reflexive spillover ($X^2(1) = 23.86$, $p<0.001$), verb ($X^2(1) = 23.70$, $p<0.001$) and in verb spillover region ($X^2(1) = 12.50$, $p<0.001$). Also, InaccessibleNP was found to have a significant main effect on total reading times at the reflexive ($X^2(1) = 9.07$, $p=0.002$), reflexive spillover ($X^2(1) = 4.36$, $p=0.03$) and verb ($X^2(1) = 4.17$, $p=0.04$) regions but not in verb spillover region ($X^2(1) = 0.04$, $p=082$). I found no significant main effect of interaction term in any region. Table5.12 demonstrates the log-linear model estimates and p-values from stepwise model-fitting.

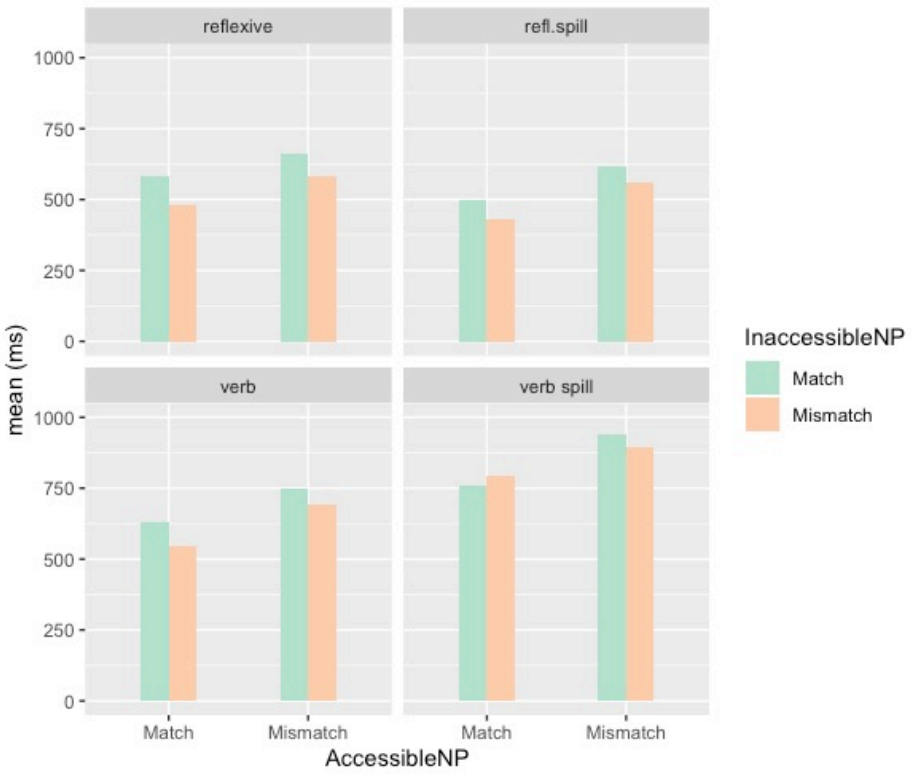


Fig.5.5 *Mean reading times for total reading time per region in Experiment 3*

		Model1		Model2		Model3		Model4	
Refl.	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.15	**<0.001**	6.06	**<0.001**	6.13	**<0.001**	6.16	**<0.001**
	Accessible NP: Mismatch			0.17	**<0.001**	0.17	**<0.001**	0.10	0.098
	Inaccessible NP: Mismatch					-0.14	**0.002**	-0.20	**0.001**
	AccessibleNPMismatch: InaccessibleNPMismatch							0.13	0.144
Ref. spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.07	**<0.001**	5.95	**<0.001**	6.00	**<0.001**	6.01	**<0.001**
	Accessible NP: Mismatch			0.24	**<0.001**	0.24	**<0.001**	0.23	**0.001**
	Inaccessible NP: Mismatch					-0.10	**0.036**	-0.11	0.114
	AccessibleNPMismatch: InaccessibleNPMismatch							0.01	0.884
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.31	**<0.001**	6.20	**<0.001**	6.24	**<0.001**	6.26	**<0.001**
	Accessible NP: Mismatch			0.22	**<0.001**	0.22	**<0.001**	0.18	**0.004**
	Inaccessible NP: Mismatch					-0.09	**0.041**	-0.13	0.034
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.08	0.343
Verb spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.55	**<0.001**	6.47	**<0.001**	6.47	**<0.001**	6.45	**<0.001**
	Accessible NP: Mismatch			0.16	**<0.001**	0.16	**<0.001**	0.18	**0.003**
	Inaccessible NP: Mismatch					0.01	0.826	0.04	0.560
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.05	0.546

Table 5.12 Stepwise regression results with p-values in total reading time

Table5.13 provides in detail the results from post-hoc pairwise comparisons for antecedent levels at four regions and for distractor levels at reflexive, reflexive spillover and verb regions. The pattern that emerged from the model results is that total reading time increased in antecedent mismatch conditions in comparison to in antecedent match conditions. On the other hand, a reversed reading performance was observed in distractor conditions: Reading time delay occurred in distractor match as compared to in distractor mismatch.

Accessible noun	**Refl.**	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	430.18	32.14	52	370.31	499.74	33.57	<0.00
		Mismatch	509.76	38.03	52	439.89	592.08	35.4	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	0.84	0.03	517	NA	NA	-3.72	<0.00
	Refl. spill over	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	385.11	24.60	53	338.79	437.75	37.354	<0.00
		Mismatch	488.96	31.15	52	430.28	555.64	41.38	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	0.78	0.03	499	NA	NA	-4.93	<0.00
	Verb	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	492.05	32.67	50	430.62	562.23	39.80	<0.00
		Mismatch	612.30	40.59	50	535.97	699.51	43.16	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	0.80	0.03	509	NA	NA	-4.92	<0.00

	Verb spill over	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	645.45	48.67	52	554.83	750.86	38.64	<0.00
		Mismatch	753.79	56.78	52	648.07	876.75	40.75	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	0.85	0.03	506	NA	NA	-3.55	0.00
Inaccessible noun	**Refl.**	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	500.87	37.32	52	431.31	581.64	33.58	<0.00
		Mismatch	437.21	32.64	52	376.39	507.85	35.90	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	1.14	0.05	515	NA	NA	3.01	0.002
	Refl. spill over	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	456.20	29.00	52	401.56	518.26	37.63	<0.00
		Mismatch	412.60	26.26	52	363.14	468.79	441.47	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	1.10	0.05	498	NA	NA	2.07	0.03
	Verb	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match	573.78	37.96	50	502.39	655.32	39.83	<0.00
		Mismatch	524.40	34.80	50	458.97	599.15	43.19	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t.ratio*	*p*
		Match/Mismatch	1.09	0.04	507	NA	NA	2.04	0.04

Table 5.13 Post hoc analysis for the levels of accessible and distractor noun at significant regions in total reading time

Finally, model results for an interference effect are provided in Table5.14. I found a reliable effect at reflexive and verb regions ($p<0.05$) in antecedent match conditions. At both critical words, total reading time increased (101±39ms and 83±40ms, respectively), hence the distractor match rendered a processing difficulty.

		Refl			**Refl.spill**			**Verb**			**Verb spill**		
		Coef	SE	p	Coef	SE	p	Coef	SE	p	Coef	SE	p
Total time	Interference (ant.match)	0.20	0.06	**.001***	0.10	0.06	0.12	0.13	0.06	**0.03***	-0.02	0.06	0.7
	Interference (ant.mismatch)	0.07	0.06	0.2	0.09	0.06	0.12	0.05	0.06	0.38	0.00	0.06	0.8

Table 5.14 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in total reading time.

5.1.3 Discussion

As usual in the literature, I will discuss the eye-movement results in two categories, which are the early and late measures.

Early Effects

The analyses of eye-movement data revealed a reliable grammatical antecedent effect at the early stage of processing. In first fixation time (FFT) and gaze duration (FPRT), there was a processing cost for the binding accessible noun at the reflexive spillover

region. I found no early evidence for the inaccessible antecedent at any region. However, there was a marginally significant interaction at reflexive spillover in gaze duration and go-past time. The interference effect was reliable in several early measures. In first fixation, a marginally reliable inhibitory interference was found at the verb region. The effect became more robust in gaze duration; a processing slowdown in antecedent mismatch conditions at the reflexive spillover region. In go-past time, processing slowdown occurred in the reflexive spillover region in antecedent mismatch conditions. Finally, a facilitatory interference numerically emerged in antecedent mismatch conditions for the gaze duration.

Late Effects

Second pass reading time did not reveal significant differences across the conditions at any region. However, I found both accessible and inaccessible noun effect in total fixation time. For grammatical antecedent, there was a mismatch cost at all regions; the subjects showed processing difficulty when the grammatical antecedent was a mismatch. Also, I found a mismatch penalty for the distractor noun at reflexive, reflexive spillover, and verb regions; total reading times increased when the distractor was a mismatch with the reflexive.

