PROCESSING GENITIVE-POSSESSIVE LONG DISTANCE DEPENDENCIES IN TURKISH

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2015

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Thesis submitted to the

Institute for Graduate Studies in Social Sciences

in partial fulfillment of the requirements for the degree of

Master of Arts

in

Linguistics

by

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Boğaziçi University

2015

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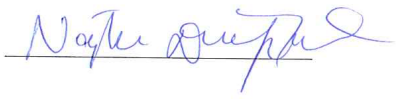
Assist. Prof. Nazik Dinçtopal 

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October 2015

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ABSTRACT

Processing Genitive-Possessive Long Distance Dependencies in Turkish

This study addresses the processing of Genitive (GEN)-Possessive (POSS) long distance dependencies in Turkish in both Noun Phrases (NPs) and non-finite embedded clauses. The self-paced reading paradigm to investigate two factors that might play a role in determining the processing complexity of the dependency at issue: the overt presence of the GEN-marker in the sentence and the linear distance between the GEN-marked noun and the POSS-marked word, which can be a noun or a nominalized verb. To that end, we compare three models on sentence processing; namely locality accounts (Hawkins, 1990; 1994; Gibson, 2000), anti-locality accounts (Konieczny, 2000; Kamide & Mitchell, 1999) and content-addressable retrieval (McElree, 2006; Phillips, Wagers, & Lau, 2010). The results indicate NPs and non-finite clauses do not exhibit a complete parallelism with respect to the processing of the GEN-POSS dependencies. While the overt presence of the GEN-marker leads to more processing load on the POSS-marked noun in both domains, the effect of the linear distance between the GEN-marker and the POSS-marker is not uniform. The linear distance does not affect the processing complexity in NPs whereas it eases the processing of the nominalized verb in non-finite embedded clauses. To conclude, this study shows that each dependency relation might have its own dynamics and a particular processing model might not be able to account for all types of long distance dependencies.

ÖZET

Türkçe İlgi-İyelik Yapılarından Oluşan Ayrık İlişkilerin İşlemlenmesi

Bu tez çalışması Türkçe'de belirtili isim tamlamaları ve yüklemi adlaştırılmış yan tümcelerdeki ilgi-iyelik yapılarının oluşturduğu ayrık ilişkilerin işlemlenmesini ele almaktadır. Bu ayrık ilişkilerin işlemlenme güçlüğünü etkileyebilecek iki etken olan cümlelerde ilgi ekinin varlığı ve de ilgi ve iyelik ekleri arasındaki çizgisel uzaklığı test etmek için kendi hızıyla okuma yöntemi kullanılmıştır. Bu çerçevede deneylerde üç cümle işlemlenmesi modeli karşılaştırılmıştır. Bu modeller, yakınlık modelleri (Hawkins, 1990; 1994; Gibson, 2000), ters-yakınlık modelleri (Konieczny, 2000; Kamide & Mitchell, 1999) ve içerik adreslenebilir bellek modelidir (McElree, 2006; Phillips, Wagers, & Lau, 2010). Bulgular belirtili isim tamlamalarının ve yüklemi adlaştırılmış yan tümcelerinin ilgi-iyelik ayrık ilişkilerinin işlemlenmesi konusunda paralellik göstermediğini ortaya çıkarmaktadır. İlgi ekinin cümlede yer alması her iki kategoriyi de aynı şekilde etkilerken ilgi ve iyelik ekleri arasındaki çizgisel uzaklık farklı sonuçlar doğurmaktadır. Belirtili isim tamlamalarında çizgisel uzaklık iyelik eki almış kelimenin işlemlenmesini anlamlı bir şekilde etkilemezken yüklemi adlaştırılmış yan tümcelerde çizgisel uzaklık yüklemin işlemlenmesini kolaylaştırmaktadır. Sonuç olarak bu çalışma her ayrık ilişkinin farklı dengeleri olabileceğini ve de mevcut bir cümle işlemleme modelinin bütün ayrık ilişkilerin işlenlenmesini açıklayamayacağını öne sürmektedir.

“Not all those who wander are lost.”

J. R. R. Tolkien

ACKNOWLEDGMENTS

Writing this thesis has been among the most adventurous and challenging journeys I have ever made in my life. Over the past year, sentence processing models, hypotheses and test item candidates have always been with me in my mind. Honestly, I felt lost at more than one time. If I could finally find my way out, it is thanks to several people who enlightened my way with their love and wisdom.

First and foremost, I would like to express my deep gratitude to my thesis advisor, Mine Nakipoğlu. Three years ago, I decided to study in the Linguistics Department to be able to work with her on my thesis, and now I am glad that happened. She took me down a rabbit hole of sentence processing, and her contagious excitement about science and research has given me the necessary inspiration and strength to complete this study. She let me explore the field, encouraged me to ask questions and taught me it was alright to be puzzled! I am especially thankful to her for helping me see the big picture and reminding me to take care of my health. Thank you! I am indebted to you for your endless patience and understanding.

Barış Kahraman has saved me from several dead-ends since the first time I contacted him over a year ago. I am grateful to him for visiting our university and spending two days with me in a coffee shop to discuss sentence processing models and to show me how to design the experiments and conduct them. Even though we were several times zones apart, it was a great comfort to know that I could always

write him and he would answer my endless questions as soon as possible. Thank you for your invaluable help and guidance!

I wish to thank Nazik Dinçtopal for being so generous with her time and knowledge. She helped me see the data from a different perspective and encouraged me to develop alternative ideas. I am also thankful to Sumru Özsoy without whose help the syntactic analyses in the study would not have been possible. I would also like to thank my instructors Aslı Göksel, Balkız Öztürk, Eser Taylan-Erguvanlı, Meltem Kelepir-Wood and Markus Pöchtrager for creating a challenging yet enjoyable learning environment.

I feel lucky to have studied with my friends Büşra, Faruk and Betül, who created a stimulating learning environment. I am thankful to Ömer Eren for being so helpful whenever I needed. I am truly grateful to Begüm Avar and Orhan Bilgin for their help with data collection. I would also like to thank Süleyman Taşçı for keeping my spirits up during long study hours.

This project has been funded by TÜBİTAK-BİDEB 2210 grant, which I acknowledge gratefully.

I am thankful to my colleagues for encouraging me to complete my studies and having me believe that it was possible work as a full time teacher and study as a full time student. Thank you Arzu, Aysun, Başak, Gülcan, Sevencan and Taciser for your support.

I feel grateful for my friends who were of great help during this challenging period. I am thankful to Yasemin for believing in me and supporting me since the beginning, to Zeynep for helping me find several articles, to Haluk and Emre for mocking me for being so serious about my studies, to Süreya for proofreading

several parts of the thesis, to Natalie, Frank and MariPi for helping me appreciate this learning experience. Also, I am grateful for my Spanish family; Eve, Antonio and Maria for their continuos support.

I am specially indebted to my dear friend Elif who has been with me at every step of this thesis. Thank you for being always there for me and for reminding me of the life outside the library.

I am forever indebted to my mother Sebahat Akpınar and my father Ahmet Akpınar, my sister Seval Akpolat and her husband İsmail Akpolat, my sister Selda Akpınar and my brother Murat Akpınar for their endless support and unconditional love. They knew how hectic my life was and helped create a balance in my life.

Finally, I am thankful for my sister Selda Akpınar; for her companionship as a sister, as a friend and as a flatmate. Thank you “Nutella” for believing in me and for going through everything with me. This thesis would not have been completed without your love and support.

This thesis is dedicated to all those who inspire me

and in particular

to my parents who inspire me to follow my dreams

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ABBREVIATIONS

ABIL	Ability marker
ABL	Ablative
ACC	Accusative
AgrN	Nominal Agreement
AgrNP	Nominal Agreement Phrase
C	Complementizer
COM	Comitative
CP	Complementizer Phrase
CRD	Constituent Recognition Domain
DAT	Dative
DLT	Dependency Locality Theory
EIC	Early Immediate Constituents
EU	Energy unit
GEN	Genitive
IC	Immediate constituents
IMPF	Imperfective
LOC	Locative
N	Noun

NEG	Negation
NOM	Nominative
NP	Noun Phrase
ORC	Object Relative Clause
PAST	Past tense
PL	Plural
POSS	Possessive
PossP	Possessive Phrase
Q	Question marker
RC	Relative Clause
REFL	Reflexive
SG	Singular
SOV	Subject-Object-Verb
SRC	Subject Relative Clause
SVO	Subject-Verb-Object
T	Tense
TAM	Tense Aspect Modality
TOP	Topic marker
TP	Tense Phrase

V	Verb
VP	Verb Phrase

CHAPTER 1

INTRODUCTION

1.1 The aim

The aim of this thesis is to investigate the underlying dynamics of on-line processing of one particular type of long distance dependency – the Genitive-Possessive construction in Turkish.

To date, there have been several proposals on how the human parser establishes the links between the words within a sentence given that only one word can be heard or seen at a time. There is less consensus, however, on how it is possible that the relations between the words which appear structurally and temporally dislocated in the sentence can be established seemingly without any extra effort. In order to form long distance dependencies such as subject-verb dependencies between the dislocated words, the human parser should perform several cognitive tasks simultaneously such as keeping track of previously encountered words, creating expectancy for the upcoming stimulus, storing multiple incomplete dependency relations in memory, and finally retrieving the first member constituting the dependency from memory when the second member is encountered in the sentence. Several hypotheses have been proposed to unravel the factors that determine the complexity of processing long distance dependencies; one influential hypothesis in the field attributes the complexity to the distance between the related words; according to the locality accounts (Hawkins, 1990, 1994; Gibson, 2000) proximity matters in processing, thus if members forming the dependency are adjacent, they are processed more easily, however the anti-locality accounts

(Konieczny, 2000; Kamide & Mitchell, 1999) postulate the opposite and state that distance between the dependents equip the human parser with a prediction power hence does not pose a disadvantage in processing; whereas others such as the content-addressable retrieval model (McElree, 2006; Phillips, Wagers, & Lau, 2010), attribute the complexity to interference of the words with the same features.

This thesis attempts to contribute to this ongoing debate by providing data from Turkish, a head final language with rich morphology; hence morphological as well syntactic and semantic links need to be established for a dependency relation in which the head of the dependency (such as the verb) follows its dependents (such as its arguments).

1.2 The scope of the study

The present study focuses on the Turkish Genitive (GEN)-Possessive (POSS) long distance dependencies in possessive Noun Phrases (NPs) and non-finite embedded clauses. The underlying reason behind this choice is twofold: as not many languages reflect a Genitive-Possessive (henceforth GEN-POSS) relation through distinct affixes on the constituents construing the GEN-POSS construction, and as the construction manifests identical morphological properties in nominal and verbal domains, Turkish provides us with a unique opportunity to test the nature of dependency at issue and to compare various sentence processing models.

The GEN-POSS constructions in Turkish obligatorily show number and person agreement; so a threefold dependency relation is formed: semantic, syntactic and morphological. As Turkish allows both scrambling and pro-drop, the GEN-marked noun and the POSS-marked word (a noun or a nominalized verb) can

occur adjacent to each other or apart from each other within the sentence, and the GEN-marked noun can be implicit, i.e., not overtly stated in the sentence. The present study examined the GEN-POSS constructions both in NPs and non-finite embedded clauses as they conform to the same GEN-POSS template even though they belong to different syntactic categories.

All the experiments I will report in the thesis attempt to contribute to our understanding of how speakers of Turkish process and comprehend GEN-POSS long distance dependencies. In particular, I am interested in finding out whether the presence of the GEN-marked noun in the sentence and the linear distance from this noun affect the processing load of the POSS-marked word, which can be a noun or a nominalized verb.

With respect to how the GEN-POSS dependencies are parsed in Turkish there are primarily two issues that are worth seeking. The first one is the presence or absence of the GEN-marker in the sentence. As a GEN-POSS construction is possible with an overt or a covert GEN-marker I am interested in finding out whether the presence of the GEN-marker on the noun eases the processing of the POSS-marked noun or renders the parsing more difficult. The overt presence of the GEN-marked might lead to facilitation in processing the long distance dependency as it gives the parser the cue that a POSS-marked word will appear in the sentence. The overt presence of the GEN-marker might also lead to extra cognitive load, as well, because the parser might retrieve the GEN-marked noun to the focus of attention to establish the dependency. Let us examine (1) for an overt and covert presentation of the GEN-marker in NPs. In both (1a) and (1b) there is a possessive NP and a finite embedded clause before the POSS-marked noun. In (1a), the GEN-marked noun is

overtly expressed in sentence initial position whereas the subject of the embedded clause is covert, which is shown as *pro*. In (1b) the subject of the embedded clause is overtly expressed while the GEN-marked noun is not, which is again shown as *pro* preceding the POSS-marked noun. Since the subject of the embedded clause and the GEN-marked noun refer to the same person, only one of them is overtly expressed in both sentences while the other one is covert.

(1) a. Profesör-ün$_i$ pro bütün sabah koşu yap-tı diye
Professor-GEN whole morning running do- PAST.3SG as
t_i diz-i ağrı-dı.[1]
knee-POSS.3SG ache-PAST.3SG

b. Profesör bütün sabah koşu yap-tı diye
Professor-NOM whole morning running do- PAST.3SG as
pro diz- i ağrı-dı.
knee-POSS.3SG ache-PAST.3SG
"As the professor ran the whole morning, his/her knee ached a lot."

Notice that the GEN-POSS dependency is overt in (1a) due to the overt presentation of the GEN-marked noun whereas it is covert in (1b). Two experiments have been conducted; Experiment 1 "Presence of GEN in NPs (P_{gen}NP)" and Experiment 2 "Presence of GEN in deverbals (P_{gen}DV)" to investigate the role that

[1] As can be seen in the GEN-POSS paradigm in Chapter 3, the suffix "-In" can either mean the GEN-marker or the 2nd person singular POSS-marker when the word finishes in a consonant. As a result; *profesör-ün* is ambiguous; it can both mean "your professor" and "the professor's". It is the latter interpretation that is discussed throughout the thesis.

the GEN-marked noun might play in the processing load of the POSS-marked word, which can be a noun or a nominalized verb. Below the two hypotheses are given that are entertained in both experiments:

i. When the sentence contains a GEN-marked noun, the human parser could predict that a POSS-marked item is on the way, hence it expects that a GEN-POSS dependency would be created. This expectancy might lead to extra cognitive load on the GEN-marked noun, which manifest itself as longer RTs on the overtly GEN-marked noun compared to a covertly GEN-marked noun, in other words, a NOM-case marked noun.

ii. According to the Active Gap Strategy by Ng (2008), which is comparable to Frazier and Clifton's (1989) Active Filler Strategy, the parser searches for a filler when it detects a gap in the sentence, and chooses to establish the link between the gap and the filler as soon as possible; so the first filler that is encountered following the gap is adopted. Although (1a) does not include a gap-filler dependency per se, the parser might still employ an Active Gap Strategy in the GEN-POSS dependency, and it might search for the second member of the dependency (the POSS-marked noun) following the first member (the GEN-marked noun). Upon encountering the POSS-marked word, the parser might backtrack and start a search for the GEN-marked noun in memory to retrieve back to focus of attention to form the dependency. This process would in turn, put extra cognitive load on the POSS-marked word -- which again would boil down to longer reading times.