The results in Experiment 3 showed that there was clear evidence for the accessible noun effect in the early stage of processing. This result was expected as the grammatical antecedent was both linearly and structurally closer to the reflexive. Crucially, the parser considered the cue-matching distractor in the early stage of

processing. Although no significant main effect of inaccessible referent was found, I found marginally significant interaction and interference as well as reliable interference effect in the early measures. This interference effect emerged despite the linear and structural distance of the distractor to the reflexive. The findings suggest that the parser did not remain completely immune to the interference from the distractor at the early stage of processing, especially in antecedent mismatch conditions. In both antecedent match and mismatch conditions, the parser was susceptible to the intrusion effect. Most of the time, the intrusion led to processing slowdown, which signals that the parser became sensitive to the semantic content of the non-target distractot noun.

To conclude, the retrieval of cue-matching inaccessible antecedent in Experiment 3 gives support for a standard cue-based memory mechanism, which posits that the parser is sensitive to semantic, morphological as well as syntactic information hence any potential referents with these cues can be activated. Hence, the early effect of the interference in an antecedent mismatch is parallel with the existing eye-movement findings (Cunnings and Sturt, 2014; Jaeger et al, 2015b; Kush and Philips, 2014). The findings reported here, on the other hand, inconsistent with structured access model, which suggests that the parser exclusively attends to syntactic information in resolving reflexive dependency and ignores the semantic cues (Sturt, 2003; Dillon, 2011, Dillon et al., 2013).

5.2 Experiment 4

The main objective of this experiment is to test if the linear position of the ungrammatical antecedent can be used as a retrieval cue. For this, the inaccessible antecedent was in proximity to the reflexive. In Experiment 3, we found the interference effect in early measures from the distractor, which was matching with the reflexive only in semantic content. Following this, if the parser was sensitive to the position information of the inaccessible noun, there should be an early effect of the distractor noun. Further, this effect should be stronger than it was in Experiment 3 since the cues favoring the retrieval of the non-target referent increase in Experiment 4. That is, by increasing the number of sources of information on the antecedent, the parser may become more susceptible to intrusion effect. If, on the other hand, the parser uses a structured access mechanism for retrieving the antecedent of *kendi*, then it will only consider structural information of candidate antecedents by ruling out the binding incompatible antecedent despite that it is linearly closer to the reflexive and it shares an animacy feature with the reflexive.

5.2.1 Methods

Participants

30 members of Middle East Technical University in Ankara, Turkey participated in the eye-tracking study (Mean age=22.9, 21F). The subjects gave Cornell University's IRB informed consent. They received 25 Turkish Lira ($5) in exchange for their participation.

Materials

In this experiment, there were sixteen test items. The same main verbs in Experiment3 were used. I tested sentences containing a main clause and an adverbial clause. The main clause subject was the only grammatical antecedent while the adverbial clause subject was the inaccessible antecedent. The two potential antecedents were manipulated in animacy. See (81) below as an illustration:

(81) (In)animate NP [(In)animate NP verb]$_{AdvC}$ / kendi /refl.spillover / verb / verb spillover

NPs in (81) have the subject roles as in Experiment 3. However, the accessible antecedent was linearly distant to the reflexive unlike in Experiment 3. Critical regions in the test items were *kendi* and afterwards as the slashes indicate in (81). The reflexive spillover region consisted of either a time or place adverbial while the main verb spillover was a postposition. Four Latin-squared lists were created to randomize critical items, which presented each test item in one of the four conditions below:

(82)

Accessible match/Inaccessible mismatch

a. Yaşlı teyze, televizyon açılınca / kendinden / bir anda / korkmuş,/ anlatılanlara göre.

"The senior lady was scared of kendi suddenly when TV turned on according to statements."

Accessible match/Inaccessible match

b. Turist, tur rehberi konuşunca / kendinden / bir anda / korkmuş, / anlatılanlara göre.

"The tourist was scared of kendi suddenly when the tour guide started to speak, according to statements."

Accessible mismatch/ Inaccessible match

a. Ambulans, yaralı inleyince / kendinden / bir anda / korkmuş, / anlatılanlara göre.

"The ambulance was scared of kendi suddenly when the patient moaned according to statements"

Accessible mismatch/Inaccessible mismatch

b. Protesto, karanlık olunca / kendinden / bir anda / korkmuş, / anlatılanlara göre.

"The protest was scared of kendi suddenly when it got dark, according to statements"

Regions after the adverbial clause were identical to avoid potential lexical bias. I had the test items in a 2x2 factorial design (i.e., Accessible match/mismatch and inaccessible match/mismatch). The frequency of each condition across the lists was identical.

Seventy-four filler items were constructed for the experiment to avoid bias against test items. The same pattern in creating fillers in Experiment1 was followed.

Procedure

The same procedure in Experimen1 was followed.

Analysis

Results from 30 subjects were entered into the analyses. The experimental items consisted of a single clause where the regions of interest were the reflexive pronoun, the reflexive spillover, the main verb, and the main verb spillover. Fixations below 30ms were removed. Also, fixations above 1000ms for a single fixation were removed. If not a single fixation, fixations above 3000ms were discarded. This data cleaning process was applied to each time measure to avoid excessive and useful data loss. The data analysis included five reading time measures as in Experiment.

5.2.2 Results

The mean comprehension question response accuracy for filler items was 89%. The analyses included five eye-movement measures for four regions of interest. The two main effects were accessible and inaccessible antecedents. I also included the interaction between the main effects. Before I detail the results for each timestamp, I provided chi-squared results and p-values from the likelihood ratio tests for model comparison in Table5.15 below (see TableA.2 in the Appendix for raw mean reading times).

Measure	Region	Factor	Chi-Square	p-value
First fixation time (FFT)	Reflexive	Accessible NP	0.00	0.95
		Inaccessible NP	**3.94**	**0.04***
		Interaction	1.02	0.31
	Reflexive spillover	Accessible NP	0.55	0.46
		Inaccessible NP	0.58	0.45
		Interaction	0.22	0.64
	Main verb	Accessible NP	0.47	0.49
		Inaccessible NP	0.05	0.82
		Interaction	0.35	0.55
	Main verb spillover	Accessible NP	1.55	0.21
		Inaccessible NP	0.64	0.42
		Interaction	0.46	0.50
First-pass reading time (FPRT, or gaze duration)	Reflexive	Accessible NP	0.18	0.67
		Inaccessible NP	**4.28**	**0.03***
		Interaction	0.12	0.73
	Reflexive spillover	Accessible NP	0.28	0.6
		Inaccessible NP	2.17	0.14
		Interaction	0.12	0.73
	Main verb	Accessible NP	0.56	0.45
		Inaccessible NP	0.03	0.85
		Interaction	0.00	0.96
	Main verb spillover	Accessible NP	**3.60**	**0.05**
		Inaccessible NP	0.01	0.92
		Interaction	0.49	0.49
Regression-path duration (RPD, or go-past)	Reflexive	Accessible NP	0.25	0.62
		Inaccessible NP	**8.26**	**0.004***
		Interaction	0.15	0.69
	Reflexive spillover	Accessible NP	0.09	0.76
		Inaccessible NP	0.13	0.72
		Interaction	0.30	0.58
	Main verb	Accessible NP	3.14	0.07
		Inaccessible NP	0.06	0.81
		Interaction	1.41	0.24
	Main verb spillover	Accessible NP	NA	NA
		Inaccessible NP	NA	NA
		Interaction	NA	NA

Second-pass reading time (SPRT)	Reflexive	Accessible NP Inaccessible NP Interaction	0.02 1.65 0.04	0.86 0.19 0.83
	Reflexive spillover	Accessible NP Inaccessible NP Interaction	0.40 0.22 0.04	0.52 0.64 0.84
	Main verb	Accessible NP Inaccessible NP Interaction	1.03 0 0.31	0.31 0.99 0.58
	Main verb spillover	Accessible NP Inaccessible NP Interaction	1.26 2.94 0.06	0.26 0.08 0.80
Total fixation time(TFT)	Reflexive	Accessible NP Inaccessible NP Interaction	**5.82** 3.28 0.38	**0.01*** 0.07 0.54
	Reflexive spillover	Accessible NP Inaccessible NP Interaction	**9.94** 0.10 0.26	**0.001*** 0.75 0.61
	Main verb	Accessible NP Inaccessible NP Interaction	**4.64** 1.74 0.44	**0.03*** 0.19 0.51
	Main verb spillover	Accessible NP Inaccessible NP Interaction	0.16 2.04 0.08	0.69 0.15 0.78

Table 5.15 Model assessment results from likelihood-ratio tests for the main effects of antecedent, distractor, and interaction at critical regions per time measure. Significant predictors are in bold.

First Fixation Time

Figure5.6 below shows mean reading time in each region of interest. For first fixation duration, I found a significant main effect of inaccessible antecedent at the reflexive region ($X^2(1) = 3.94$, $p=0.04$). No other significant main effect was found in any other region for the factors in question. Table5.16 demonstrates the results from model comparisons and their estimates with p-values.