The other factor that I am interested in investigating is the linear distance between the GEN-marked noun and the POSS-marked word. The GEN-marked noun

and the POSS-marked word can appear adjacent as in (2a) or they might be separated by several words that come in between as illustrated in (2b).

(2) a. Bütün sabah koşu yap-tı diye profesör-ün diz- i
whole morning running do- PAST.3SG as profesor-GEN knee-POSS.3SG

b. Profesör- ün bütün sabah koşu yap-tı diye diz-i
Professor-GEN whole morning running do-PAST.3SG as knee-POSS.3SG
"As the professor ran the whole morning, his/her knee…"

In Chapter 5 two experiments are reported; Experiment 3 "Distance of GEN in NPs (D_{gen}NP)" and Experiment 4 "Distance of GEN in deverbals (D_{gen}DV)". Three hypotheses are entertained in each experiment. First, it can be claimed that as there are more intervening words between the members of the dependency, it gets cognitively harder to process the dependency (Hawkins, 1990, 1994; Gibson, 2000). Second, it is possible that as each word in a sentence would potentially give clues about the upcoming information, words that follow the first member of the dependency might guide the parser through processing by helping to form expectations about the syntactic category, animacy and the case marker of the second member of the pair (Konieczny, 2000; Kamide & Mitchell, 1999). Third, it can be argued that the distance in between does not affect the ease/difficulty and the speed of retrieval of the first pair from memory, because memory for language is not hierarchically structured; in other words, structural relations that show hierarchical distance between words such as c-commanding is not included in memory

(McElree, 2006; Phillips, Wagers, & Lau, 2010 among others). As a matter of fact these three hypotheses reflect the basic premises of three on-line sentence processing models that are given a detailed discussion in the following chapter: locality accounts, anti-locality accounts and the content-addressable retrieval model, respectively.

Four self-paced reading tasks have been conducted to test the hypotheses that are discussed above. I will first give a brief background on the self-paced reading technique (SPRT) in the next section which will also touch upon the strengths and weaknesses of the technique for psycholinguistic research.

1.3 Self-paced reading paradigm

The self-paced reading task measures the time the participants take to read a given stimulus. The participants are given the control of determining how much time they want to spend on each word. In a typical experiment, each time the participant presses a designated button, a new word appears on the computer screen. Self-paced reading tasks can be cumulative, meaning each button press brings a new word on the computer screen and it stays on the screen when new words appear, or non-cumulative, so only one word is seen at a time while the others are replaced with dashes. In most studies linear display is preferred over the central display so, words appear one by one from left to right. This is done to make sure the experiment resembles natural reading as much as possible (Jegerski, 2014). In all the experiments we will report in this study, we employed a non-cumulative self-paced reading task with a linear display, which is also called the moving windows technique.

The underlying notion the self-paced reading paradigm relies on is that the amount of time the participants spend in reading a specific word is an indication of how much time they need to process the word. This assumption entails that longer reading times (RTs) show that the word is cognitively loaded; so it is hard to process, whereas shorter RTs indicate that the word does not pose much challenge in processing terms.

Like any other testing technique, there are advantages and disadvantages to implementing this technique. To start with, it is a low-cost, yet efficient method because the required software can be installed on any computer. Also, during testing, the participants are not aware of the fact that the program records their RTs, they are usually asked to answer a comprehension question after each sentence; hence they focus on reading the sentences at their own pace and comprehend them to answer the questions correctly. A major drawback of this technique, however, is that as prosody is not controlled different participants might read the same sentence with different intonation patterns and interpret it differently.

1.4 The gap between theories of language processing and theoretical linguistics

Chapter 3 describes the morphological properties of the GEN and POSS-markers and then shows how GEN-POSS dependencies in NPs and non-finite embedded clauses are derived in syntax. According to the Generative Accounts, the dependency relation is formed as a result of the head-specifier relation within the Possessive Phrase (PossP). A close look at the phrase structure rules reveals that they do not make any reference to the mechanisms underlying the processing of the dependency. This is an example of the current gap between theories of language processing and formal

linguistics. As Ferreira (2005) points out both theories of language processing and formal linguistics converge on the fact that the linguistic knowledge which is stored in the long term memory enables speakers of a language to make the necessary sound-to-meaning matching. The discrepancy lies in what happens in real-time processing. In this regard, one should bear in mind that the human parser comprehends around 300 words each minute and spends approximately 500 ms on each word. This seemingly short time accommodates the simultaneous processing of semantic, syntactic and morphological components of the word. The goal of the theory of language processing is to explain the mechanisms employed by the speakers in real-time processing whereas formal linguistic theory focuses on how a finite set of rules can lead to infinite number of derivations and sentences.

Most formal linguists have been criticized for not paying attention to empirical data (Jackendoff, 2007; Juffs & Rodriguez, 2014) and relying on one person's intuition - usually none other than his or her native speaker judgment- while formulating syntactic theories (Schutze, 1996; Featherston, 2007; Gibson & Fedorenko, 2013 among others). Such a non-quantitative method of data collection might result in invalid observations, and many questions remain about the reliability of testing. Although these criticisms are usually directed towards generative linguists in general, it is of high importance to note that there is a difference in the applicability of Government and Binding (GB) and Minimalist Program (MP) to psycholinguistic research. GB has appealed to psycholinguists with its distinction on the underlying structure and the surface structure distinction. This distinction has led the researchers who work on sentence processing to determine the underlying positions of the words and to ponder how the human parser relates the vacated

position and the dislocated word, which is known as forming filler-gap dependencies. On the other hand, MP has proven itself to be less compatible with real-time processing with its strict bottom-up derivation. According to MP, the first word in the structure is the most embedded one. The maximal projection is derived from this word; so "anticipatory or predictive structure-building is theoretically problematic." (Jackendoff, 2007, p. 5). Phillips and Lau (2004) called this challenge "Logical Problem of Language Processing", and their main aim is to explain how the structure is built incrementally in online processing. Still, most of psycholinguists lie at the other end of the continuum by totally abandoning generative linguistics and adopting a connectionist approach, instead (Ferreira, 2005).

In this study, I aim to provide a psycholinguistic account of GEN-POSS long distance dependencies the morphological and syntactic properties of which have been studied extensively in Turkish (see Göksel & Kerslake, 2010 and Kornfilt, 2007 for a review). To that end, I first go through the morphological and syntactic properties of the dependency of interest. As mentioned above, the generative framework does not make explicit predictions about sentence processing; hence, the predictions are based on the derivation of GEN-POSS constructions described Chapter 3, and a comparison between these predictions with the premises of the expectation-based parsing is given in Chapter 4. I believe such an approach could help narrowing down the current gap between formal linguistics and language processing theories.

1.5 Organization of the thesis

The thesis contains six chapters. This chapter has introduced the scope and goal of this study. In the following chapter, I present a summary of various sentence processing models on long distance dependencies in head-initial and head-final languages, and we compare how the processing load of a sentence is measured in locality accounts, anti-locality accounts and the content-addressable retrieval model. Chapter 3 discusses the properties of the GEN-POSS long distance dependency relation in Turkish in two different grammatical categories: Possessive NPs (NPs) and non-finite embedded clauses. To that end, the morphological properties of both categories are explored first, and then their internal structures are analyzed with a focus on the assignment of GEN-marker. Finally, I report the results of a few psycholinguistic studies that investigated similar structures in Turkish. The goal of Chapter 4 is to present two experiments; Experiment 1 "Presence of GEN in NPs (P_{gen}NP)" and Experiment 2 "Presence of GEN marker in deverbals (P_{gen}DV)" which aim to document evidence for the effect of the presence of the GEN-marked noun on the processing of the POSS-marked word. Experiment 3 "Distance of GEN in NPs (D_{gen}NP)" and Experiment 4 "Distance of GEN in deverbals (D_{gen}DV)" in Chapter 5 test the predictions of the sentence processing models as discussed in Chapter 2. Finally, Chapter 6 discusses how the results from the four experiments of this study can contribute to a better understanding of the underlying mechanisms of sentence processing in Turkish and provides some ideas for future research.

CHAPTER 2

ESTABLISHING LONG DISTANCE DEPENDENCIES

2.1 Introduction

One of the central issues in psycholinguistics is how the human parser can derive the meaning of a sentence from the meaning of a string of individual words. In order to achieve this seemingly trivial task, the human parser must establish semantic, syntactic and morphological dependencies between several words. These dependencies can be local, which means that the words which are interpreted together appear adjacent to one another in the sentence. The related words, i.e., the members of a dependency relation can be separated, as well, since it is possible to have words or even clauses in between. This kind of dependencies is classified as long distance, non-local or unbounded dependencies (Traxler, 2011). (1) illustrates a long distance dependency between the subject and the verb in Turkish. The obligatory subject-verb agreement in Turkish demands a dependency relation between the subject and the verb in the sentence.

(1) Biz dün akşam okul-da politika hakkında konuş-tu-k
We yesterday evening school-LOC politics about talk- PAST-1PL
"We talked about politics at school last night."

The subject "we" in (1) and the verb bearing the 1st person plural agreement marker establishes a long-dependency whereby the relevant constituents are separated by several words.

Long distance dependencies become intriguing in particular when the canonical word order is altered due to question formation, topicalization or relative clause (RC) formation. In Generative Accounts such structures are derived from an underlying representation through displacement, and the displaced words leave an empty position behind when they move. A typical long-distance dependency relation is encountered in English in "Wh- questions". Let us consider (2b) which is assumed to be derived from (2a) below.

(2) a. Kim knows that Sam likes to eat cereal for breakfast.

b. Which cereal does Kim know that [Sam likes to eat ___ for breakfast]?

In (2a), cereal is the argument of the verb "eat" and it occurs next to the verb, but in (2b) this position is empty. The argument "cereal" is displaced to the sentence initial position, leaving a gap at the vacated position. (3) is an example of an indirect question in Japanese in which the question word is moved out of the embedded clause to the sentence initial position.[2] (examples adapted from Aoshima, Phillips, & Weinberg, 2004: 24-26).

(3) Dare- ni John-wa [Mary-ga _____ sono hon- o ageta-ka] itta.
whom- DAT John- TOP Mary- NOM that book-ACC gave- Q said
"John said to whom Mary gave that book."

[2] The canonical word order of ditranstives in Japanese is widely accepted to be NOM-DAT-ACC (Aoshima et al., 2004)

In both (2b) and (3), the question word is displaced to the left leaving its canonical position empty. The displaced item is referred to as a *filler* and the empty position is called a *gap*. In head initial languages, this dependency between the filler and the gap is called *filler-gap dependencies* as the filler precedes the gap whereas in head final languages unlike what the Japanese example in (2) illustrates, the filler can also follow the gap. Such dependencies are called *gap-filler dependencies* (Kwon, 2008; Lin, 2006). In (4) for example, the Relative Clause (RC) head noun *öğrenci* (student) has been displaced to the rightmost of the clause, and its underlying position prior to the verb is unoccupied. Due to the head-final nature of RCs in Turkish, the gap obligatorily precedes the filler when the head noun is used explicitly in the RC; hence the dislocated head noun and its vacated position form a gap-filler dependency.

(4) Öğretmen-in ____ gör-düğ-ü öğrenci sigara iç-iyor-du.
teacher-GEN see-ORC-POSS.3SG student cigarette smoke-PROG-PAST
'The student who the teacher saw was smoking a cigarette.'
(example taken from Kahraman, Sato, Ono, & Sakai 2010)

The crucial assumption in sentences like (4) is that constituents move out of their underlying positions. Movement applies to the constituents, and the underlying position that the constituents are generated and the surface position that they appear in the sentence are not the same. In order to comprehend these sentences that deviate from the canonical word order, the human parser needs to make a connection between the filler and its gap site (Aoshima et al., 2004). This is achieved through

distinct mechanisms in head initial and head final languages. In head initial languages, parsers become aware of an upcoming gap when they encounter the filler in the sentence whereas in head final languages a gap may be posited before the filler is encountered. As shown above, the gap may come before or after the gap. When the filler precedes the gap, the structure is also called forward filler-gap dependencies. In forward dependencies a search for the gap site starts as soon as the human parser encounters the filler. In backward dependencies the gap precedes the filler, and the parser looks for the gap once the filler is encountered in the sentence (Kwon, 2008). In the following sections, the formation of long distance dependencies is discussed both in head-initial and head-final languages.

2.2 The processing load of establishing long distance dependencies

As we have seen above one of the key questions in psycholinguistics is how the human parser establishes the necessary connections between the words (or the filler and its gap) in a sentence. Given that only one word is seen or heard at a time, the human parser should be equipped with a mechanism that not only stores the previous words while simultaneously processing the new word but also integrates the new word into the sentence structure that has been built thus far. This process requires creating local and/or long distance dependencies, which is achieved by storing information about incomplete dependencies, creating an expectancy for the second member of the dependency to appear in the sentence, and finally establishing the link between the first member and the second member (which are also referred to as the head and the dependent) of the dependency.

In what follows, I will provide a review of various accounts on the processing of long distance dependencies and discuss whether the linear distance between the related items affect the processing load of dependencies, making it easier or more difficult to establish the necessary link between the members of the dependency.

2.2.1 Locality accounts

Although there are differences in the way locality-based accounts formalize the processing load of forming long distance dependencies, they all share the same underlying hypothesis that as the distance between the words that form the dependency increases, the dependency formation becomes harder (Wanner & Maratsos, 1978; Hawkins, 1994; Gibson, 1998, 2000). That, in turn, might yield difficulty in head-final languages when a word that appears at the end of the sentence needs to be linked to the words that occur at the beginning of the sentence.

In this section, two insightful locality based sentence processing frameworks are examined: Early Immediate Constituents (EIC) Model by Hawkins (1990; 1994) and Dependency Locality Theory (DLT) by Gibson (2000). EIC Model is closely related to parsing preferences. Hawkins claims that short constituents are preferred towards the left of the sentence whereas rightward position tends to accommodate longer constituents in head initial languages and vice versa in head final languages. The ease of processing depends on how early the immediate constituents are created; therefore, long distances in a given domain such as VP result in higher processing cost. In this model, distance is based on the number of the words that intervene between the related words that form the dependency. In DLT, Gibson (2000) takes into account not only how many words intervene a long distance dependency but

also whether they are new to discourse or not. Both models are given a detailed discussion below.

Hawkins (1990; 1994) studied the word order patterns across human languages and found out that most word order patterns are on par with processing complexity. He proposed that cross-linguistically the preferable word orders reflected how fast the nodes inside a syntactic unit were determined in on-line processing. In other words, Hawkins assumes a parser that tries to reach the basic word order of the language as soon as possible. Such a parser was also proposed in Frazier's (1978) Minimal Attachment Principle. Frazier claimed that the parser adopted the simplest syntactical analysis possible while interpreting the sentence; hence new words in a sentence are attached to the nodes that have already been created in the sentence rather than projecting new syntactic nodes. Note that while Frazier proposed Minimal Attachment as a parsing principle, Hawkins used Early Immediate Constituents (EIC) as a metric to calculate the processing difficulty. In this section, I review how Hawkins determined the syntactic units in a sentence and measured the processing difficulty in different word order patterns in English and Turkish.

While processing a sentence, the human parser determines the words that belong together to form a syntactic unit. Hawkins claims that the most efficient way of pinning down the syntactic units is to determine the mother node. Once the mother node is determined, the syntactic unit can be recognized, and its immediate constituents (ICs) are assigned. Let us examine (5) to see how the mother node and the ICs are determined.

(5) I gave [NP a quite interesting book on Indonesia] [PP to Pam].
1 2 3 4 5 6 7 8 9

In (5) the verb "gave" constructs the mother node VP, so it is the first IC. Under the VP domain, there are two more ICs: NP and PP. The NP domain is constructed immediately when the determiner "a" is reached, and likewise the preposition "to" creates the PP domain. As all ICs should be encountered to determine the constituent domain, a long NP has to be processed first, and then the head for the PP is encountered. Yet, it is possible to reformulate (5) as in (6) so that the distance between the first IC and the last IC is much shorter.

(6) I gave [PP to Pam] [NP a quite interesting book on Indonesia].
1 2 3 4 5 6 7 8 9

The phenomenon in (6) is known as Heavy NP Shift. Parsers prefer to dislocate a long and "heavy" NP to the rightward position in English. Hawkins claims that the underlying reason for this preference is that the constituent domains are recognized at different speeds in (5) and (6). Hawkins (1990) formalizes Constituent Recognition Domain (CRD) as follows:

> The constituent recognition domain for a node X is the ordered set of words in a parse string that must be parsed in order to recognize all ICs of X, proceeding from the word that constructs the first IC on the left, to the word that constructs the last IC on the right, and including all intervening words. (p. 229)

We have seen that different word order patterns result in different CRDs. In sentences such as (5) CRD is very long; a lot of words have to be processed to encounter all of the ICs whereas in sentences like (6) fewer words suffice to determine the CRD. This is the main idea behind EIC; the word order pattern that

enables the parser to recognize the CRD quickly will be preferred over others. EIC is calculated on the basis of the ratio between the number of ICs of a CRD and the number of all the words that need to be processed to determine the CRD.

Let us form a rough estimate for EIC in the examples above. In (5), there are 3 IC: the verb, the NP and the PP. the total number of words to recognize the CRD is 8; so the ratio is 3/8. There are 3 ICs in (6), as well, but the total number of words within CRD is 4 ,which gives the ratio 3/4. The IC-to-word ratio in (5) is twice as high as in (6).

Hawkins examined ten typologically different languages to test whether the predictions of EIC accounted for the cross-linguistically preferable word orders. These languages were English, German, Greek, Polish, Rumanian, Finnish, Hungarian, Turkish, Japanese and Korean. Let us examine data from Turkish, a head-final language that allows both left-branching and right branching in NPs. The head noun appears obligatorily on the right in RCs and GEN constructions, so these NPs are [NP_m] in Hawkins's terms. The mother node can be constructed only at the end of the phrase when the head noun is encountered. Except for these two constructions, determiner or a modifier can signal that the mother node will be an NP before encountering the head noun. These NPs are labeled as [$_mNP$]. Both NP types can be used in a sentence as illustrated in (7).

(7)

$_{mNP}$[Camekan-a] $_{NPm}$[salon-da-ki bütün biblo-lar-ı] kal-dır-dı.

showcase-DAT living room-LOC-GER all trinket-PL-ACC stay-CAU-PAST

"He/she kept all the trinkets that were in the living room in a showcase."

In (7), there are three ICs: the verb *kaldırdı* (he/she kept), the noun *bibloları* (trickets) and *camekana* (to the showcase). As the overall domain for VP is between the first IC and the last IC, we can say that the CRD for the VP is quite long in (7). All the words inside the NP_m is included in the CRD because they come between the first IC; i.e. $_m$NP and the mother node; i.e., the verb. In fact, it is possible to reword (7) as (8) to attain a shorter CRD.

(8) $_{NPm}$[Salon-da-ki bütün biblo-lar-ı] $_{mNP}$[camekan-a] kaldırdı.

(examples taken from Hawkins, 1994: 160)

EIC clearly predicts a preference for (8) over (7): the NPm must precede mNP irrespective of the length of the phrases. Hawkins tested whether EIC's predictions represented the commonly encountered word order patterns by analyzing written data from Turkish.[3] Results showed that there was not any significant difference between the two word orders. 47% of sentences with [NP NP V] structure showed [NP_m $_m$NP V] order while the rest showed [$_m$NP NP_m V] order. Hawkins explained this arbitrary preference by referring to the structure of Turkish specifically, it is being a case marking system. He proposed that in Turkish suffixes can create a grandmother node, so a case marker inside an NP can readily create a VP node dominating the NP. To illustrate, the Accusative marker, for example, signals that a verb will be encountered in the sentence; so it creates a VP node dominating

[3] Written data were collected from pages from a fictional book titled *Ah Bayım Ah* by Nazlı Eray (1976).

the NP, which in turn suggests that the VP can be identified before the verb is encountered in head final languages.

In a nutshell, Hawkins claimed that as the human parser opts for the highest IC-to-word ratio possible within a CRD and certain word order patterns are preferred over the alternative ones cross-linguistically. EIC is of particular interest for the present study as it makes a connection between the linear word order and processing difficulty. A similar connection could be found in Gibson's (2000) Dependency Locality Theory (DLT). Let us now examine how processing difficulty is calculated in DLT.

As stated at the beginning of Chapter 2, the human parser must simultaneously accomplish at least two tasks during on-line processing: integrating the new word into the sentence and storing the current structure in the memory. Gibson (2000) assumed that these two tasks draw from the same pool of computational resources. The total amount of computational resources consumed depends on the cost of these two tasks. As a result, how much resources integration and storage demand determines the processing load of a given sentence. When storage and integration components consume considerable amount of resources, processing the sentence becomes harder. In this section, I give a detailed review of Gibson's (2000) DLT which is an updated model of his earlier Syntactic Prediction Locality Theory (Gibson, 1988) and discuss how integration and storage costs are calculated.

The fundamental point of DLT is locality; so integration and storage costs are bound up with the proximity between the related items; such as the verb and its arguments. In this respect, it shares the same principle with EIC: as the linear

distance between the members of a dependency increases, the processing load increases as well. These two theories are incongruent; however, with respect to how distance is calculated. As discussed in the previous section, Hawkins (1994) measured the distance in terms of the number of all words that intervened. Gibson (2000), on the other hand, claimed that not all words consume equal computational resources as words differ in how accessible they are in a given context (Gundel, Hedberg, & Zacharski, 1993; Warren & Gibson, 2002). According to DLT, when a referent is encountered for the first time in the context, a new file in the processing system is opened to accommodate it, and this process consumes computational resources. These referents are typically referred with indefinite NPs and proper nouns (Kamp, 1984). When the same referent is encountered again in the context, it is usually replaced with a pronoun, and there is no need to employ more resources to integrate it into the structure. Hence, old referents do not consume any recourses whereas new referents do (Gibson, 2000). To put it more explicitly, for each new discourse referent that intervenes between the head and its dependent, cognitive effort or (using Gibson's terminology) one energy unit (EU) is used. A formal definition of DLT structural integration cost which takes into account the oldness of referents is given in (9).

> (9) DLT structural integration cost:
> The structural integration cost associated with connecting the syntactic structure for a newly input head *h2* to a projection of a head *h1* that is part of the current structure for the input is dependent on the complexity of the computations that took place between *h1* and *h2*. For simplicity, it is assumed that 1 EU is consumed for each new discourse referent in the intervening region. (Gibson, 2000, p. 105)

Let us turn to how Gibson calculates the processing load of a dependency that is found in Relative Clauses (RCs). It has been repeatedly shown that there is an asymmetry between Subject Relative Clauses (SRCs) and Object Relative Clauses (ORCs) in terms of processing complexity. As illustrated in (10), the RC pronoun "who" is either extracted from the subject position (10a) or from the object position of RC (10b).

(10) a. The professor who admired the students quit her job.

b. The professor who the students admired _____ quit her job.

This structural difference in the underlying position of the RC pronoun influences the integration cost of the verb and its arguments. (10a) starts with "the professor" which is a definite NP that opens a new file in the discourse, so it consumes one EU. The word "who", however, is co-indexed with "the professor" and it does not introduce any new referent, and there is nothing between the two items, so it does not consume any EU. The verb "admired" introduces an event, but there is no new referent that intervenes between the verb "admired" and its subject "the professor"; hence, only one EU has to be spent. The object of the relative clause students introduces another referent and it is adjacent to the verb "admired" hence it only consumes one EU. The main verb "quit" shows the highest integration cost. As it is a new event in the discourse, it costs one EU. Also, it needs to be integrated with its subject "the professor" that occurs in sentence initial position. There are two new discourse referents in between; "admired" and "students", so 2 EUs have to be used to integrate the verb and the subject. Hence the total integration cost for quit is 3. The

following word “her” is a pronoun which has an antecedent in the discourse, so it does not consume any EU. Finally “job” is a new referent, so it consumes one EU. Table 1 shows the integration cost of each word in (10a).

Table 1. The EUs Spent for Processing the SRC

	The	professor	who	admired	the	students	quit	her	job.
New discourse referent	0	1	0	1	0	1	1	0	1
Structural integration cost	0	0	0	0	0	0	2	0	0
Total EUs	0	1	0	1	0	1	3	0	1

Let us examine the ORC in (10b).The critical difference from (10a) is the empty position (or gap) in the RC. In (10b) the RC pronoun is extracted from the object position of the verb “admired”; hence a difference in the integration cost at the verb is observed. As in (10a) the verb “admired” introduces a new event, which costs one EU. Also, it is integrated with the empty position as it is the object of the verb, and there is not any new discourse referent between the empty position and the verb; so no EUs need to be spent at this stage. The empty position; however is co-indexed with the RC pronoun “who,”and there are two referents intervening at this point, the noun “students” and the event “admired”. These two new referents add up to 2 EUs. As a result the total integration cost for “admired” turns out to be 3. As in (10a), 3 EUs have to be spent for the verb “quit” as it is a new referent (one EU) and it is linked to its agent (2 EUs). The EUs for a each word is summarized in Table 2.

Table 2. The EUs Spent for Processing the ORC

	The	professor	who	the	students	admired	quit	her	job.
New discourse referent	0	1	0	0	1	1	1	0	1
Structural integration cost	0	0	0	0	0	2	2	0	0
Total EUs	0	1	0	0	1	3	3	0	1

Gibson argues that the difference in the structural integration cost on the embedded verb in (10a) and (10b) causes different levels of complexity of processing. In order to see whether total EUs reflect actual processing complexity, Gibson and Ko (1998) designed a self-paced reading task. Their main assumption was that in ORCs like (10b) the participants would slow down on the verbs of the embedded clause and the main clause as these two words showed highest EUs in the sentence. As for SRC, on the other hand, longer RTs were expected only at the matrix clause verb. The results confirmed their expectations; the residual RTs were long on both verbs in ORC whereas it was only the main verb on which the participants slowed down in SRC.

To summarize, DLT assumes that computational resources for language processing are limited in nature, and the same set of resources is used to integrate the new upcoming word into the structure as well as to store the incomplete dependencies in the current structure. The processing load of linking two words in the sentence together depended on the number of new referents that are introduced interim. Although Gibson draws a distinction between new and old referents and only takes new referents into account while calculating the processing load, the main

argument in both DLT and EIC is that the the linear distance between the members of a dependency affects the processing load associated with a sentence.

2.2.2 Anti-locality accounts

Although there are differences in terms of how distance between the items in a dependency relation is measured, both Hawkins (1994) and Gibson (1998; 2000) argued that it was easier to process a dependency relation when the related items were close rather than split up by intervening words. Both models assume that distance leads to an increased amount of processing load. Yet, there are models that claim just the opposite; i.e., the distance between two related items leads to facilitation in parsing and establishing the dependency. Thus they argue that it is easier to establish dependencies when there are words in between (Kamide & Mitchell, 1999; Kamide, Altmann, & Haywood, 2003; Konieczny, 2000, Hopp, 2012). In this case, the language is said to show an anti-locality effect (Konieczny, 2000; Hopp, 2012).

The underlying logic of anti-locality accounts is that language is processed incrementally. Parsers create expectations for the upcoming information based on information they have processed; hence they anticipate a certain structure or even guess a certain word to follow the already parsed words. An eye tracking study by Altmann and Kamide (1999) illustrated how the information delivered by the verb limit the rage of nouns that could occur as its argument in head initial languages. In their Experiment 1, participants saw a visual stimulus containing several objects, and they heard a sentence. In half the experimental data, the verb was compatible with only one of the objects (For example, the sentence was “The boy ate…” and the only

edible object in the scene was a "cake", and the other three objects were distractors.) while in the rest the verb could be followed by any of the four objects. The participants were more likely to look at the appropriate object before they heard it if it was the only compatible object in the sentence. The results from this study show that the human parser is able to predict what might occur next in the sentence. Prediction has been repeatedly shown to be a key factor in language processing (see Kutas, DeLong, & Smith, 2011 for a review). The prediction of a word is facilitated through a probability-based grammar (Hale, 2001) or the syntactic constraints on argument structure of phrases (Konieczny, 2000). Let us first discuss Levy's (2008) expectation-based theory of sentence processing, which elaborates on Hale's (2001) proposals on predictability of a word in a particular structure, and then link it with Konieczny's observation for processing RCs in German.

The basic premise of Levy's expectation-based theory of processing is that as the predictability of a given word increases due to the information in the sentence that has been processed thus far, the surprisal level of the word decreases, which in turn facilitates processing. Cloze procedure tests illustrate this notion well, the participants can predict which word would be used in a certain position.[4] To illustrate, in (11a) as opposed to (11b) the word "stamp" is highly predictable whereas "car" is less predictable, because other words; such as "house, computer" etc. could also occur in this environment.