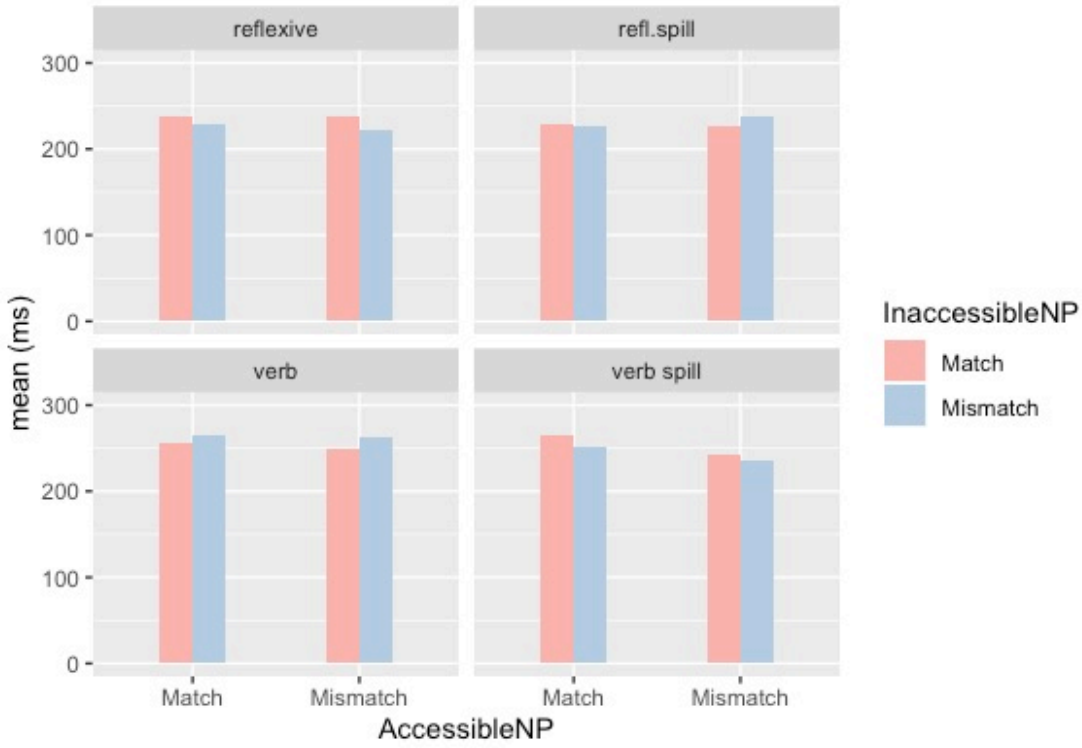


Fig.5.6 *Mean reading times for first-fixation per region in Experiment 4*

Regions		Model1		Model2		Model3		Model4	
Reflexive	*Predictors*	*Coef.*	*P*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.38	**<0.001**	5.38	**<0.001**	5.41	**<0.001**	5.38	**<0.001**
	Accessible NP: Mismatch			0.00	0.946	0.00	0.920	0.04	0.432
	Inaccessible NP: Mismatch					-0.07	**0.047**	-0.03	0.497
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.07	0.311
Reflexive spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.38	**<0.001**	5.37	**<0.001**	5.36	**<0.001**	5.37	**<0.001**
	Accessible NP: Mismatch			0.02	0.459	0.02	0.445	0.01	0.845

	Inaccessible NP: Mismatch					0.02	0.446	0.01	0.849
	AccessibleNPMismatch: InaccessibleNPMismatch							0.03	0.635
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.47	**<0.001**	5.46	**<0.001**	5.45	**<0.001**	5.47	**<0.001**
	Accessible NP: Mismatch			0.02	0.493	0.02	0.494	0.00	0.947
	Inaccessible NP: Mismatch					0.01	0.819	-0.01	0.794
	AccessibleNPMismatch: InaccessibleNPMismatch							0.04	0.552
Verb spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.42	**<0.001**	5.44	**<0.001**	5.46	**<0.001**	5.47	**<0.001**
	Accessible NP: Mismatch			-0.05	0.210	-0.05	0.213	-0.08	0.174
	Inaccessible NP: Mismatch					-0.03	0.442	-0.06	0.296
	AccessibleNPMismatch: InaccessibleNPMismatch							0.06	0.498

Table 5.16 Stepwise regression results with p-values in first fixation.

Table5.17 shows the results from post hoc pairwise test for inaccessible antecedent in the reflexive area. The mean reading time in inaccessible match was 223ms ± 7.47 whereas mean reading time was 209ms±7.00 in mismatch conditions. Reading times in this region increased about 14ms ± 7.23 (standard errors) in match conditions for the inaccessible NP.

Means	*Mean*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match	223.81	7.47	45	209.25	239.39	54.32	<0.0001
Mismatch	209.48	7.00	45	195.83	224.07	54.73	<0.0001

Contrast	*Ratio*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match / Mismatch	1.06	0.03	417	NA	NA	1.97	0.04

Table 5.17 Post hoc analysis for the levels of InaccessibleNP at the reflexive region in first fixation.

The results from nested contrasts analysis for an interference effect in antecedent match and mismatch conditions were provided in Table5.18. The model yielded a significant interference at reflexive in antecedent mismatch conditions only. The first fixation time increased for 17± 8.5ms at the reflexive area.

		Refl			Refl.spill			Verb			Verb spill		
		Coef.	*SE*	*p*	*Coef.*	*SE*	*p*	*Coef.*	*SE*	*p*	*Coef.*	*SE*	*p*
First fixation	Interference (ant.match)	.003	.004	0.49	-.008	.004	0.8	0.01	0.05	0.7	0.06	0.05	0.3
	Interference (ant.mismatch)	.009	.004	**0.03***	-.03	0.04	0.3	-0.02	0.05	0.5	.005	0.05	0.9

Table 5.18 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in first fixation

Gaze Duration

Figure5.7 shows mean reading time in each region of interest. In gaze duration, there was a significant main effect of inaccessible antecedent at the reflexive region ($X^2(1) =4.28$, p=0.03). Also, I found a significant main effect of accessible antecedent at the main verb spillover region (($X^2(1) =3.60$, p=0.05). Table5.19 demonstrates the results from model comparisons and estimates including p-values.

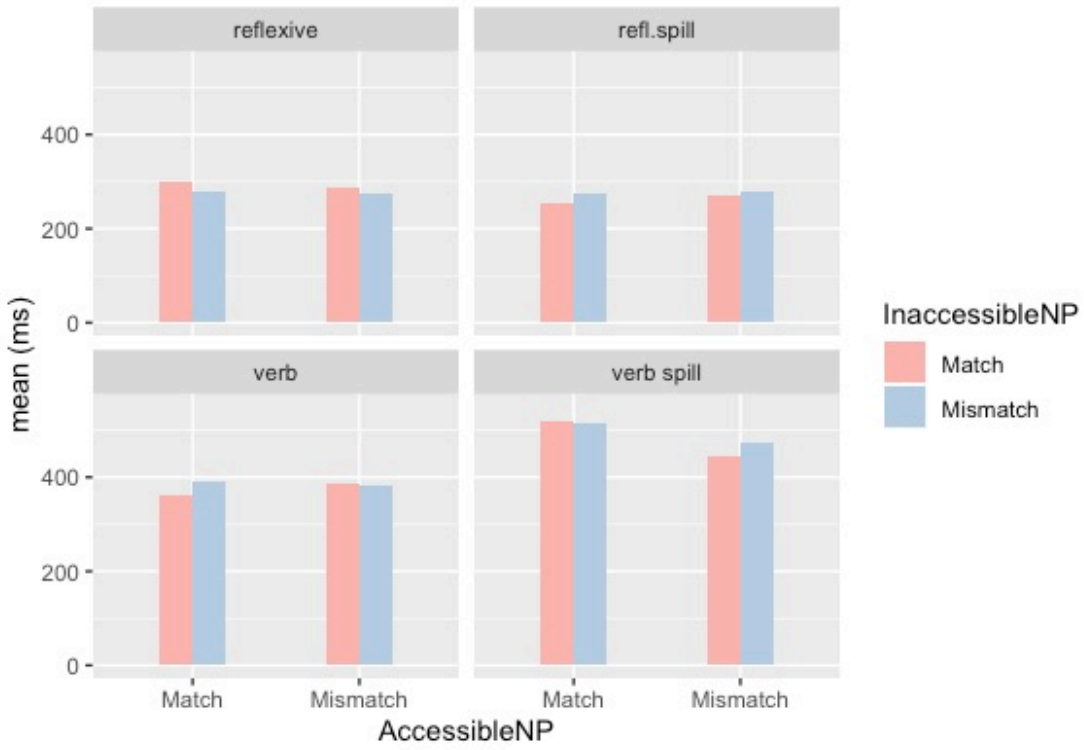


Fig.5.7 *Mean reading times for gaze duration per region in Experiment 4*

Regions		Model1		Model2		Model3		Model4	
Reflexive	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.56	**<0.001**	5.57	**<0.001**	5.60	**<0.001**	5.60	**<0.001**
	Accessible NP: Mismatch			-0.02	0.669	-0.01	0.700	-0.00	0.982
	Inaccessible NP: Mismatch					-0.08	**0.037**	-0.06	0.222
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.03	0.725
Reflexive spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.53	**<0.001**	5.52	**<0.001**	5.49	**<0.001**	5.48	**<0.001**
	Accessible NP: Mismatch			0.02	0.597	0.02	0.565	0.03	0.516