[4] In the Cloze procedure, a word is arbitrarily deleted from the sentence and the participants are asked to fill the gap with a word they choose (Taylor, 1953). This paradigm has been used to test how predictable a word is in a given context; the probability that the participants use a specific word to complete the sentence determines the predictability of this word in the sentence.

(11) a. He mailed the letter without a stamp.

b. There was nothing wrong with the car. (taken from Levy, 2008:13)

Levy's Surprisal Theory overlaps with prediction-based processing models, but one important difference is that in the Surprisal Theory the possibility of a word to occur in a certain environment is not merely semantic; it can also be syntactic, phonological or morphological. The Surprisal Theory assumes that sentences are processed incrementally; so the probability of upcoming words is updated at each word. When there are more than one competing words, there is less probability for each word to occur in the sentence; which yields a higher surprisal value for each one.

Levy's expectation theory provides important insights into processing of long distance dependencies. If a dependency relation such as subject-verb, determiner-noun or GEN-POSS is available in the language, upon encountering the first member of the dependency pair, the human parser knows that the second pair of the dependency will occur in the sentence. According to the rules of the given language, the second dependent might occur right after the first dependent or it might come after several words. As sentences are not expected to be infinitely long, the probability of encountering the second pair of the dependency increases with each word processed in the sentence; in other words, it helps processing long distance dependencies to have words that come between two members.

Given this account, a sentence does not get necessarily harder towards the end of the sentence (as predicted by locality accounts), because even though the first member of a dependency has to be held in memory until the second member is

encountered in the sentence, the words following the first member gives cues about the second member, which might facilitate processing.

Konieczny (2000) investigated this issue by manipulating the position of RCs in the sentence. In German, the RC pronoun can appear next to the noun that it modifies or it can come after the verb. Hence, there are two dependency relations at issue: the dependency relation between the verb and its argument (the object of the sentence) and that of the NP and the RC pronoun. Hence, he manipulated the position as well as the length of the RC. As 12 illustrates, the RC either appeared next to the NP (12a) or after the verb (12b). Also, the RC was either short (13a), moderate (13b) or a long one (13c). A sample data set is given below.

(12) RC position: adjacent vs. extraposed

a. Er hat [$_{NP}$ die Rose] [RC] hingelegt, und . . .

He has the rose [RC] laid_down, and . . .

b. Er hat [$_{NP}$ die Rose] hingelegt [RC], und . .

He has the rose laid_down [RC], and . . .

(13) RC length: three–five words (a) vs. six–eight words (b) and nine–eleven words (c)

a. ... die Rose ..., [$_{RC}$ die wunder schön war], …

... the rose ..., that was beautiful, ...

b. ... die Rose ..., [$_{RC}$ die auffällig schön und farbenprächtig war], ...

... the rose ..., that was remarkably beautiful and colorful, ...

c. ... die Rose ..., [$_{RC}$ die auffällig schön gewachsen und ganz besonders farbenprähtig war], ...

... the rose ..., that was remarkably beautifully grown and especially colorful, ...

(data taken from Konieczny, 2000: 632)

Locality accounts predict that establishing the dependency relation between the NP and the RC pronoun is easier in (12a) compared to (12b). Yet, note that in (12a) the RC intervenes between the verb *hingelegt* (laid down) and its argument *die Rose* (the rose); hence, the verb is expected to be harder to process in this word order, because the parser has to cross over the RC to create the long distance dependency between the verb and its argument. Also, an increase in the processing load of the verb should vary depending on the length of the RC, which determines how many words come between the verb and its argument.

He tested these assumptions by conducting a magnitude estimation task and a self-paced reading task. In the magnitude estimation task, he asked the participants to read the sentences in which the RCs at various length appeared in different positions (12a or 12b) and rate how acceptable the sentences were relative to the reference sentence that was given before the experiment started. The results showed that the sentences in which the RC was adjacent to NP (as in [12a]) received higher rating; so, they were preferred over the sentences in which the verb and the NP occurred next to one another. For the NP-RC pronoun dependency, he found that the sentences with a long RC were rated higher if the RC is extraposed rather than adjacent whereas the sentences with a short RC was favored when it was adjacent.

Konieczny also conducted a self-paced reading experiment with the same data set to find out whether Reading Times (RTs) confirmed the sentence structure preferences that were expressed in the magnitude estimation task. There were two important regions in his sentences. The first one was the RC pronoun and the second one was the verb. The results showed that the verb was read significantly faster in the condition in which RC intervened between the verb and its argument (as in [12a]). The length of the RC did not affect integration of the verb into the structure; there was not any significant difference between the RTs for short condition (13a) and long condition (13c). The position of the RC affected the processing of the RC pronoun, though. The participants read the RC pronoun slower when it was extraposed (as in [12b]), which means it was harder to establish the dependency relation between the noun *die Rose* (the rose) and the RC pronoun *die* (that) when the two were separated in the sentence.

When the results for the verb-argument and the noun-RC pronoun dependencies are taken together, the study shows both locality and anti locality effects. The verb was read faster when it was separated from its argument by several words whereas the RC pronoun was read slower when it was separated from the noun which it modified. Hence, distance led to facilitation in the verb-argument dependency and processing complexity in the noun-RC pronoun. Konieczny suggests that the reason why distance affects the verb and RC pronoun differently lies at the predictability of these constituents in the sentence. The verb is syntactically expected to occur in the sentence, and its arguments (the subject and the object) create anticipation for the verb. The RC pronoun, on the contrary, was syntactically and pragmatically unpredictable in the test items. To reconcile the results for the RC

pronoun with the anti-locality effect, Konieczny proposed that locality accounts can only account for unpredictable items in the context and fail to explain the facilitation effect for predictable items.

We have seen above from the English and German data that parsers are continuously guided by the sum of information they have processed in the sentence. To date there is growing evidence from various languages that sentence processing is incremental; hence items are not stored in a buffer in a frozen mode until the head is reached and only then can they be interpreted (Levy, 2008). On this issue, head final languages provide a unique opportunity to investigate whether information about the head of a phrase is available before the head is encountered in the sentence. In contrast to models that advocate incremental processing, Pritchett (1991) proposed that information about the upcoming words in a sentence was not available at all, and the constituents in a phrase could not be processed before the head is encountered in the sentence. Pritchett also assumed that only when the head is encountered in the sentence, the licensing relations such as theta role assignment are determined. The main principle of the Head-driven Parsing Model is given in (14).

> (14) "A node cannot be projected before the occurrence of its head, since the relevant features which determine its categorical identity and license both its own and its arguments' attachment are theretofore undetermined" (Pritchett, 1991, p. 252).

According to (14) the phrase structure can only be established at the head which comes at the end of the phrase in head-final languages like Turkish. (15)

illustrates a string of four modifiers in Turkish. According to the Head-driven Parsing Model, no maximal projection is formed before the head noun is encountered; so the adjectives simply "float" until the noun is integrated into the structure.

(15) mavi ince uzun antika

blue thin long antique

A quick survey with native speakers of Turkish on (15) undermines head-driven parsing, as the general tendency is to expect a noun to follow the modifiers.[5] In fact, speakers can even guess the noun; there is a very high chance it will be *vazo* (vase). It supports that some information about the head is available and the constituents of the phrase are processed before the head is reached unlike head-driven margin models predicted. Kamide and Mitchell (1999) looked at ambiguous sentences in Japanese such as (16) to test whether the theta assignment and the argument structure are established before the verb is encountered in the sentence.

(16) Kyooju-ga gakusee-ni toshokansisho-ga kasita mezurasii

Professor-NOM student-DAT librarian-Nom lent unusual

komonjo-o miseta.

ancient manuscript-ACC showed.

"The professor showed [HA: the student] the unusual ancient manuscript which the librarian had lent [LA: the student]."

(example taken from Kamide & Mitchell, 1999: 639)

[5] I asked fifteen native speakers of Turkish to complete (15) orally. 14 out of 15 speakers used the noun *vaso* "vase" while 1 speaker used the noun *kılıç* "sword."

The ambiguity arises in (16) because the dative marked object *gakusee-ni* (student) can be the argument of either the matrix verb (high attachment) or the embedded verb (low attachment). If parsers choose high attachment, the sentence reads that it was the student to whom the unusual ancient manuscript was shown; whereas, low attachment forces the meaning that the unusual ancient manuscript was shown to someone else who is not overtly stated in the sentence and it was lent to the student. Pritchett's head driven parsing model favors low attachment, because the first verb that is encountered in the sentence is *kasita* (lent), and the theta requirements of this verb are satisfied and parsers cling on this interpretation before the second verb is encountered. When the second verb appears, parsers can still go with their first interpretation or they can reanalyze it in a way that the dative cased noun can be attached to either of the two verbs.

In their self-paced reading task, there were three conditions: the sentences in which only high attachment was possible, the sentences in which only low attachment was grammatical and finally ambiguous sentences in which both interpretations were possible. As discussed above, head driven parsing hypothesis assumes that all attachment decisions are postponed till the head appears, and according to this parsing model the theta roles are assigned as soon as possible, and the structure can be reanalyzed if necessary. Note that the first verb to be seen in the sentence is the embedded verb; so the parser would assign the theta roles as soon as encountering this verb if the embedded verb and the DAT-marked object are compatible. In the high attachment condition it is obvious from the meaning of the embedded verb and the DAT-marked object that the two are not compatible; hence the parser does not choose low attachment, and the attachment of the DAT-marked

noun is delayed until the matrix verb is seen. In the low attachment condition, the DAT-marked noun can be an argument of the embedded verb, hence the theta roles are assigned when the embedded verb is encountered. In the ambiguous sentences; however, upon reaching the matrix verb, the parser realizes that the DAT-marked noun can be the argument of both the embedded verb and the matrix verb and examines the sentence to satisfy the theta requirement of the verb. At this point the sentence might be reanalyzed and theta assignments might be changed. If the structure is subject to reanalysis, it occurs only when the matrix verb is seen; hence Pritchett's (1991) Head-driven Parsing Model does not predict any difference in the RTs of the embedded verb across conditions while proposing that reanalysis on the matrix verb might lead to reading latencies in ambiguous condition as opposed to low/high attachment conditions. Incremental processing models; on the other hand, assume that theta assignment starts before the verb is reached, and the DAT-marked noun *gakusee-ni* (to the student) is linked to an attachment host before any verb is encountered in the sentence. When the main verb can accommodate this attachment host, the system runs smoothly. Yet, when it is not compatible as in the case of low attachment condition, the structure has to be revised to change the prediction from high attachment to low attachment. Therefore, in low-attachment condition, longer RTs on the main verb are expected compared to the ambiguous and high attachment conditions. The results of the study showed that it took the participants to read the main verb was read in a statistically longer time only in low attachment condition; which shows that the parser revised their interpretation in this region. That shows that parsers initially chose high attachment, which is not predicted by head driven parsing hypothesis.

Kamide and Mitchell's (1999) study suggests in head-final languages that information about the head is available before the head is encountered in the sentence as the parser does not postpone the processing of the words that precede the head in a phrase.

To summarize, anti-locality accounts draw on the main arguments of incremental sentence processing such as the predictions about the upcoming information are updated and become clearer with each word being processed. Given the fact that the information about the upcoming words become richer as more words are being processed, the distance between the two members of a long distance dependency leads to anti-locality effect; the processing of the second member will be facilitated of processing rather than becoming more difficult.

2.2.3 Content addressable retrieval

Up to this point, the "word" has been the base of the discussion as distance is measured based on the number of words intervening the dependents of the long distance dependency. Another perspective in the parsing literature concerns the specific features that these words have in determining the ease or difficulty of processing. This proposal brings along a different kind of mental representation than the traditionally assumed structural representation. In this section, I first briefly discuss the nature of mental representations and then provide a summary of studies that provide evidence for the fact that retrieval from memory is achieved through cues and features rather than node by node search.

Most linguistic theories assume highly structured mental representations (Chomsky, 1981; Steedman, 1997). These mental representations consist of abstract

categories which are ordered in a hierarchical manner, so hierarchical relations such as c-command is assumed to be construed during sentence generation. To illustrate, in (17) the pronoun “he” refers to a male person other than John.

(17) He thinks John will win the elections.

This sentence cannot mean ‘John thinks himself as the winner of elections’. “John” as an R-expression cannot be co-indexed with an antecedent that c-commands it as formalized with Principle C (Chomsky, 1981). Only a structurally rich mental representation that embodies a c-command relation enables correct interpretation. Also, structurally rich mental representations make it possible to have the correct subject-verb agreement in sentences like (18). The verb agrees with the subject, which is singular rather than the adjacent noun which is plural.

(18) The door to opportunities opens for the new graduates.

The examples (17) and (18) show that structural mental representations make possible to have the correct interpretation and morphological agreement in a long distance dependency. Notwithstanding, I should note that as Wagers (2008) pointed out every millisecond counts in on-line language comprehension,and the human parser is to deal with several dependency relations in a single sentence. Thus, having hierarchical representations in every sentence with several dependencies is very costly and at times redundant. Recently an alternative to this structured, hierarchical mental representations has been proposed: a context dependent and content

addressable memory structure (Lewis & Vasishth, 2005; McElree, 2006; Martin & McElree, 2008; Wagers, 2008). The crucial point in this memory structure is that search does not depend on hierarchical relations even though these relations are represented in the structure. Instead, a feature would be searched for a matching item. For example, in (19) "his" has the features of being singular and masculine, so these probes are searched for in memory to find what "his" refers to.

(19) John thinks his daughter will win the elections.

It is assumed that content addressable retrieval yields faster access as it pins down the matching words with the feature without taking into the consideration of their syntactic position in the sentence (McElree, Foraker, & Dyer 2003). The downside of such a structure insensitive search is that the feature can match with a word that is not grammatically licensed, as a result of which structures that are grammatically not licensed can be formed such as (20).

(20) The door [$_{PP}$ to opportunities] open for the new graduates.

Here, the subject of the sentence "door" is singular, the plural noun "opportunities" is embedded under PP, and the verb carries plural inflection. Speakers establish a dependency relation between the verb and the adjacent noun "opportunities", which is plural, instead of the subject of the sentence "door", which is singular. This issue is known as *agreement attraction,* the plural feature on the noun "opportunities" attracts the plural feature of the verb. That, in return, results in

a grammaticality illusion; ungrammatical sentences like (20) are judged to be grammatical by native speakers of English (Wagers, 2008).

Grammaticality illusions show us that when parsers search for a feature, they do not only go through the words in syntactically relevant positions. They rather go through all the words including the grammatically irrelevant ones. Henceforth, retrieval does not occur through node by node search which would avoid grammatically illicit sentences like (20) with high accuracy. Instead, retrieval is achieved through scanning the whole memory with specific cues and activating encodings which are similar to the relevant cues. Content addressable retrieval is faster compared to node by node search, but it is not as accurate as the former, because it may lead to illusions of grammaticality (Phillips et al., 2010).

Grammatical illusions have been observed for Negative Polarity Items (NPIs), as well. In simple terms, NPIs such as *any* or *ever* occur in negative environments.[6] (21) shows that there needs to be a negative element in the structure to have scope over the NPI; otherwise, the NPI is unlicensed, which results in ungrammaticality (Von Fintel, 1999).

(21) a. No student has ever finished this project in time.

b. *A student has ever finished this project in time.

c. *A student that no teacher believed in has ever finished this project in time.

[6] Von Fintel (1999) argues that constituents like “only” or superlatives as well as negative elements can license NPIs.

Drenhaus, Saddy, and Frisch (2005) aimed to see whether grammaticality illusion with NPIs occurred in German. Their experimental sentences were composed of grammatical sentences in which NPI was licensed, ungrammatical sentences which did not have any negative element and ungrammatical sentences in which a negative element was present but not c-commanding the NPI. The results of speeded acceptability judgment task revealed that participants detected the ungrammaticality when the NPI was not licensed as in (21b), but it took them longer to judge the sentence to be ungrammatical when there was a negative element in the sentence even though it did not c-command the NPI (as in [21c]). Also, the rejection rate of this type of a sentence was lower compared to sentences which did not have any negator as in (21b). From content-addressable access point of view, this finding is not surprising. When participants saw the NPI, they start scanning the memory for an item that has the [+negative] feature. As there is a negator in the sentence, it matches this feature. Phillips et al. (2010) replicated these results for English, they found out that the acceptance rate of sentences which have a negator in a non-c-commanding position was 15 to 30% higher compared to sentences without any negator.

In several languages, an asymmetry has been attested in grammatical illusions with respect to the markedness of features. In subject-verb agreement, for example, a noun with [+plural] feature leads to more agreement attraction than [+singular] in English (Wagers, 2008), Spanish (Vigliocco, Butterworth, & Garrett, 1996) Italian (Vigliocco, Butterworth, & Semanza, 1995) or [+ feminine] feature leads to more grammatical illusions compared to [+neuter] or [+masculine] feature in Slovak (Badecker & Kuminiak, 2007).

Another possible factor that might affect the likelihood of agreement attraction is linear distance: Does the linear distance between two related words affect the ease of establishing an agreement relation? In order to investigate this question, Wagers and McElree (2011) looked at English DPs with demonstrators such as "that clever, risk-taking burglar". The analogy between subject-verb agreement and determiner and the noun is that when the demonstrator is singular (this/that), the noun has to be singular (burglar) whereas when the demonstrator is plural (these/those), the noun needs to have [+plural] features (burglars). They prepared sets of grammatical (that burglar) and ungrammatical sentences (that burglars), and they manipulated the distance between the determiner and the noun by adding one (that clever burglar) two modifiers (that clever, risk-taking burglar). The participants were tested with Multiple Response Speed-Accuracy Tradeoff (SAT) paradigm.[7] The results showed that it was slower to process the DP when the determiner and the noun are not adjacent. Nevertheless, no difference was observed between one-modifier condition and two-modifier conditions; in other words, distance did not lead to any processing difficulty or facilitation.

Wager and McElreee's experimental sentences consisted of DPs at different length; the determiner and the noun were adjacent or separated by one modifier or two modifiers. This manipulation makes it possible to investigate the role of distance. Yet, as there was not any other noun in the structure that could lead to agreement attraction, we cannot gain any insights on the role of interference from their study. An ERP study by Kaan (2002) gives us the opportunity to observe the

[7] The SAT technique aims at examining the accuracy of a response given at different time intervals after the stimulus is presented. The participants are trained to respond when the response signal is given, not before or after (Nikolić & Gronlund 2002).

role of distance as well as intervention in subject-verb agreement in Dutch. Kaan was interested in two types of ERP components: left anterior negativity (LAN) and syntactic positive shift (P600). LAN has been proposed to be activated when the human mind encounters ungrammaticality rising from violation in word formation, such as in number or gender feature. On the other hand, P600 is activated when the sentence is re-analyzed due to the fact that the previous parsing strategy turns out to be wrong (Friederici, Hahne, & Mecklinger, 1996) or when the syntactic integration is challenging (Kaan, Harris, Gibson, & Holcomb, 2000). Kaan aimed to see if these two components were activated in a grammaticality judgment task by using grammatical and ungrammatical sentences and manipulating the number of elements between the subject and the verb (long vs. short condition) and the number features of the subject and the object (singular vs. plural). If establishing distance between the subject and the verb gets more difficult as the number of intervening words increases, larger P600 should be elicited in long conditions. Also, there will be a difference in P600 amplitude between grammatical and ungrammatical verbs in the long condition as the parser revises its initial analysis. The results showed that when there were words between the subject and the verb, the accuracy rate dropped especially when the subject was singular and the object was plural, which supports the selectivity of grammatical attraction (Wagers, 2008). An analysis of sentences that were correctly diagnosed as grammatical and ungrammatical did not reveal any role of distance in P600 amplitude. Ungrammatical sentences irrespective of length showed larger P600 compared to grammatical sentences at 500 ms after the critical verb was encountered. Interference however affected ERP waveforms. The sentences which have a singular subject and a plural object elicited larger P600 between 250

and 300 ms in the grammatical condition. These results suggest that the ease of retrieval of a certain feature, which is the number feature of the subject in this study, does not depend on its position in the sentence, because there was not any significant difference in P600 amplitude between the long and short conditions. Kaan suggested the results show that memory is not searched in a linear or a hierarchical manner. Instead, features are retrieved directly à la content-addressable retrieval model. The fact that intervention rather than length affects ERP waveforms is also in accordance with content addressable retrieval.

2.3 Summary

Establishing long distance dependencies such as subject-verb or determiner-noun agreement and gap-filler or filler-gap dependencies constitutes a key issue in topics in sentence processing. In this chapter, we have seen that several hypotheses have been proposed with respect to what determines the ease or difficulty of processing long distance dependencies. Early Immediate Constituents by Hawkins (1994) and Dependency Locality Theory by Gibson (2000) propose that as the linear distance between the members of long distance dependencies increase, the processing load increases. Anti-locality accounts by Konieczny (2000) and Kamide & Mitchell (1999) propose just the opposite; the sentence is processed incrementally and predictions about the upcoming words become clearer with each word being processed; so distance between the members of the dependency leads to facilitation of processing long distance dependencies. Finally, content addressable retrieval by (McElree, 2006; Phillips, Wagers, & Lau, 2010; Wagers, 2008 among others) does not refer to distance at all, the memory is scanned in a structure insensitive fashion

and competitive cues might lead to grammatical illusions. The experiments reported in the following chapters aim is to find out to what extent the assumptions of these models are valid for Turkish or to put it in another way, to what extent Turkish data support these models by investigating the processing of GEN-POSS long distance dependencies.

CHAPTER 3

GENITIVE-POSSESSIVE CONSTRUCTIONS IN TURKISH

3.1 Introduction

This chapter attempts to examine the GEN-POSS constructions in NPs and non-finite embedded clauses in Turkish and to provide a comprehensive account of GEN-POSS constructions with a focus on morphological, semantic and syntactic features. As will be discussed further in this section, though they are of different categories, NPs and non-finite embedded clauses share important features with respect to their internal structure. Both of them contain a GEN-marked noun and a POSS-marked item, which can be a noun in NPs or a nominalized verb in embedded clauses. A dependency relation is formed between the GEN-marked noun and the POSS-marked item, as these two words have to agree in person and number. Also, they can occur adjacent in the sentence or can be separated by several words or even clauses. Thus, I first provide an overview of the GEN-POSS constructions in NPs and non-finite embedded clauses, and discuss how the GEN-marker and the POSS-marker are generated in syntax. Then, details on two on-line sentence processing tasks that target the processing complexity of GEN-POSS constructions are given.

3.2 GEN-POSS constructions in NPs

In Turkish, the possession relation is expressed through the possessive construction. In this construction there are at least two nouns; the first one bears the genitive (GEN) marker and the second one carries the possessive (POSS) marker; so the first

noun serves as the possessor and the second one is the possessed. Hence, they are called GEN-POSS constructions (Göksel & Kerslake, 2010).[8]

(1) öğretmen-in ceket-i

teacher-GEN jacket-3SG.POSS

the teacher's jacket

In (1), the POSS-marked noun belongs to the GEN-marked noun; in other words, the teacher owns the jacket. Ownership is not the only semantic relation in a GEN-POSS construction, though. As indicated by Gencan (2001), the POSS-marked noun can be abstract or a notion related to self. In (2), the word *şans* (luck) is used as the possessee.

(2) Bu çocuğ-un şans-ı yok.

This child-GEN luck-POSS.3SG there is not

"This child does not have luck (This child is not lucky)."

The GEN-POSS dependency is observed in partitive constructions, as well. As exemplified in (3) the group member is marked with POSS, and the group name carries GEN-marker (Göksel & Kerslake, 2010; Bahadır, 2012).

[8] Öztürk & Erguvanlı-Taylan (2015) categorized possessive compounds into three groups. In addition to GEN-POSS illustrated in (1), there are Possessive Compounds such as "öğretmen ceketi" (teacher's jacket) in which the first word does not carry GEN marker and Possessive free Genitives such as "öğretmenin ceket" (the teacher's jacket) in which the second noun is not attached the POSS-marker. As the main concern of this study is GEN-POSS dependency formation, a thorough discussion on these two types is beyond the scope of this study.

(3) öğrenci-ler-in bazı-ları

student-PL-GEN some-POSS.3PL

" some of the students"

Whether used in the possessive or the partitive construction, there are a few features that GEN-POSS constructions share. Some of these features will be of importance regarding the experimental sentence we have formed are listed below.

(i) Case marking: Depending on their syntactic position, GEN-POSS constructions are attached case markers similar to simple NPs. In this case, it is the second noun that these markers are attached to.

(4) Ben-im dosya-lar-ım-ı bul-a-m-ıyor-um.

I-GEN folder-PL-1SG.POSS-ACC find-ABIL-NEG-IMPF-1SG

"I cannot find my folders."

(ii) Multiple GEN-POSS constructions: A GEN-POSS construction can involve more than two nouns; in other words a GEN-POSS construction can be part of a larger GEN-POSS construction. In this case, the smaller GEN-POSS serves as the possessor (Göksel & Kerslake, 2010).

(5) Biz-im proje-miz-in sonuç-lar-ı burada.

We-GEN project-1PL.POSS-GEN result-PL-3SG.POSS here

"Here are the results of our project."

(iii) The optional status of GEN-marked noun: It is possible to drop the GEN-marked noun when the possessor is a pronoun or when it is co-indexed with the subject of clause (6). However, it is retained for emphasis in (7) (Underhill, 1976; Göksel & Kerslake, 2010; Bahadır, 2012).

(6) Ben bu sabah (benim) araba-m-ı servis-e götür-dü-m.
I this morning (my) car-POSS.1SG-ACC service-DAT take-PAST-1SG
"I took my car to service this morning."

(7) Bu o-nun araba-sı, ben-im araba-m değil.
This he/she-GEN car-POSS.3SG I-GEN car-POSS.1SG not
"This is his/her car, not my car."

The fundamental aspect of GEN-POSS constructions for the purpose of the present study is that there is a morphological as well as a semantic dependency relation that need to be formed as the GEN and POSS-markers have to agree in person and number. Table 3 presents the agreement paradigm for two nouns: *çanta* (bag) and *ceket* (jacket).[9]

[9] Note that the suffixes alternate according to Vowel Harmony. Also, the final "n" in 3rd person POSS-marker is dropped in word final position; in other words when no other suffix is attached to the stem.

Table 3. Genitive-Possessive Agreement Paradigm

	Genitive Case	Possessive Marker	çanta	ceket
1st Person Singular	ben-im	-m, -ım, -im, -um, -um	çanta-m	ceket-im
2nd Person Singular	sen-in	-n, -ın, -in, -un, -ün	çanta-n	ceket-in
3rd Person Singular	o-nun/-nın, -nin, -nün, -ın, -in, -un, -ün	-sı(n), -si(n), -su(n), -sü(n), -ı(n), -i(n), -u(n), -ü(n)	çanta-sı	ceket-i
1st Person Plural	biz-im	-mız, -miz, -muz, -müz, -ımız, -imiz, -umuz, -ümüz	çanta-mız	ceket-imiz
2nd Person Plural	siz-in	-nız, -niz, -nuz, -nüz, -ınız, -iniz, -unuz, ünüz	çanta-nız	ceket-iniz
3rd Person Plural	onlar-ın	-leri(n), ları(n)	çanta-ları	ceket-leri

It is possible to form a long distance dependency relation in possessive constructions by inserting modifiers such as adjectives in (8) and RCs in (9) between the possessed noun and the possessee. This modification is only legitimate with GEN-POSS constructions, though. As (10) shows no constituent is licensed to occur between the two nouns that form a Possessive Compound (Hayasi,1996).

(8) Murat'ın yabancı arkadaş-ı GEN-POSS

Murat-GEN foreign friend-POSS.3SG

"Murat's foreign friend"

(9) Murat-ın İspanya-dan gel- en arkadaş-ı GEN-POSS

Murat-GEN Spain-ABL come-SRC friend-POSS.3SG

“ Murat’s friend who comes from Spain”

(10) * bebek pahalı mama-sı Possessive Compound

baby expensive food-POSS.3SG

“expensive baby food”

Having analyzed the morphological structure of GEN-POSS dependencies in possessive compounds, let us now turn to an analysis of their internal structure. The morphological analysis of possessive construction reveals that a dependency relation is formed between the GEN-marked noun and the POSS-marked noun, which manifests itself as agreement in person and number. What is of interest is how this dependency relation is represented in the syntactic structure. Before examining how the GEN and the POSS markers are generated in syntax, I shall first examine the properties of simple NPs with a focus on the structural relations.

There are three possible relations between a constituent and the head of a phrase. The constituent can function as the modifier, complement or the specifier of the head. Let us examine whether all these relations are available in Turkish NPs. Typically adjectives are used as modifiers as in (11).

(11) başarılı doktor

successful doctor

“a successful doctor”

As the distinction between nouns and adjectives is not very clear in Turkish (Göksel & Haznedar, 2007), nouns can be used as modifiers, as well.

Note that (12) means a doctor who is female rather than "woman's doctor", who specializes in gynecological diseases. That meaning is only achieved through attachment of the POSS-marker as in (13).