	Inaccessible NP: Mismatch					0.05	0.140	0.07	0.202
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.03	0.732
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.82	**<0.001**	5.80	**<0.001**	5.80	**<0.001**	5.80	**<0.001**
	Accessible NP: Mismatch			0.03	0.452	0.03	0.453	0.03	0.571
	Inaccessible NP: Mismatch					0.01	0.851	0.01	0.868
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.00	0.962
Verb spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.03	**<0.001**	6.08	**<0.001**	6.08	**<0.001**	6.09	**<0.001**
	Accessible NP: Mismatch			-0.09	**0.057**	-0.09	0.058	-0.13	0.066
	Inaccessible NP: Mismatch					-0.00	0.921	-0.04	0.571
	AccessibleNPMismatch: InaccessibleNPMismatch							0.07	0.486

Table 5.19 Stepwise regression results with p-values for gaze duration

Table5.20 shows the results from post hoc test for inaccessible antecedent at the reflexive region and accessible antecedent at the verb spillover region. For inaccessible NP at the reflexive region, mean reading time in match conditions was 269±12 whereas mean reading time was 249±11ms in mismatch conditions. Reading times in this region increased about 20±11ms in match conditions for the inaccessible antecedent.

For the accessible NP in verb spillover, mean reading time in match conditions was 435±27ms while mean reading time in mismatch was 396±24ms. For accessible antecedent, participants had greater processing difficulty in match conditions in contrast to mismatch conditions with a reading delay of 38ms.

Inaccess. noun	Reflexive	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Upper.CL*	*t*	*p*
		Match	269	12.	46	245.68	295.45	44.53	<0.00
		Mismatch	249	11	46	227.69	273.84	42.84	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t*	*p*
		Match/Mismatch	1.07	0.03	412	NA	NA	2.08	0.03
Accessible noun	Verb spill over	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Upper.CL*	*t*	*p*
		Match	435	27	47	383	494.04	39.87	<0.00
		Mismatch	396	24	45	349	450.05	38.71	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match/Mismatch	1.09	0.05	423	NA	NA	1.89	0.05

Table 5.20 Post hoc analysis for the levels of InaccessibleNP at the reflexive region and for the levels of AccessibleNP at the verb spillover

The model testing for interference effect did not reach significance at any region for gaze duration as Table5.21 demonstrates.

		Refl			Refl.spill			Verb			Verb spill		
		Coef	SE	p	Coef	SE	p	Coef	SE	p	Coef	SE	p
Gaze Dur.	Interference (ant.match)	0.06	0.05	0.2	-0.06	0.05	0.2	-0.01	0.06	0.8	0.03	0.06	0.5
	Interference (ant.mismatch)	0.08	0.05	0.08	-0.04	0.05	0.4	-.006	0.06	0.9	-0.02	0.06	0.6

Table 5.21 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in gaze duration

Go-past Time

Figure5.8 plots mean reading times per region of interest. In Table5.22, I demonstrate the results from model comparisons. We see a significant main effect of inaccessible antecedent at the reflexive region ($X^2(1) = 8.26$, p=0.004). Also, there was a marginally reliable effect of accessible noun at the verb area ($X^2(1) = 3.14$, p=0.07), At this region, the processing slowdown occurred in accessible match conditions. No other significant main effect was found in any other region.

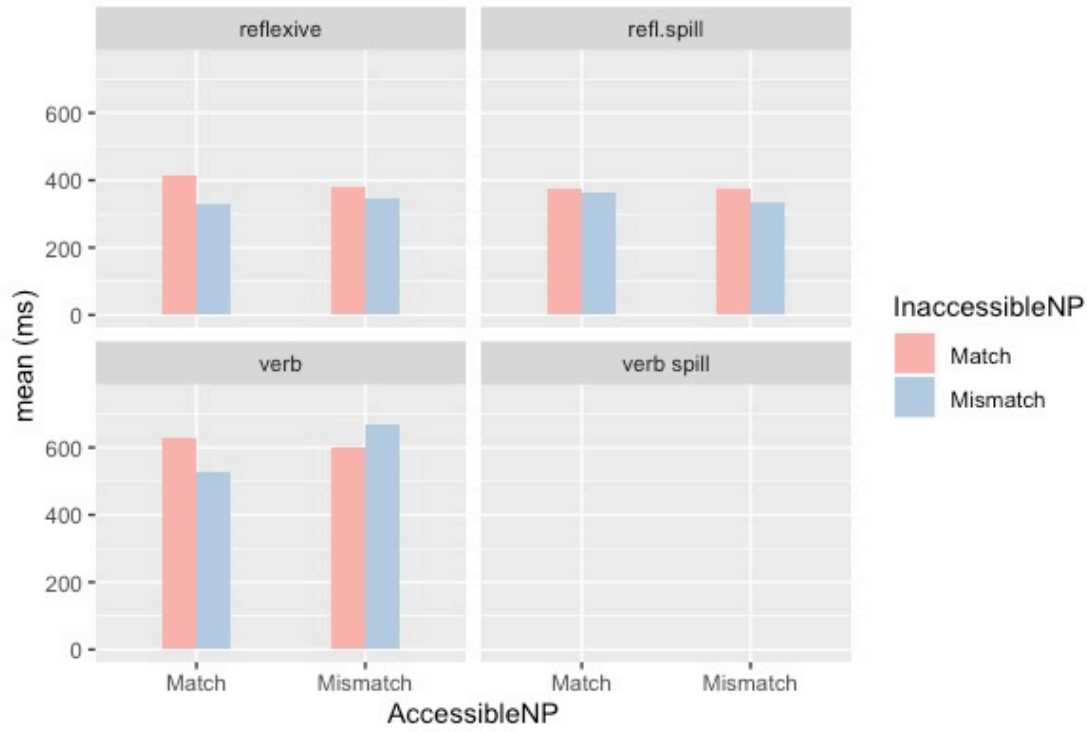


Fig.5.8 *Mean reading times for go-past time per region in Experiment 4*

		Model1		Model2		Model3		Model4	
	Predictors	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
Refl.	(Intercept)	5.74	**<0.001**	5.76	**<0.001**	5.82	**<0.001**	5.83	**<0.001**

	Accessible NP: Mismatch			-0.02	0.616	-0.02	0.647	-0.04	0.547
	Inaccessible NP: Mismatch					-0.14	**0.004**	-0.16	0.021
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.04	0.693
Ref. spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.71	**<0.001**	5.72	**<0.001**	5.73	**<0.001**	5.71	**<0.001**
	Accessible NP: Mismatch			-0.02	0.760	-0.02	0.754	0.01	0.859
	Inaccessible NP: Mismatch					-0.02	0.714	0.01	0.891
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.06	0.581
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.13	**<0.001**	6.07	**<0.001**	6.08	**<0.001**	6.11	**<0.001**
	Accessible NP: Mismatch			0.11	0.076	0.11	0.075	0.04	0.675
	Inaccessible NP: Mismatch					-0.01	0.812	-0.09	0.313
	AccessibleNPMismatch: InaccessibleNPMismatch							0.14	0.235

Table 5.22 Stepwise regression results with p-values for go-past time

Table5.23 shows the results from post hoc test for inaccessible antecedent at the reflexive. Mean reading time in match conditions was 334ms ± 17.66 whereas mean reading time was 291ms ± 15.31 in mismatch conditions. Reading times in this region increased about 43ms ± 16.52 (standard errors) in match conditions for the inaccessible antecedent.

Means	*Mean*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match	334.47	17.66	47	300.76	371.96	42.73	<0.01
Mismatch	291.31	15.39	47	261.93	323.98	40.09	<0.01
Contrast	*Ratio*	*SE*	*df*	*Lower.CL*	*Upper.CL*	*t.ratio*	*p.value*
Match / Mismatch	1.14	0.05	414	NA	NA	2.87	0.004

Table 5.23 Post hoc analysis for the levels of InaccessibleNP at the reflexive region in go-past time

Table5.24 below shows that there was a significant interference at the reflexive region in antecedent match conditions ($p<0.05$). The interference from the distractor rendered 81±24ms slowdown in reading time. Also, there was a marginally significant interference in antecedent mismatch conditions at the reflexive ($p=0.07$), where go-past time increased for 34±27ms.

		Refl			Refl.spill			Verb		
		Coef.	*SE*	*p*	*Coef.*	*SE*	*p*	*Coef.*	*SE*	*p*
Go-past time	Interference (ant.match)	0.15	0.06	**0.02***	-0.01	0.07	0.8	0.08	0.08	0.3
	Interference (ant.mismatch)	0.11	0.06	**0.07**	0.04	0.07	0.5	-0.05	0.08	0.5

Table 5.24 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in go-past time.