(12) kadın doktor

woman doctor

"female doctor"

(13) kadın doktor-u

woman doctor-POSS.3SG

"gynecologist"

That the head complement relation is not allowed when the POSS-marker does not occur in the structure has led to the conclusion that simple NPs do not involve a complement or a specifier position (Yükseker, 1998). Also, the GEN-marker is not licensed if POSS-marker does not occur in the structure as in (14a). [10]

(14) a. *kadın-ın doktor

woman-GEN doctor

[10] In colloquial usage, it is possible to drop the POSS-marker and retain the GEN-marker such as (1). Taylor and Öztürk (2015) call this structure "possessive-free genitive construction."

1. kadın-ın doktor
   woman-GEN doctor
   the doctor of the woman

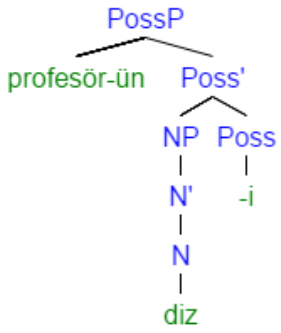
b. kadın-ın doktor-u

woman-GEN doctor-POSS.3SG

"the woman's doctor"

Examples in (14) show that GEN-marker is only licensed through the POSS-marker, hence it is assumed that the POSS-marker creates a functional projection to the specifier position of which the GEN-marker can be assigned (Kornfilt, 1997; Yükseker, 1998; Arslan-Kechriotis, 2006).[11] The structure for a possessive NP is given in (15).

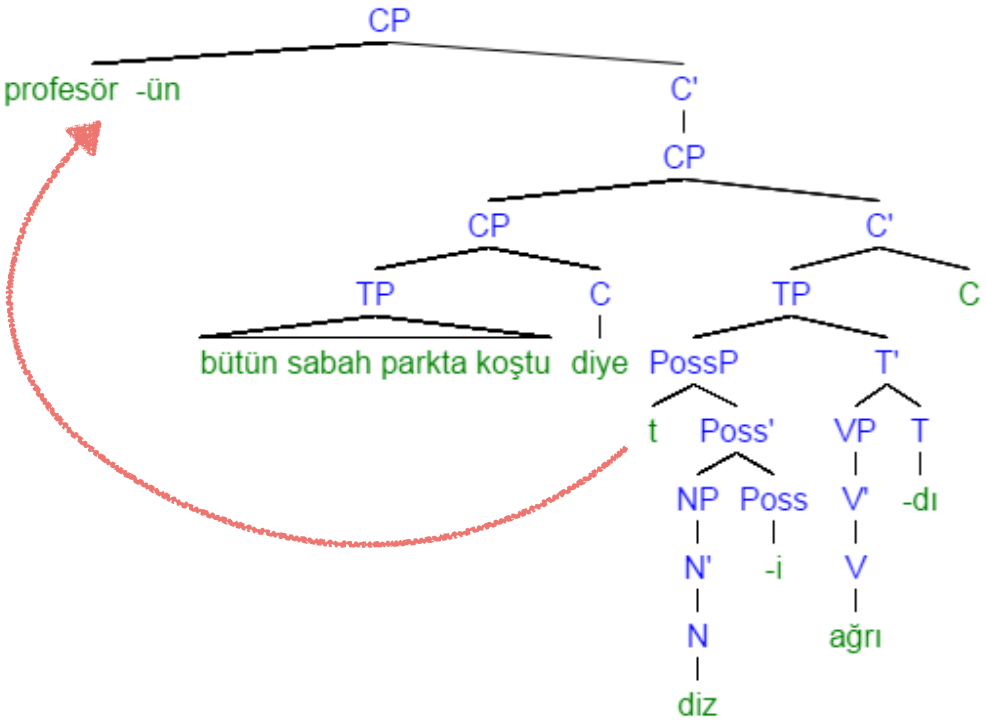
(15) profesör-ün diz-i



As discussed in the previous section, the GEN-marked noun can be separated from the POSS-marked noun in the sentence. The diagram in (16) represents the structure when a finite embedded clause intervenes in between.

[11]Throughout this paper, I refer to case licensing as case assignment. It is beyond the scope of this study to discuss whether Case is checked (as in Minimalist Program) or assigned (Government and Binding Theory).

(16) Profesör-ün bütün sabah parkta koştu diye diz-i ağrıdı.



Notice that in (16) the underlying position of the GEN-marked noun is the SPEC position of the PossP. It moves out of this position to the sentence initial position crossing over a finite embedded clause. The subject of the finite embedded clause is not overtly expressed, and it is interpreted as the same referent with the GEN-marked noun.

Having discussed the morphological and syntactic properties of possessive NPs, let us examine embedded clauses in detail and discuss whether there are any similarities with the internal structure of possessive NPs or not.

3.3 Embedded clauses in Turkish

Embedded clauses can be finite or non-finite in Turkish. Finite embedded clauses are syntactically the same as main clauses, because the subject is in nominative (NOM) case and the verb is fully inflected. Within finite clauses, Göksel & Kerslake (2010) make a distinction between "bare finite noun clauses" and "finite clauses with a subordinator". Direct quotations with the verb *de- (*say) fall into the first group (17).

(17) Elif ["Ömer bugün çok çalış-tı"] de-di.
Elif Ömer today a lot work-PAST.3SG say-PAST.3SG
Elif said "Ömer worked very hard."

There are three subordinators that can be used with finite clauses; *ki* (that), *gibi* (like) and *diye* (so that). *ki* always stands right after the matrix verb (18a), and *diye* and *gibi* obligatorily comes at the end of the clause that it belongs to (18b, 18c) (Göksel & Kerslake, 2010).

(18) a. Duy-du-m [ki yeni iş-e başla-mış-sın.]
hear- PAST-1SG ki new job-DAT start-hearsay-2SG
"I heard that you have started a new job."

b. Başkan [ülke-de herkes mutlu-ymuş gibi] konuş-tu.
president country-LOC everyone happy-hearsay like speak-PAST.3SG
The President spoke as if everyone was happy in the country.

c. Meral [eş-i çiçek getir-di diye] mutlu ol-du.

Meral spouse-3SG.POSS flower bring- PAST-3SG so that happy be-PAST.3SG

"Meral was happy that her husband brought (her) flowers."

As this study intends to address the GEN-POSS dependency relation, a detailed discussion of the non-finite clauses that conform to the GEN-POSS template is given in the following section.

3.3.1 Non-finite embedded clauses

Non-finite embedded clauses differ from the finite clauses in that the predicate does not carry any Tense Aspect Modality (TAM) markers and the subject does not surface in the NOM-case. The predicate in non-finite clauses carries one of the five subordination suffixes instead; i.e., -mAK, -mA, -DIK, -(y)AcAK and -(y)Iş. These suffixes have been called the "nominalizing suffixes" (Özsoy, 2010) and the predicate with a nominalizing suffix is called a "deverbal noun" (Underhill, 1976) or a nominalized verb. The subject of the embedded clause carries the GEN-marker and the nominalized verb carries the corresponding POSS-marker as in (19).

(19) [Sen-in böyle konuş-ma- n] doğru değil.

You-GEN like-this speak- mA-POSS.2SG right not

"It is not right/ proper for you to speak like this."

Like NPs, non-finite embedded clauses are assigned case markers according to their syntactic position in the sentence as illustrated in (20).

(20) [Bebeğ-in ağla-dığ-ın-ı] farket-me-di-k.

Baby- GEN cry- DIK-POSS.3SG-ACC notice-NEG-PAST-1PL

"We did not notice that the baby was crying."

Various analyses have been proposed for the classification of the nominalizing suffixes. Traditionally, a temporal difference has been pointed out between -DIK/-(y)AcAK and -mA/-mAk clauses as the former makes a distinction between future and non-future, respectively whereas the latter does not. Also, it has been argued that -DIK and -(y)AcAK clauses denote factual information whereas -mA clauses express an action (Özsoy, 2005; Göksel & Kerslake, 2010). As the main focus of the present study is the GEN-POSS construction, I do not intend to provide an exhaustive account of the semantic differences among these subordination suffixes; rather we examine the internal structure of the embedded clauses and focus on the suffixes which render nominalization possible by the attachment of the GEN-marker to the subject and the POSS-marker to the nominalized predicate.

(i) -DIK and -(y)AcAK: -DIK or -(y)AcAK subordination suffixes are used when the embedded clause refers to a fact (Özsoy, 2005) as illustrated in (21).

(21) [Öğrenci-ler-in çok çalış-tık-ları] belli.

Student-PL-GEN very work-DIK-POSS.3PL obvious

"It is obvious that the students work/ have worked very hard."

Although -DIK and -(y)AcAK clauses are non-finite clauses, they have reference to the time of occurrence. The nominalizing suffix -DIK is used when the event in the embedded clause occurs in the present or the past with respect to the event expressed in the matrix clause (22), whereas -(y)AcAK is used to express that the time of the event is in the future (23).

(22) [Sen-in dün İzmir' e git-tiğ-in]-i duy-du-m.
You-GEN yesterday İzmir-DAT go-DIK-POSS.2SG-ACC hear-PAST-1SG
"I have heard that you went to İzmir yesterday."

(23) [Sen-in yarın İzmir' e gid-eceğ-in]-i duy-du-m.
You-GEN tomorrow İzmir-DAT go-(y)AcAK-POSS.2SG-ACC hear-PAST-1SG
"I have heard that you are going to İzmir tomorrow."

When the subject of the matrix clause and that of the embedded clause are the same, the subject is usually omitted in the embedded clause, yet it can be retained for emphasis or contrast.

(24) Ben [[Ahmet-in değil] ben-im rapor-u yaz-dığ-ım-]-ı
I Ahmet-GEN not I- GEN report-ACC write-DIK-POSS.1SG-ACC
söyle-di-m.
say-PAST-1SG
"I said that it is I who wrote the report, not Ahmet."

All the examples show that the subject of the embedded clause always bears the GEN-marker. Nonetheless, it is important to note that there are exceptions to this rule. For instance, when the subject of the embedded clause is not definite, it occurs in the pre-verbal position and is not obligatorily marked with GEN-marker, but the verb always bears the POSS-marker for third person (Underhill, 1976; Özsoy, 2005; Göksel & Kerslake, 2011).

(25) Öğretmen [sınıf-a yeni bir öğrenci gel-diğ-in]-i
Teacher class-DAT new one student come-DIK-POSS.3SG-ACC
söyle-di.
say-PAST.3SG
"The teacher said a new student came to the class."

Also, when the embedded clause is an existential clause as in (26), GEN-marker is usually omitted (Göksel & Kerslake, 2011).

(26) [Şehir-de çok büyük bir katedral ol-duğ-un]-u
City-LOC very big one cathedral be-DIK-POSS.3SG-ACC
gör-dü-m.
see- PAST-1SG
I saw that there was a very big cathedral in the city.

Another way of nominalization is through the use of the nominalizer –mAk. As will be discussed shortly, -mAk clauses unlike -mA clauses do not surface with

the genitive marker on the subject or the possessive on the embedded verb, thus they do not provide a testing ground for the purposes of the present study. Nonetheless in what follows I will briefly touch upon the properties of -mAk.

ii. -mAK: -mAK embedded clauses can also be used as the subject or the object of the matrix clause. When it is the subject, the subject of the embedded clause does not refer to one single entity; but rather it has a general meaning.

(27) [PRO Boğaz-da yürü-mek] çok güzel.
Bosphorus-LOC walk-mAk very nice
'It's very nice to walk by the Bosphorus.'

When the -mAK clause serves as the object of the matrix clause, its subject is always co-indexed with the subject of matrix clause; so the subject of the embedded clause is omitted.

(28) (Ben) [PRO trafik- te bekle-mek-ten] nefret ed-iyor-um.
(I) trafik-LOC wait- mAK-ABL hate-IMPF-1SG
"I hate being stuck in traffic."

As seen in (27) and (28), -mAk clauses do not have an explicit subject either because there is a generic reading or the subject of the embedded clause is the same as the main clause. Also the verb does not carry the POSS marker; there is not GEN-POSS construction in -mAk clauses.

iii. -mA: Underhill (1976) refers to the nominalizer -mA as “short infinitive”. Unlike -mAk clauses, the use of the nominalizer -mA requires non-coreferential subjects hence the subject of the embedded clause needs to be explicitly stated in the sentence as shown in (29).

(29) Ben [Ayşe-nin şarkı söyle-me-sin]- i duy-du-m.

I Ayşe-GEN song sing-mA-3SG.POSS-ACC hear-PAST-1SG

“I heard Ayşe’s singing.”

In (29), the interpretation is that I heard the way Ayşe sang; so the action itself rather than the fact that she sang. Unlike -DIK and -(y)AcAK clauses, -mA clauses are not factive.

As previously discussed if the subject of the embedded clause is not definite in -DIK/(y)AcAK clauses, the GEN-marker is not obligatory. This alternation is not available for -mA clauses. The nominalizer -mA is used with definite subjects (30), and if the subject of the embedded clause does not refer to any definite referent, the nominalizer -mAk is used instead as illustrated in (31).

(30) [Sen-in sigara iç-me-n] çok sağlıksız.

You-GEN cigarette smoke-mA-2SG.POSS very unhealthy

“It is very unhealthy for you to smoke.”

(31) [PRO Sigara iç-mek] çok sağlıksız.

Cigarette smoke-mAK very unhealthy

"Smoking is very unhealthy."

iv. -(y)Iş: The use of the nominalizer -(y)Iş is more restricted compared to the nominalizers that have been discussed. It denotes the single occurrence of an action or the manner an action or an event is performed (Göksel & Kerslake, 2011). In embedded clauses formed with -(y)Iş, the subject obligatorily bears the GEN-marker and the predicate bears the POSS-marker as illustrated in (32).

(32) [Emre-nin gül-üş-ün]-ü hatırl-ıyor-um.

Emre-GEN laugh-(y)Iş-POSS.3SG-ACC remember-IMP-1SG

"I remember the way/how Emre smiled"

Having introduced the nominalizers let us discuss the lexical status of the nominalized verbs; in other words whether they behave like verbal elements or nominal elements in the sentence.

3.3.2 How nominal are nominalized verbs?

In the previous sections, I have analyzed the morphological and syntactic properties of non-finite clauses and have shown that their internal structure resembles finite clauses fully, yet they can occur in the subject or object position of a matrix clause. This raises an important question: Are nominalized verbs nominal-like or verbal-

like? Before addressing this question, a discussion is due with respect to noun-verb distinction in Turkish.