Second-pass Reading Time

Figure5.9 shows mean reading time per region of interest. For time measures analyzed, I found no significant main effect of antecedent and the distractor at any region as

displayed in Table5.25 below. Similarly, no interference effect was revealed in second pass time. I provide the mean reading time plot and model results table below.

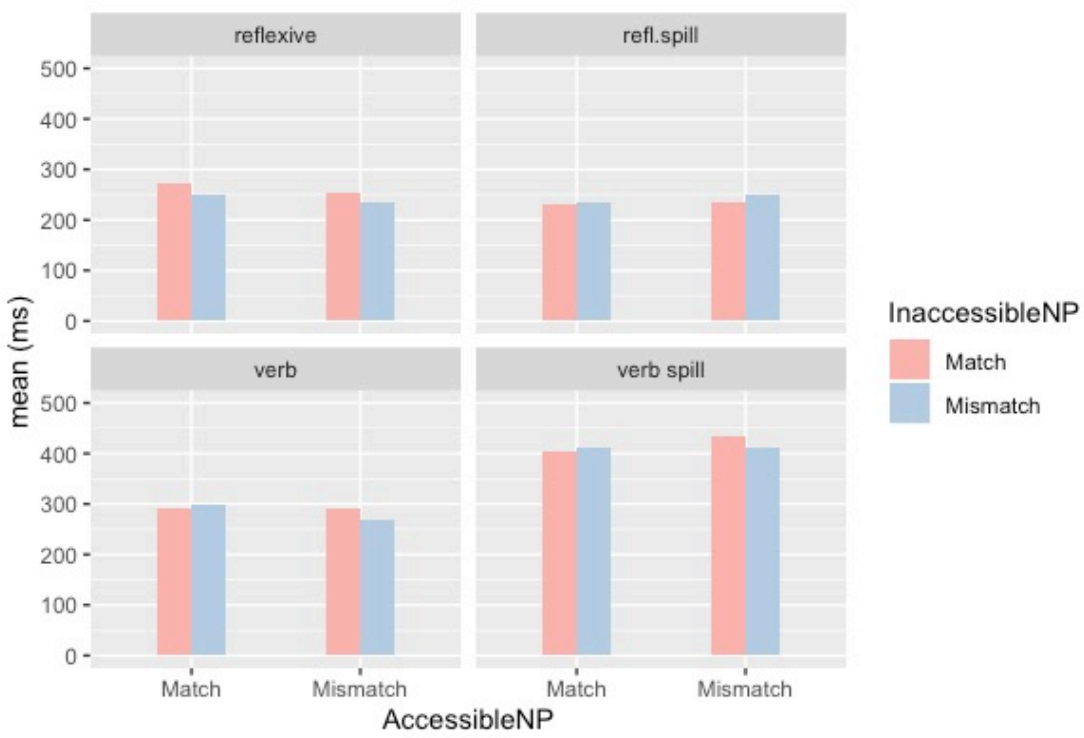


Fig.5.9 *Mean reading times for second-pass time per region in Experiment 4*

		Model1		Model2		Model3		Model4	
Refl.	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.42	**<0.001**	5.42	**<0.001**	5.45	**<0.001**	5.45	**<0.00**
	Accessible NP: Mismatch			0.01	0.863	0.01	0.819	0.00	0.934
	Inaccessible NP: Mismatch					-0.06	0.197	-0.08	0.309
	AccessibleNPMismatch: InaccessibleNP Mismatch							0.02	0.839
Refl. spill	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*

over	(Intercept)	5.39	**<0.001**	5.37	**<0.001**	5.36	**<0.001**	5.36	**<0.001**
	Accessible NP: Mismatch			0.03	0.526	0.03	0.534	0.02	0.750
	Inaccessible NP: Mismatch					0.02	0.635	0.01	0.864
	AccessibleNPMismatch: InaccessibleNPMismatch							0.02	0.842
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.50	**<0.001**	5.54	**<0.001**	5.54	**<0.001**	5.52	**<0.001**
	Accessible NP: Mismatch			-0.07	0.310	-0.07	0.311	-0.03	0.722
	Inaccessible NP: Mismatch					-0.00	0.992	0.04	0.685
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.07	0.577
Verb spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	5.85	**<0.001**	5.80	**<0.001**	5.87	**<0.001**	5.88	**<0.001**
	Accessible NP: Mismatch			0.09	0.259	0.09	0.296	0.07	0.548
	Inaccessible NP: Mismatch					-0.14	0.085	-0.16	0.182
	AccessibleNPMismatch: InaccessibleNPMismatch							0.04	0.804

Table 5.25 Stepwise regression results with p-values for second-pass time

Total Fixation Time

Figure5.10 shows mean reading time in each region of interest. I found a significant main effect of accessible antecedent at the reflexive ($X^2(1)=5.82$, p=0.01), the reflexive

spillover ($X^2(1) = 9.94$, p=0.001), and the verb region ($X^2(1) = 4.64$, p=0.03). No other significant main effect was found in any other region. Table5.26 demonstrates the results from model comparisons and estimates including p-values.

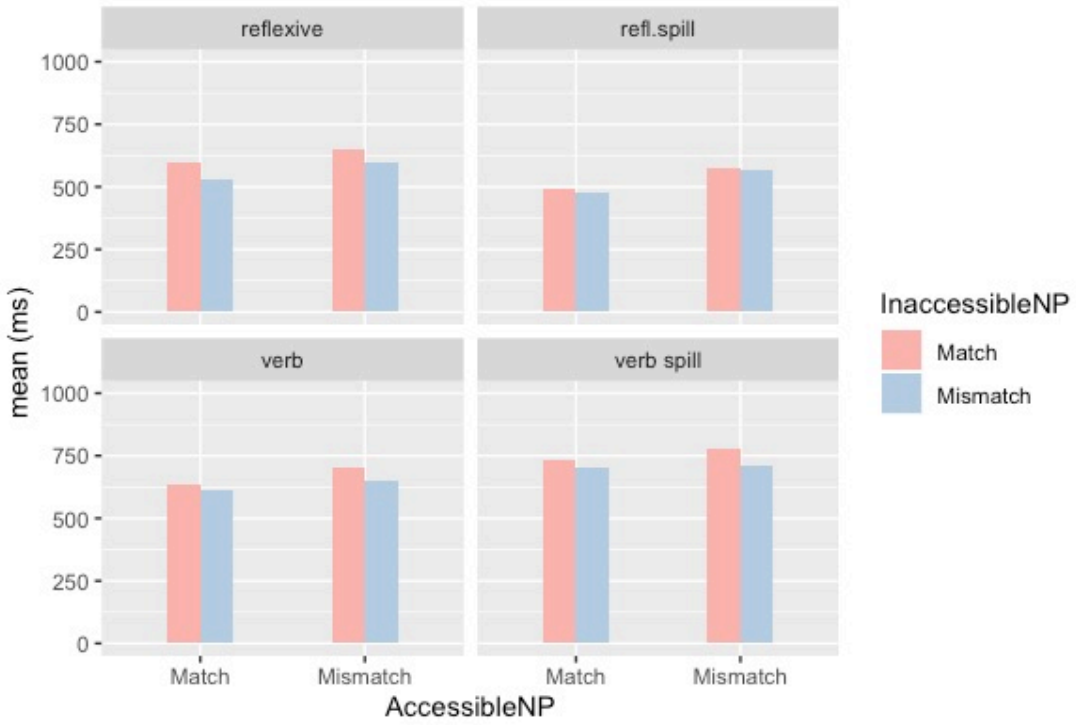


Fig.5.10 *Mean total reading times per region in Experiment 4*

		Model1		Model2		Model3		Model4	
	Predictors	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.22	**<0.001**	6.16	**<0.001**	6.20	**<0.001**	6.22	**<0.001**
Reflexive	**Accessible NP: Mismatch**			0.12	**0.016**	0.12	0.015	0.09	0.198
	Inaccessible NP: Mismatch					-0.09	0.070	-0.12	0.087
	AccessibleNPMismatch: InaccessibleNPMismatch							0.06	0.535
	Predictors	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*

Reflexive spill over	(Intercept)	6.10	**<0.001**	6.02	**<0.001**	6.03	**<0.001**	6.04	**<0.001**
	Accessible NP: Mismatch			0.16	**0.002**	0.16	0.002	0.13	0.061
	Inaccessible NP: Mismatch					-0.02	0.751	-0.04	0.560
	AccessibleNPMismatch: InaccessibleNPMismatch							0.05	0.612
Verb	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.31	**<0.001**	6.25	**<0.001**	6.28	**<0.001**	6.30	**<0.001**
	Accessible NP: Mismatch			0.11	**0.031**	0.11	0.030	0.08	0.288
	Inaccessible NP: Mismatch					-0.07	0.187	-0.10	0.161
	AccessibleNPMismatch: InaccessibleNPMismatch							0.07	0.507
Verb spill over	*Predictors*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*	*Coef.*	*p*
	(Intercept)	6.43	**<0.001**	6.42	**<0.001**	6.45	**<0.001**	6.44	**<0.001**
	Accessible NP: Mismatch			0.02	0.686	0.02	0.666	0.03	0.616
	Inaccessible NP: Mismatch					-0.07	0.152	-0.05	0.421
	AccessibleNPMismatch: InaccessibleNPMismatch							-0.03	0.781

Table 5.26 Stepwise regression results with p-values in total reading time

In Table5.27 below, the results from pairwise post-analysis were provided for accessible antecedent in the reflexive, reflexive spillover and verb regions. In the reflexive region, mean reading time in match conditions was 472ms ± 30.23 while mean reading time was 530ms± 33.77 in mismatch conditions. Thus, reading time increased about 58ms ± 32 in mismatch conditions at reflexive. In the reflexive spillover, mean reading time for match level was 411ms ± 25.07 while it was 481ms ± 29.18 for mismatch conditions. There was a reading latency in mismatch conditions for about 69ms ± 27 at reflexive

spillover. As for the verb region, mean reading time for animacy match conditions was 518ms ± 27.43 while mean reading time for mismatch level was 580ms ± 30.64. Reading time increased about 62ms ± 29 going from match to mismatch level at the verb.

Accessible noun	Reflexive	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match	472	30.2	40	415.13	537.63	40.66	<0.00
		Mismatch	530	33.7	39	466.44	603.35	42.70	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match/Mismatch	0.89	0.04	435	NA	NA	-2.41	0.01
	Reflexive spill over	*Means*	*Mean*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match	411.72	25.07	46	364.22	465.42	40.47	<0.00
		Mismatch	481.55	29.18	45	426.22	544.06	43.25	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match/Mismatch	0.85	0.04	427	NA	NA	-4.93	0.001
	Verb	*Contrast*	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match	518.08	27.43	47	465.74	576.29	50.88	<0.00
		Mismatch	580.31	30.64	47	521.84	645.34	53.18	<0.00
		Contrast	*Ratio*	*SE*	*df*	*Low.CL*	*Up.CL*	*t*	*p*
		Match/Mismatch	0.89	0.04	435	NA	NA	-2.15	0.03

Table 5.27 Post hoc analysis for the levels of AccessibleNP at significant regions in total reading time

For total reading time, the nested contrasts model did not reach to significance for the predictors as the following table shows.

		Refl			Refl.spill			Verb			Verb spill		
		Coef	SE	p	Coef	SE	p	Coef	SE	p	Coef	SE	p
Total time	Interference (ant.match)	0.11	0.06	0.08	0.04	0.07	0.5	0.10	0.07	0.16	0.05	0.06	0.4
	Interference (ant.mismatch)	0.05	0.06	0.39	-.009	0.06	0.8	0.03	0.07	0.63	0.07	0.06	0.2

Table 5.28 Pairwise comparisons of animacy of the distractor (interference) nested within antecedent match/mismatch conditions in total reading time

5.2.3 Discussion

In this experiment, the binding inaccessible antecedent had surface string locality in contrast to the binding accessible antecedent. However, the structural distance remained constant in the two eye-tracking experiments. The results will be discussed concerning the early and late stages of processing.

Early Effects

The results provided above show that there was reliable evidence for the inaccessible noun in first fixation, first-pass reading time, and go-past time at the reflexive region. The early distractor effect found in these regions led to processing costs when the inaccessible antecedent matched the animacy of the reflexive. Considering that the distractor effects emerged in the three early time measures, including first fixation, at the reflexive area suggests that the parser started to consider syntactically unfavored

referent as soon as it encounters the anaphoric dependency; this is the earliest point reflecting the processing. Also, I found a delayed effect of binding accessible antecedent in gaze duration at the sentence-final position. This implicates that the readers did not consider the accessible antecedent as a potential antecedent until they read the sentence-final region in this early period of processing. Interestingly, the readers had a longer gaze duration in accessible match conditions as compared to the accessible mismatch conditions. Similarly, a marginally reliable antecedent effect was found in go-past time at the main verb region. Again, the reading latency occurred in the antecedent match rather than mismatch conditions. Against the given findings, once the parser hits to the reflexive, it gives priority to non-structural cues at this stage. In post-critical areas such as verb and verb spillover, however, the structural cues guide the parser rather in an unusual fashion; processing slowdown instead of speed up takes place in antecedent match conditions.

Further, the data showed that there was reliable evidence for an inhibitory interference from the distractor in early measures. In first fixation time, this effect occurred in antecedent mismatch conditions at the reflexive where there was a processing slowdown when the distractor was animate. Despite marginally significant, the interference effect in antecedent mismatch was replicated in gaze duration at the reflexive. Go-past times also revealed a clear inhibitory interference in antecedent match conditions at the reflexive. For this time measure, a marginally reliable inhibitory intrusion in antecedent mismatch was found.

The listed early effect of the distractor noun is inconsistent with the view that memory access during antecedent retrieval for reflexives exclusively relies on the structural information at early stages of processing (Sturt,2003; Dillon et al., 2013; Philips et al.,2011, Xiang et al., 2009). In contrast, the findings support an antecedent search mechanism for reflexives that gives equal weight to any linguistic information such as surface string and semantic information including the structural cues.

Late Effects

The late eye-movement measures showed that there was reliable evidence for the accessible antecedent. This effect showed at the reflexive, reflexive spillover and verb regions in total fixation time. For this timestamp, readers had processing difficulty in accessible mismatch conditions as the longer reading times suggested. Even if not reliable enough, the interaction effect between the accessible noun and the distractor was found at the reflexive area. Similarly, the interference effects were marginally significant. That is, the availability of the animate distractor in antecedent match conditions led to processing slowdown in total fixation time. To recap, the parser was mostly considering the accessible noun at the later stage of processing, while the influence of the inaccessible antecedent on the parser diminished at this temporal stage.

Taking the results for the two temporal stages together, when the parser constructs a reflexive dependency in Turkish, it gives more prominence to the semantic and string position information over structural cue in the early stage of processing. However, the parser does not completely ignore the syntactic cue in the early stage; rather it delays

using this information to the sentence-final position. The use of syntactic cue coupled with non-syntactic cues in the early measures induces an ambiguity or surprisal effect as the longer reading times in antecedent match conditions suggest. This surprisal disappears in the late stage of processing where only the accessible noun was reliably influencing the parser. That is, the processing speed up occurs in accessible match conditions in contrast to accessible mismatch conditions. Finally, the effect of the inaccessible noun, which was prominent in the early stage, decreases in the late stage of antecedent retrieval for the reflexive *kendi*.

The findings reported so far are inconsistent with a theory of antecedent retrieval mechanism that favors structural information over non-structural cues. Rather, the findings support a language comprehension model arguing that the parser initially deploys any information available (Badecker and Straub, 2002; Chen et al., 2012; Jaeger et al., 2015b; Patil et al., 2016). In the given context, parsing Turkish reflexive is influenced by the linear distance, or position information and animacy feature in that participants initially considered the structurally ineligible but linearly closer and animacy matching antecedent.

5.3 General Discussion

The main question addressed in Chapter 5 was to find what kinds of information sources can be used as a retrieval cue in resolving antecedent-reflexive dependency. Existing accounts propose two distinct views on the issue: the exclusive use of the structural cues or deployment of any cues including structural ones. Each position has distinct

implications for memory access mechanisms while the parser constructs an antecedent-reflexive dependency. The first view, which is *structured access*, argues that retrieving the linguistic memory, here the antecedent, is gated with the syntactic cue (Nicol and Swinney, 1989; Sturt, 2003; Xiang et al., 2009; Philips et al., 2011; Dillon et al., 2013). The second approach, *standard cue-based access*, puts forward that any content available on potential antecedents suffices memories to be reactivated (Badecker and Straub, 2002; Chen et al., 2012; Jaeger et al., 2015b; Patil et al., 2016).

To tease apart the nature of cues in the early stage of processing, I brought eye-movement data from a novel reflexive form in the sentence processing literature, Turkish reflexive *kendi*. In particular, my motivation was to investigate how the comprehension of Turkish reflexive *kendi* unfolds in real-time. In both experiments, only one antecedent was c-commanding the reflexive, which was the grammatical licensor within Principle A of Binding Theory. Both experiments included items that had a semantic feature match/mismatch of potential antecedents with the reflexive as *kendi* requires a sentient referent. Also, both antecedents had grammatical subject roles to avoid any potential confound of grammatical roles on the reflexive processing (Sturt, 2003). In Experiment 3, the test items consisted of object relative clauses that the accessible antecedent was linearly closer to the reflexive whereas in Experiment 4 items included adverbial clauses that the inaccessible antecedent intervened between the reflexive and the accessible antecedent. The effect of surface-string locality on the parser was included in the study to test if the parser is sensitive to this information. Also, the manipulation of the string position of the antecedent candidates aimed to replicate

experiments in the literature that did not provide evidence for the interference from the distractor noun.