Uygun (2009) proposed that although the noun-adjective distinction has been argued to be fuzzy in Turkish, nouns and verbs can be distinguished on several grounds. She lists a comprehensive set of criteria for the nominal-verb distinction. Rather than exhausting the entire criteria that she proposes in what follows the discussion will be limited to the distinct morphological and syntactic distribution that nominals (nouns and adjectives) and verbs exhibit. First, unlike nouns (33) verbs cannot occur in argument positions and cannot be assigned case and number (34).

(33) Kadın temiz-ler-i al-dı.
woman clean-PL-ACC take-PAST.3SG
"The woman took the clean ones."

(34) *Git-ler daha gel-me-di.
go-PL yet come-NEG-PAST.3SG
Intended meaning: "The ones who went have not come yet."

Also verbs can be attached tense, aspect, modality, voice and polarity suffixes as illustrated in (35) whereas nominals cannot (36).

(35) Ali kendi-si-yle öv-ün-dü.
Ali own-POSS.3SG-COM praise-REFL-PAST.3SG
"Ali praised himself."

(36) *Ali kendi-si-yle gurur-un-du.

Ali own-POSS.3SG-COM proud-REFL-PAST.3SG

Intended meaning: “Ali was proud of himself.”

(examples taken from Uygun (2009) pp. 47-56)

We have seen that there are clear-cut distinctions between Turkish nominals and verbs. When it comes to nominalized verbs, however, we see that they behave both like verbs and nominals. They are like nominals as they occur in argument positions (subject and object), and case and number morphology can be attached to them. Furthermore they can be used with postpositions such as *göre* (as) or *için* (because/for) (Kornfilt, 2001) . Also, as will be discussed in detail in Chapter 4, nominalized verbs can bear the comitative marker “(y)lA” (with) which is typically used with nouns (Kornfilt, 1997).

In addition to these nominal-like features, nominalized verbs can bear polarity, voice and reciprocal markers which are reserved for verb stems only (Kural, 1993).[12] Also, unlike nominals, adjectives cannot modify nominalized verbs, only adverbs such as adverbs of manner or frequency can do so. Furthermore, just like finite verbs, nominalized verbs can assign theta-roles and appropriate case markers to their arguments (Bahadır, 2012; Kornfilt 2007; Kural, 1993).

A final note on the lexical status of nominalized verbs is that they show variety within the group, as well. The lexical status of the five nominalizers has been

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[12] As discussed earlier, the nominalizers -DIK and -(y)AcAK have reference to time. Hence, it has been argued that they show tense, aspect and modality (Kornfilt, 2003a)

argued to fall along a continuum between nominal and verbal. Because of reference to time, -DIK and -(y)AcAK have been accepted as most verbal like of the nominalizers whereas -(y)Iş has been considered as the most nominal like of the group (Kornfilt, 1997).[13]

3.3.3 How are non-finite embedded clauses generated in syntax?

In the previous sections non-finite embedded clauses are compared on the basis of their morphological and semantic properties. In this section, let us analyze their internal syntactic structure and discuss how the Genitive case is licensed on the subject.

It is generally assumed that the internal (syntactic) structure of non-finite embedded clauses is very similar to that of finite clauses (Borsley & Kornfilt, 2000; Kornfilt, 2001).

However, as non-finite embedded clauses have nominal features, as well, there must be a projection to accommodate those nominal features. As discussed in the previous section, non-finite embedded clauses appear in canonical nominal positions, and they are assigned case according to their syntactic position. Hence, it is assumed that there is a nominal functional category such as AgrN that dominates the VP layer in the structure. The subject of the non-finite clause moves to the specifier position of AgrN. The GEN-marker is assigned to the subject as a result of head-specifier relation (Kornfilt, 2001). Hence, if Agr has [+N] feature, the noun in

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[13] In her structural priming study, Bahadır (2012) observed a difference in the priming effect between -DIK and -(y)Iş. When the participants were given a sentence with an embedded clause with the nominalizer -DIK, they completed the following sentence with a verbal stem whereas with -(y)Iş, the verbal and nominal completions were used almost in the same degree. The details of this structural priming study are given in Section 3.4.2.

the SPEC position is assigned the GEN-marker. If Agr has [+V] feature instead of [+N], the case on the subject is realized as NOM, which is the case in finite embedded clauses (Kornfilt, 2003b). This analysis accounts for why GEN is attached to the subject of most non-finite clauses.[14] (Kornfilt, 2003b).

The issue becomes intriguing as there are some non-finite clauses that license both NOM-case and GEN-marker on their subject (Kornfilt, 2001; Aygen, 2007). These clauses typically occur with a postposition (37).

(37) a. [Hasan -Ø duy-duğ-u-na göre] herkes duy-acak.

Hasan -NOM hear-DIK-POSS.3SG-DAT since everybody hear-FUT.3SG

"Given that/since Hasan heard, everybody will hear (it)"

b. [Hasan-ın duy-duğ-u- na göre] herkes

Hasan-GEN hear-DIK-POSS.3SG-DAT according to everbody

duy-acak-mış.

hear-FUT-hearsay.3SG

"According to what Hasan heard, everybody will hear (it)'

(examples adapted from Aygen, 2007: 9)

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[14] There are also some embedded clauses that only license NOM-case bearing subjects (1). Kornfilt classifies them as "untypical" adverbial clauses, and in the most instances they denote a temporal meaning.

(1) [Murat/*Murat-ın ev-e gel-ince] herkes çok sevin- di.
[Murat/*Murat-GEN home-DAT gel-IncA] everyone a lot get happy-PAST.3SG
Everyone got very happy when Murat came home

There is a difference in meaning between (37a) and (37b), but these sentences are very similar as both have an embedded clause that is used with *göre* (as), yet the subject of the embedded clauses shows difference in terms of case marking. Kornfilt (2001) claimed that GEN assignment is "locked" in non-finite embedded clauses that are adjunct of the matrix clause (unlike complement clauses in which AgrN assigns GEN to its specifier position). As the embedded clause in (37a) is an adjunct, bare default case is assigned to its subject instead of GEN. She accounts for the GEN-marking in (37b) by saying that the sentence is actually a Free Relative Clause and is interpreted as the following: "on the basis of the things Hasan heard….." (Kornfilt, 2001, p. 196). Unlike Kornfilt, Aygen (2007) proposed that the syntactic position of embedded clauses could not predict the NOM/GEN alternation. Instead, she used tests like "head-insertion" and "object-insertion". The tests showed that an object could be inserted only when the subject carries the NOM-case as in (38). Also, a head noun could only be inserted when the subject bears the GEN-case as in (39).

(38) [Hasan -Ø/ *Hasan-ın haber-i anla-dığ-ın-a göre]
Hasan-NOM/*Hasan-GEN news-ACC understand-DIK-POSS.3SG-DAT since
herkes anla-yacak.
everybody understand-FUT
'Because Hasan understood the news everybody will.'

(39) [Hasan-GEN/*Hasan-Ø duy-duğ- u] şeye göre]

Hasan -GEN/*Hasan-NOM hear-DIK-POSS.3SG thing-DAT based on

herkes duy-acak-Ø.

everbody hear-FUT

'Based on/according to what Hasan heard, everybody will hear (it).'

(adapted from Aygen, 2007:11-12)

These results led Aygen to conclude that non-finite embedded clauses with a NOM bearing subject (such as 38) are a full clause with a CP layer whereas those with GEN bearing subjects (such as 39) are RCs inside a PP.

As shall be seen in the following chapter, the embedded clauses that are investigated in this study are "-mAsIylA" and "-IşIylA" constructions illustrated in (40).

(40) Öğrenci-nin sınav-ı [PP geç-me-si-yle/ geç- iş-i-yle]

student-GEN exam-ACC pass-mA-POSS.3SG-COM/ pass-Iş-POSS.3SG-COM

okul-da-ki öğretmen-ler mutlu ol-du.

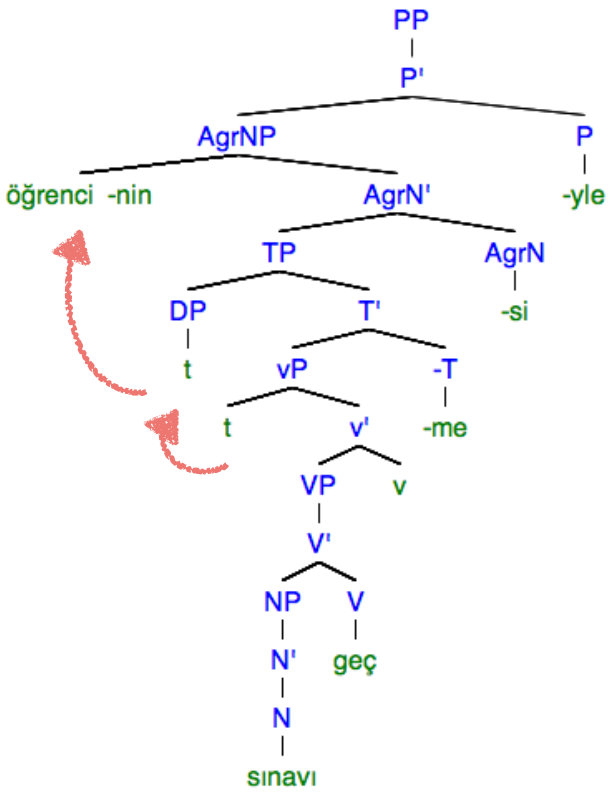
school-LOC-ki teacher-PL happy become-PAST.3SG

"The teachers at the school were pleased with the fact that the student passes the exam.

The embedded clause in (40) is the complement of the PP. The subject obligatorily bears the GEN-marker. Based on these observations, I will follow

Kornfilt (2001) and Aygen (2007) and suggest that the embedded clause in (40) is not a full clause and schematize its internal structure as in (41). I assume that the object is generated as the sister of V node, and the subject of the embedded clause is base-generated in the specifier position of vP. The subject moves to the specifier position of TP to satisfy the Extended Projection Principle. Finally it moves to the specifier position of AgrNP and GEN is assigned as a result of the specifier-head relation.

(41)

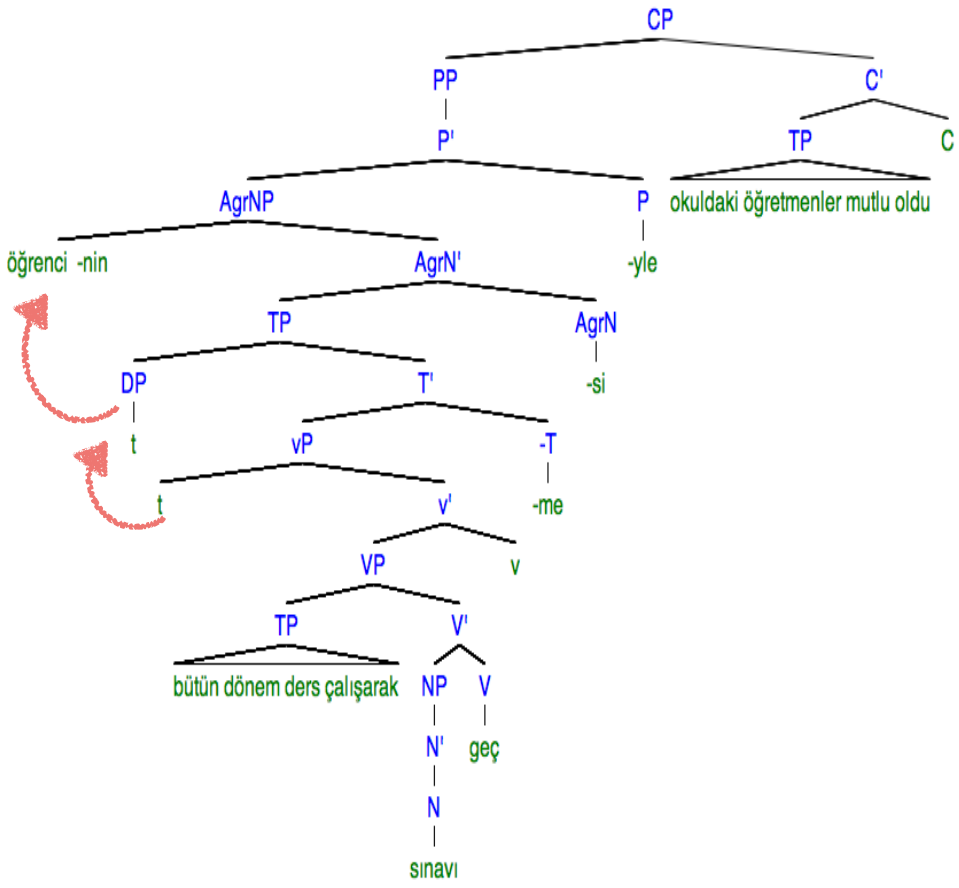


In (41), there is only one word between the GEN-marked noun and the embedded verb. However, in the previous section it was shown that a longer string of words or even a clause can appear in-between. To illustrate, another non-finite embedded clause that acts as an adverbial clause can be inserted into (41) as shown in (42).

(42) Öğrencinin [$_{TP}$ bütün dönem ders çalış-arak] sınavı geçmesiyle

In (42), the adverbial phrase *bütün dönem ders çalışarak* (by studying the whole term) comes between the subject and the predicate of the embedded clause. (43) shows how the syntactic structure is represented when (42) is used inside a matrix clause.

(43)



The adverbial phrase adjoins to the VP, hence it comes between the GEN-marked subject and the POSS-marked predicate. It is crucial to note that the

structural distance between the GEN and the POSS is the same in (40) and (42). Only the linear distance varies. This manipulation has enabled us to test the effects of linear distance between the GEN-marked noun and the POSS-marked nominalized verb without a confounding factor of structural distance in between. [15]

The internal structure of possessive NPs and non-finite embedded clauses shows that the GEN-marker is licensed through the presence of the POSS-marker in both constructions. This raises an important question for on-line processing and language comprehension in general, as the GEN-marked noun precedes the POSS-marked word in the sentence. Setting aside the issue of whether theories which are developed on the basis of production data can predict language comprehension as well, I focus on to what extent the GEN-marked noun is processed when it is first seen or heard: Is it stored in a buffer and unanalyzed before the POSS-marked item is encountered in the sentence or does some processing (incremental) or complete processing (exhaustive) is achieved beforehand? Recall that in his Head-driven Parsing Model, Pritchett (1991) suggested that the processing of the constituents of a phrase is postponed until the head appears in the sentence. Hence, the GEN-marked noun is expected to be kept frozen until the POSS-marked item is seen or heard in the structure. However, there is growing evidence from head-final languages that parsers have information about the maximal projection and the head even before the head of the phrase is available in the sentence (see Miyamoto (2000) for Japanese; Kim (1999) for Korean inter alia). The advocators of strongly incremental models as Lombardo and Sturt (2002) do not accept any delay in processing; each word is

[15] According to the Structural Distance Hypothesis, the processing complexity is calculated on the basis of the number of the syntactic nodes that need to be crossed over to establish a dependency (O'Grady, 1997).

immediately connected in the structure as it is encountered. As a comprehensive comparison between head-driven parsing models and strongly incremental models is out of the scope of this study, I would like to refer the interested reader to Tyler & Marslen-Wilson (1977) for a detailed discussion on the incremental parser, Konieczny (1996) and Inoue & Fodor (1995) for experimental evidence from German and Japanese, respectively.