At the outset, the eye-movement results from two experiments suggest that non-structural information can be used as a retrieval cue while the parser constructs reflexive dependency in Turkish. In Experiment 3, I found an inhibitory interference effect from the distractor in antecedent mismatch conditions at the early stage of processing although the distractor was linearly and structurally distant to the reflexive pronoun. The distractor had only animacy feature matching with the reflexive. This finding alone was inconsistent with most of the reported eye-movement data in the literature. Crucially, this inhibitory effect was not delayed effect; it showed up at the reflexive spillover region. Given results in Experiment 3 replicate inhibitory interference in antecedent mismatch reported in Cunnings and Felser (2013), Cunnings and Sturt (2014), Kush and Philips (2014), and Jaeger (2015b). Also, I found an early accessible antecedent effect in Experiment 3 as predicted by both memory access models. At the later stage of processing in Experiment 3, both accessible and inaccessible antecedents were operative in guiding the parser, which was suggesting that the parser benefits structural and semantic cues identically at a later stage. Also, in this temporal stage, I found the inhibitory interference at reflexive and verb regions in antecedent match conditions.

In Experiment 4, eye-tracking data provided further support for the parser's sensitivity to non-structural cues. Specifically, the linear distance was added to the paradigm and the inaccessible antecedent, which was in proximity to the reflexive, was considered by the parser in the early stage of processing. Also, there was evidence for

inhibitory interference in antecedent mismatch conditions at the reflexive region in the early stage of processing. However, the accessible antecedent was marginally prominent in the early stage and this effect appeared in the sentence-final position. At a later stage of processing, the parse gave more priority to the structural cue. The results from Experiment 4 also support a memory access model that adopts the use of any linguistic information as a retrieval cue in the early stage of processing.

To summarize the facts in two experiments, Turkish speakers are susceptible to grammatical illusions in antecedent search for the reflexive *kendi* in that ungrammatical referents can be considered by the parser. The degree of grammatical fallacy gets higher if the similarity between the reflexive and non-target linguistic memory increases. This observation is in line with the *standard cue-based retrieval mechanism* (McElree, 2000; McElree et al., 2003; Lewis and Vasishth, 2005; Lewis et al., 2006). Further, the findings suggest that non-structural cues may be operative in the early stage of reflexive processing (Badecker and Straub, 2002; Chen et al., 2012; Jaeger et al., 2015b; Patil et al., 2016) and the animacy feature and the linear position information can be used as a set of retrieval cues for the online reflexive resolution during the early stage of processing. Also, considering that ungrammatical antecedent had a subject role in both experiments, the interference from the distractor had more chance to occur, an issue raised in Nicol and Swinney (2003). Needless to say, the framework argued in this chapter does not ignore the influence of structural constraints on the parser, instead, it suggests the use of a variety of retrieval cues including the structural information.

Past studies provide eye-movement data that support mostly the structured access mechanism for the reflexive resolution. The empirical evidence favoring the

involvement of non-structural information during the initial parse has been relatively scarce. A closer inspection of the research findings reveals that the inconsistency in research findings may stem from the typology of the language under investigation. To frame it more precisely, many works reporting the absence of grammatical illusion come from English reflexives while the interference effect was mostly reported in languages that allow LD-reflexives. Given this observation, the variation in existing eye-movement results may be accounted for considering whether they allow long-distance anaphors or not. That is, non-structural cues may play a larger role in accessing the linguistic memory in languages with long-distance reflexives like Chinese whereas structural cues were given more priority in languages without long-distance reflexives like English. That said, I discussed in previous chapters that Turkish speakers allow the long-distance reading for *kendi* in certain constructions. Thus, their grammar may be susceptible to intrusion from the ungrammatical but cue-matching referent even in clauses where c-command requirement is not satisfied. If this reasoning holds, there are two ways that the LD-property of Turkish may explain the use of non-structural cues in the parse. The first one is about the timing when in the parse a Turkish hearer/reader identifies the full clausal architecture or at least determines if the context allows a non-local interpretation. One possibility is that Turkish speakers wait for the sentence-final region as Turkish has canonical SOV word-order. However, the SOV property of the language falls short in answering the question as the eye-movement data revealed that antecedent retrieval started to unfold as soon as the parser encountered the reflexive or reflexive spillover. In other words, the parser did not wait to reach the main verb to initiate a search for the antecedent. Thus, an alternative answer is that the hearer or

speaker obtains sufficient information about the structure before reaching to the reflexive area. This option seems rather plausible considering the rich morphology of Turkish in constructing various sentence embeddings. A closer inspection of nominalized embedded clauses on one hand and the object and adverbial clauses, on the other hand, bring a contrastive situation. The nominalizer markers and the object relativizer in Turkish are identical (e.g., -DIK and -ACAK) along with the case marking on their subjects (i.e., GEN). However, there is a crucial distinction between two constructs; in ORCs the extracted object becomes the subject of the main clause leaving a gap site behind. In nominalized embedded clauses, on the other hand, the main subject linearly precedes the embedded subject. As a result, in parsing an ORC, the hearer obtains adequate information about the structure when s/he hits the verb; whether there is an extracted site but not a grammatical subject. In adverbial clauses, a similar strategy is adopted. The adverbial verb endings are morphologically distinct from nominalizers in Turkish (e.g., -INCA, -IP, -KEN among others). To recapitulate, Turkish speakers have enough sources of information regarding whether the antecedent is in a nominalized clause before they reach to the reflexive, hence their parser initiates a search mechanism accordingly. Thus, the point where the parser starts to initiate the antecedent search for the reflexive may not explain the interference effects observed in Turkish. The second alternative to accounting for intrusion profiles of languages with long-distance reflexive regards to the parameter setting in child language acquisition. Concisely, a Turkish child (or Chinese) learns that his/her language allows long-distance reflexives hence s/he gives more attention to the non-structural cues than a child learning English. This parameter surfaces in Turkish speakers very strongly that it

suppresses the morphological clues mentioned earlier and hence they remain sensitive to non-structural cues in the parse. In conclusion, further investigations on long-distance reflexives in various languages are required to gain better insight into whether the use of non-syntactic cues varies depending on the language typology.

CHAPTER 6

Conclusion

The main research question in the thesis was about how Turkish speakers construct a full interpretive architecture for the bare reflexive pronoun *kendi* 'self'. I approached the problem both formally and experimentally. Initially, a formal account was offered in defining the distribution of the reflexive, which are mostly based on the judgments reported in the earlier syntactic accounts as well as my interpretation. The experimental approach proceeded in two ways. The first method was to collect systematic offline data to have insight into the final comprehension of the reflexive in various finite and non-finite sentence embeddings. The second experimental method included eye-tracking during reading to gain insight into the real-time resolution of *kendi* interpretation. Given this, the investigation of the offline and online aspects of the reflexive resolution made use of the linguistic and psycholinguistic research methodologies, an area gaining popularity among linguists. The overall objective in incorporating two seemingly distinct disciplines was to indicate that both fields attempt to explore the same cognitive system, and hence the beneficial interaction in investigating human language comprehension mechanisms should be entertained. Given this backdrop, let us overview how the thesis attempts to achieve this goal.

The Turkish bare reflexive *kendi* has attracted the notice of the syntacticians over the years. The debate has focused on to what extent it can be constrained by Principle

A of Binding Theory. Most formal accounts argued that *kendi* is a local anaphor and needs a local licensor. A few researchers put forward that the reflexive *kendi* may occur in non-local contexts and may find a cross-clausal antecedent. However, the distribution of the anaphor in a non-local context has been restricted to particular sentence embeddings, namely non-finite domains. Also, many works have adopted a pragmatic approach in analyzing the long-distance interpretation of this referential unit. Departing from a pragmatic approach, I offered an alternative framework, which was a two-partite system focusing on its person feature composition. That is, the reflexive can be marked with distinct person features: kendim 'myself', kendin 'yourself', kendi 'himself/herself. I proposed that 1P and 2P reflexives need a local licensor in the narrow syntax via Agree mechanism while 3P reflexive can resolve its referential deficiency with local and non-local antecedents via indexing at LF in non-finite subordinate clauses. I have built the given analysis on the existing empirical evidence in the literature that 3rd person is not a true person feature. Hence, person feature specification on person unmarked *kendi* (or, the absence of person feature) enables it to check its referential deficiency at LF. The non-local interpretation is then obtained at this interpretive level via head-raising to the matrix domain. The LF movement ensures any argument in the matrix clause can antecede the person unmarked reflexive. On the other hand, the person feature-marked reflexives such as *kendim* and *kendin* need to engage in an Agree relation. This follows from the assumption that they have unvalued [Participant] and [Speaker] features respectively, which need to have valuation before sent off to the interface. Otherwise, the derivation does not converge. In sum, the distinct

lexical properties of Turkish reflexive entail unique mechanisms to be able to resolve its interpretive deficiency.

In Chapter 4 I provided acceptability judgment data about the final interpretation of the 3rd person reflexive kendi (i.e., person unmarked) which previously has been a rarely adopted research methodology. Collecting offline data had two motivations. The first objective was to evaluate the reported judgments in the literature. The second was to set a ground for eye-tracking experiments in that I would able to design test materials accordingly. I found in Experiment 1 that Turkish speakers equally allow local and non-local interpretation in non-finite nominalized sentence embeddings. In Experiment 2, on the other hand, the non-local antecedent choices decreased substantially in the finite subordinate clauses, while the local interpretation remained constant. Based on the findings I concluded in Chapter 4 that Turkish speakers show a preference for a local antecedent in finite subordinate configurations, except ECM type verbs whereas both local and non-local antecedents, may construct a dependency with *kendi* in the non-finite embedded clauses. I take the findings as evidence that non-local antecedent selection for *kendi* is restricted to certain clause embeddings and conclude that the distribution of the bare reflexive *kendi* can be accounted for within Principle A of Classical Binding Theory in constructions other than non-finite subordinate clauses and finite ECM subordinates.

The findings in previous chapters led to the testing real-time application of Principle A in resolving *kendi* dependency. Research on how meaning unfolds in real-time has adopted various techniques such as self-paced reading (SPR), eye-tracking (ET), and event-related-potential (ERP). Eye-movement data using eye-tracking during

reading provide an accurate temporal picture so that I adopted this methodology in the thesis. The mechanism that modulates how the human sentence comprehension unfolds in real-time has been extensively addressed in the psycholinguistics area. Reflexive dependency resolution has taken attention regarding whether the parser considers the referents violating syntactic constraints such as Principle A. Also, the timing of the online implementation of structural constraints by the parser has been a prolific research area. The existing eye-movement evidence from various languages yielded a mixed picture of mechanisms in retrieving antecedents. Two mainstream proposals have been made accordingly; the parser is sensitive to only the structural position of the potential antecedent (e.g., Principle A) in the early stage of reflexive processing, or the morphological and semantic cues beside the syntactic information influence the processing initially. The first view predicts that grammatically illicit noun cannot intervene in the early stage even if there is a semantic and morphological feature matching with the reflexive. The second framework puts forward that the distractor exerts an influence on the parser in the early processing as long as it shares morphological and semantic features with the reflexive. In a memory access model of language comprehension (e.g., content addressable) the questions were reframed as what sources of information can be used as a cue in accessing linguistic memory (namely, antecedents). The *structured memory access* favors only the structural cues over the non-structural ones, hence memories violating this configurational constraint are never activated. On the other hand, *standard cue-based access* argues that any cues on the potential targets can be used in memory access. This memory access architecture consequently predicts that dependency targets are not constrained by the structural

information as long as they share content with the dependent unit. This prediction suggests interference from the grammatically illicit antecedent as it can be partially activated as long as it shares an identical content with the reflexive.

Sentence processing has been linked to general cognitive theory using Adopting Control of Thought Rational (ACT-R), which was developed by Anderson and Lebiere (1998). The computational model of cue-based parsing was originally implemented for English reflexive processing in Lewis and Vasishth (2005) and Lewis et al. (2006) as they conceptualized the sentence processing "as a serious of skilled memory retrievals, modulated by similarity-based interference and the fluctuation of memory trace activation". The computational model is mainly used to predict the speed of retrieval. The various applications of the cue-based ACT-R model of reflexive processing with various parametrizations predict that similarity-based interference takes place at the time of the retrieval and the interference from the partially matching distractor may either speed-up (facilitatory interference) or slow down the retrieval (inhibitory interference). In sum, this computational model predicts the use of non-structural cues by the parser in the early stage of the reflexive processing should be at the time of the retrieval.

At the outset, the findings in eye-movement experiments provide support for the standard cue-based antecedent retrieval mechanism for the Turkish reflexive in the early stage of processing. That is, for the items where the candidate antecedent was structurally and linearly distant to the reflexive, there was a reliable interference effect as predicted by the standard cue-based memory models (e.g., Experiment 3). In other words, non-targets violating the syntactic constraint were activated based on their

similarity to the reflexive in the animacy feature. Given this, this finding challenges to the *structured memory access* view where the structural cues exclusively modulate the early stage of reflexive processing. Another major finding in the experiment was that the surface linear locality of the candidate can be used as a retrieval cue in accessing linguistic memory (Experiment 4). That is, for items where the inaccessible antecedent was in proximity to the reflexive, I found that the inaccessible antecedent exclusively guided the parser interference at the earliest point in the processing. This suggests that as the number of cues associated with the reflexive increases, the grammar is more likely to retrieve ungrammatical antecedents. And, this fallacy of the grammar occurs at the point the parser encounters with the reflexive. The computational ACT-R model makes similar observations for the effect of the linear surface information in reactivating memories. That is, decay (and the interference) may reduce the activation level of an item in the memory. Considering the temporal distance of the accessible antecedent (i.e., decay) and the intrusion from the cue-matching distractor, the decreased activation level for the accessible antecedent was expected in Experiment 4. The empirical evidence reported so far fit overall dependency resolution mechanisms in various syntactic configurations such as filler-gap (McElree, 2003), subject-verb (Van Dyke and McElree, 2006; 2011; Wagers et. al., 2009; Dillon et al., 2013), negative-polarity items (Vasishth et al., 2008) and verb-phrase ellipsis (Martin and McElree, 2008). The eye-movement evidence also provides support for content-addressable memory access (McElree, 2000, 2003).

We may ask what underlies in inconsistent findings on the interference effect in the literature. A possible answer to this question is whether languages allow long-

distance anaphors or not. The bulk of the eye-movement data comes from English reflexives, a language that does not include a long-distance reflexive, and the online antecedent retrieval in English reflexives is exclusively sensitive to syntactic constraints, at least in the majority of research results. On the other hand, for the Chinese long-distance reflexive *ziji* non-structural cues can be used to retrieve potential antecedents. If this line of thought is on the right track, the interference effect found in processing the Turkish reflexive can be explained. Early chapters in the thesis have provided compelling evidence that the person unmarked reflexive *kendi* can be a long-distance anaphor, especially in nominalized clauses. Based on this assumption, the speakers of Turkish and Chinese (or any languages with LD reflexives) have learned that non-structural information plays a larger role in retrieving antecedents in the processing. In contrast, a child learning English becomes less susceptible to non-structural cues. To evaluate this rationale, we need more eye-movement data, especially from languages with long-distance reflexives.

To conclude, findings from eye-movement data support a cue-based retrieval mechanism for reflexives in the early stage of processing. That is, the parser is sensitive to the content of the potential items and starts to consider them if they carry a matching feature with the target element. The parser does not give any prominence to structural content like Principle A over non-structural content.

Appendix

Table A.1 Raw mean reading times in Experiment 3

	Reflexive				Refl. Spill over				Verb				Verb spill over			
Antecd.	Match		Mismatch		Match		Mismatch		Match		Mismatch		Match		Mismatch	
Distractor	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.
FFT	232 (9)	231 (7)	228 (6)	236 (9)	222 (6)	224 (6)	240 (9)	231 (8)	244 (8)	229 (7)	227 (7)	233 (8)	282(19)	283(18)	286(20)	270(16)
FPRT	281 (12)	275 (14)	268 (12)	278 (11)	250 (8)	258 (8)	301 (14)	276 (13)	346 (9)	319 (16)	316 (11)	344 (21)	508(38)	513(35)	498(27)	523(36)
RPD	343 (26)	333 (21)	300 (21)	350 (20)	284 (12)	303 (20)	362 (21)	319 (21)	454 (37)	423 (29)	425 (38)	470 (33)	203 1(88)	193 9(69)	192 0(67)	207 3(71)
SPRT	264 (12)	251 (17)	258 (11)	270 (13)	238 (11)	258 (23)	258 (10	234 (9)	265 (18)	296 (21)	307 (18)	286 (12)	285(29)	461(44)	431(36)	441(36)
TFT	582 (39)	481 (39)	664 (51)	583 (45)	498 (36)	432 (27)	617 (37)	559 (40)	628 (45)	545 (36)	763 (49)	691 (47)	800(73)	806(57)	959(75)	922(81)

Table A.2 Raw mean reading times in Experiment 4

	Reflexive				Refl. Spill over				Verb				Verb spill over			
Antecd.	Match		Mismatch		Match		Mismatch		Match		Mismatch		Match		Mismatch	
Distractor	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.	Match	Mism.
FFT	237 (10)	229 (9)	239 (9)	222 (8)	228 (11)	227 (7)	226 (7)	237 (7)	257 (13)	265 (18)	246 (7)	263 (10)	265(11)	251(11)	243(10)	235(10)
FPRT	298 (16)	278 (17)	287 (15)	273 (16)	253 (12)	274 (11)	269 (12)	279 (9)	360 (15)	390 (25)	388 (23)	381 (17)	521(35)	515(30)	443(27)	472(31)
RPD	412 (28)	331 (21)	379 (28)	345 (26)	373 (39)	366 (31)	375 (29)	332 (17)	627 (95)	527 (44)	602 (64)	667 (67)	205 6(86)	199 1(77)	206 8(71)	203 2(79)
SPRT	273 (21)	249 (15)	252 (10)	236 (7)	232 (13)	235 (16)	236 (8)	249 (15)	291 (18)	301 (20)	290 (20)	268 (18)	402(26)	413(37)	435(31)	410(32)
TFT	596 (42)	531 (37)	647 (45)	597 (39)	488 (33)	478 (34)	573 (36)	564 (36)	633 (37)	615 (52)	701 (43)	652 (37)	733(47)	705(39)	781(61)	710(47)

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