3.4 A psycholinguistic investigation of the GEN-POSS dependencies

Although Turkish is a relatively understudied language with respect to sentence processing, some research has been carried out on the processing of subject-verb agreement (Aygüneş, 2013; Bamyacı, Häussler, & Kabak, 2014), that of relative clauses (Demiral, 2001; Dinçtopal-Deniz, 2010; Özge, 2010; Kahraman, 2012) and word order effects (Demiral, 2007; Kahraman & Hirose, 2014). In this section, I limit the review to two studies, namely Özge (2010) and Bahadır (2012) which aim to understand the effect of the GEN-marker and the GEN-POSS construction in sentence processing.

3.4.1 Ungrammaticality detection: Missing GEN-POSS agreement markers

In the previous sections, I highlighted the agreement relation between the GEN and POSS-markers and pointed out that when the GEN-marker is overtly expressed in the sentence, the POSS-marker has to be expressed on a noun or a nominalized verb.[16] Özge (2010) examined whether lack of GEN-POSS agreement markers affects monolingual Turkish-speaking adults and children to the same degree. To examine

[16] With the exception of the colloquial forms such as “ben-im araba” (my car) as discussed in 3.2.

this issue, she used the word monitoring paradigm of Marslen-Wilson and Tyler (1980).[17] The underlying principle of word monitoring task is that it is harder to detect the target word when it follows an ungrammatical structure as opposed to a grammatical structure. In other words, the target word is expected to be read slower when participants detect ungrammaticality in the sentence.

(44) illustrates two conditions from Özge (2010). As can be seen, the crucial manipulation was that the target word appeared after a grammatically formed Object Relative Clause (ORC) as in (44a) or after an ungrammatical structure in which the ungrammaticality stems from the lack of GEN-POSS agreement as shown in (44b).

(44) Target word: ayı "bear"

(a) Kral aslanın yanlışlıkla tekmelediği bir ayı korkudan titremeye başlamış.[18]

"A bear that the king lion kicked by mistake started to shake out of fear."

(b) *Kral aslanın yanlışlıkla tekmeledik bir ayı korkudan titremeye başlamış.

(adapted from Özge (2010): p. 210)

The rate at which the ungrammaticality was detected was deduced from a comparison of the RTs to the target word in grammatical vs. ungrammatical sentences. The results showed a clear disparity between children and adults. Children's RTs to the target word was not affected by ungrammaticality whereas adults were sensitive to the grammaticality of the GEN-POSS construction; in other

[17] Word monitoring task is a tool to assess on-line sentence processing. In this task, participants are given a target word before hearing a sentence and they are asked to press the designated button as soon as they can if this word appears in the upcoming sentence.

[18] It should be noted that the first two words of this sentence lead to ambiguity; the sequence can either be a compound "the king lion's" or two separate nouns "the king, the lions."

words, it took adults longer to detect the target word when the agreement morphology was missing in the sentence. Özge proposed that the results cannot be attributed to the difficulty of forming an agreement relation between the GEN-marker and the POSS-marker given the fact that the children who participated in another production task experiment in the same study did not make any agreement mistakes. Rather, the results might be linked to the processing of the GEN-marker. Özge notes that the GEN-marker might not be salient for children, and children might not able to differentiate the GEN-marker from the Accusative marker. Apart from the more complex nature of the GEN-marker, the task demand might be the reason behind the difference between the adult and the child participants. Grammaticality judgment task requires metalinguistic awareness which has been claimed to develop with schooling. Not before the age of 14 children can show adult like performance (Karanth, Kudva, & Vijayan, 1995), and the child participants in Özge's study were 5-8 years old. Hence, they might have shown poorer performance compared to adults because they have not developed metalinguistic awareness yet.

3.4.2 The effect of structural repetition

The findings of Özge (2010) suggest that the GEN-marker might be the underlying source of complexity in the processing of ORCs. A related question is whether the complexity of processing a GEN-POSS construction can be reduced when another GEN-POSS construction is encountered in the context. Bahadır (2012) was primarily interested in this "structural priming" effect, which reflects the degree to which encountering a particular structure in a sentence would affect processing another sentence that has the same structure.

Bahadır (2012) investigated the structural priming effect both in NPs and embedded clauses in Turkish. The discussion in Chapter 3 on the issue has clearly shown that even though possessive NPs and nominalized verbs are of different syntactic categories, there are syntactic and morphological similarities between these structures. To eliminate the effects of the choice of the matrix verb in structural priming, Bahadır first carried out a sentence completion task and diagnosed a "balanced" set of verbs that were used equally well with NPs and the nominalized VPs. In the self-paced reading experiment and eye-tracking study, only these balanced verbs were used. The aim of both experiments was to see whether there was any priming effect of the GEN-POSS construction within the same syntactic category (i.e., noun-noun and nominalized verb-nominalized verb) as illustrated in (45 & 47) and across syntactic categories (i.e., noun-nominalized verb and nominalized verb-noun) as shown in (46).

(45) Prime: Şoför, [yolcu-nun rica-sın]-ı hatırlıyor. (Nominal)
"The driver remembers the passenger's request."
Target: Kovboy, [şerif-in ima-sın]-ı hatırlıyor. (Nominal)
"The cowboy remembers the sheriff's hint."

(46) Prime: Teğmen [komutan-ın git-tiğ-i]-ni hatırlıyor. (Verbal)
"The lieutenant remembers that the commander was gone.
Target: Kaymakam [müteahhid-in kaygı-sın]-ı hatırlıyor. (Nominal)
"The governor remembers the contractor's concern."

(47) Prime: Damat, akrabasının kaçtığını anlatır. (Verbal)

"The grooms tells that his relative has run away."

Target: Çiçekçi, berberin battığını anlatır. (Verbal)

"The florist tells the barber has gone bankrupt."

(examples taken from Bahadır, 2012: p. 309)

Analysis of RTs of the critical words in the target sentences, (the noun with the POSS-marker) showed whether the GEN-POSS construction in the prime sentence facilitated the processing of the same structure in the target sentence or not. The results revealed that the critical word in the target sentence was read faster in Nominal-Nominal condition (45) than that of Verbal-Nominal condition (46); so the prime sentence with a possessive noun rather than the nominalized verb with a possessive marker made it easier to process the noun in the target sentence. This result suggests that the category (NP vs. embedded clause) is an important factor in structural priming. When the target sentence contained a nominalized verb such as in (47); however, having a prime sentence of the same category resulted in longer RT; in other words the participants were slower to read a nominalized verb after reading a sentence that had a nominalized verb. Interestingly, the participants were faster at reading the embedded verb in the target sentence after reading the prime sentence which had a possessive noun. Bahadır proposed that the results might be due to the fact that the nominalized verbs are more loaded in processing terms, meaning they are harder to process. A comparison of the nominalized verbs with the nouns of the same length showed that participants needed more time to read the nominalized verbs. This might stem from the morphological structure of the nominalized verbs;

parsers might employ a decomposition strategy when encountered with a complex verbal form.

Bahadır (2012) further tested the same set of stimuli with the eye tracking method to find out the eye-fixation duration on each word and the possible regressions to previous words. Differing from the self-paced reading task, the target-prime pair was simultaneously presented on the computer screen. The results of the fixation times on the critical words replicated the RTs from the self-paced reading task. The noun in the target sentence was read faster after a prime sentence with a possessive noun whereas the nominalized verbs showed a reversed priming effect; i.e., the nominalized verb in the target sentence took longer to read after reading a prime sentence with a nominalized verb compared to the condition in which the prime had a possessive noun. Also, when saccades go back to the previous words, there was a tendency to backtrack to the 2nd word in the prime sentence, which is a GEN-marked noun. This result suggests that the parser is aware of the GEN-POSS construction; and the whole construction rather than only the critical word plays a role in structural priming.

3.5 Summary

The aim of this chapter was to examine the morphological, semantic and syntactic properties of NPs and non-finite embedded clauses that form a GEN-POSS dependency. It has been shown that agreement in number and person between the GEN-marker and the POSS-marker is obligatory in both constructions. Furthermore the internal structures show similarity in that in both the NPs and the VPs a projection is stipulated for the generation of the GEN-marker. In particular the GEN-

marker is incorporated into the structure via AgrNP in VPs and a PossP projection in NPs, the head of which is the POSS-marker. I have further presented experimental evidence that has recently shown that GEN-marked nouns are cognitively loaded and the category, noun vs. nominalized verb is a strong determinant of the processing load of the POSS-marked item.

CHAPTER 4

THE EFFECT OF THE GEN-MARKER IN PROCESSING LONG DISTANCE DEPENDENCIES

4.1 Introduction

In this chapter, I present two experiments that investigate the role that the GEN-marked noun may play in parsing, in particular in NPs and VPs; hence the main question I ask in both of the experiments is as the following:

(1) Would the presence of a GEN-marked item affect the processing load of a POSS-marked item (a noun or a nominalized verb) encountered later in the sentence? i.e., does a GEN-marked item suggest that the human parser should pay attention to the upcoming dependency?

The processing of the POSS-marked word might be affected by the syntactic structure that precedes the POSS-marked word as well the choice of the nominalizer used to from the nominalized verb. Hence, the experiments addresses these following questions, as well:

(2) Would the choice between a finite and a non finite embedded clause (diye vs. –dIğI için) have any effect on the POSS-marked noun?

(3) Would the choice of the nominalizer on the embedded verb (-mA vs. -(y)Iş) affect the processing load of a POSS-marked embedded verb?

In order to address these questions I have designed two experiments that target NPs and VPs. In what follows, I first lay out the hypotheses of the study, then introduce the procedure of the non-cumulative self-paced reading task that is used in both experiments, Then, I will present the results of these two experiments and discuss whether there are any similarities and/or differences in the processing complexity of the possessive NPs and non-finite embedded clauses with respect to the presence and/or the absence of the GEN-marker in the sentence.

4.2 Experiment 1: Presence of GEN in NPs ($P_{gen}NP$)

This experiment attempts to find out how a GEN-POSS construction is processed when the constituents of the construction are away from each other. In particular, we are interested in finding out whether a GEN-marked noun that is produced very early in the sentence increases the expectation of a POSS-marked noun, hence facilitates a faster processing of the POSS-marked item or to the contrary, whether a POSS-marked noun shows latency due to the formation of long distance dependency.

Below are given two hypotheses regarding $P_{gen}NP$. The first one is motivated by parsing accounts and the second one is motivated by syntactic accounts.

(i) What do/may parsing accounts suggest about the processing of $P_{gen}NP$?

According to the prediction based incremental parsing models (Konieczny, 2000; Altmand and Kamide, 1999), a GEN-marked noun in the initial position of a sentence could bring forth an expectation of a POSS-marked noun further in the sentence; hence, it can trigger a faster reading time at the POSS -marked noun, which is in line with the expectation-based theory (Levy, 2008). To illustrate, two

sentence types from a sample experimental set are presented in Table 4.[19] Due to the presence of a GEN-marked noun in Region 1 in (1a), the POSS-marked noun in Region 8 might be anticipated, hence predicted to be read faster in (1a) than that of Region 8 in (1b) where the noun in Region 1 does not have an overt GEN-marker.

Table 4. Sentences with GEN vs. NOM-marked Noun for Experiment 1 (PgenNP)

<table>
<tr><th></th><th>1</th><th>2 3 4 5 6</th><th>7</th><th>8</th><th>9 10</th></tr>
<tr><td>4a.
OVERT GEN</td><td>Profesör-ün</td><td rowspan="2">bütün sabah parkta koşu yaptı</td><td rowspan="2">diye</td><td>diz-i</td><td rowspan="2">çok ağrıdı.</td></tr>
<tr><td>4b.
NOM</td><td>Profesör</td><td>diz-i</td></tr>
</table>

(ii) What may syntactic accounts suggest about the processing of PgenNP?

According to Generative Accounts, the base position for the GEN-marked noun is the Spec of PossP (Kornfilt, 1997; Yükseker, 1998; Arslan-Kechriotis, 2006). For a GEN-marked noun to appear in the sentence initial position like (1a), it has to move out of the CP domain leaving a trace behind. For this reason, a sentence -- where a GEN-marked noun is in the initial position of the matrix clause i.e., displaced away from the POSS-marked noun-- can only be interpreted by retrieving the GEN-marked noun back to its underlying position. That would demand a longer reading time on the POSS-marked noun as the GEN-marked noun has to be retrieved back to the empty position and construed as occupying the vacated position to form the dependency. In (1b) the GEN-marked noun is not

[19]The English glosses and the translation of the sentence are given in the following section.

expressed overtly; hence there is a *pro* before the POSS-marked noun that is in Region 8. As the GEN-marked noun is displaced away from its base position in (1a), it would prove to be more challenging with respect to processing, hence the POSS-marked noun “diz-i" in (1a) will be read much slower than that of (1b).

To summarize, the prediction based parsing models predict shorter RT in the POSS-marked noun in Region 8 whereas generative models predict longer RTs.

The third hypothesis of the experiment concerns the finite/non-finite alternation in the embedded clause and attempts to find out whether the finiteness of the embedded clause would affect the processing of the words that follow the embedded verb in the sentence. A sample set from Experiment 1 that aims to compare the effect of finite vs. non-finite embedded clauses on the processing of the matrix clause is given in Table 5.

Table 5. Sample Sentences with Finite (F) vs. Non-finite (NF) Embedded Clauses for Experiment 1 (PgenNP)

	1	2 3 4 5	6	7	8 9 10
5a. F	Profesör	bütün sabah parkta koşu	yaptı	diye	dizi çok ağrıdı.
5b. NF	Profesör		yaptığı	için	

I postulate that it would be harder to process the words in the matrix clause that follow a finite embedded clause compared to words that follow a non-finite embedded clause as the initial assumption that the participants form might be that the sentence finishes when the finite verb is reached. Yet, when the complementizer is

reached, a reanalysis is required; the finite verb that has been encountered cannot be the matrix verb. Hence, longer RTs are expected in Regions 8, 9 and 10 in (2a) compared to those in (2b) in illustrated in Table 5.

4.2.1 Materials and method

Participants

Twenty-eight native speakers of Turkish (18 female, 10 male; mean age: 22.06) from Boğaziçi University participated in the experiment. All the participants had normal or corrected-to-normal vision. They participated in the experiment voluntarily or for extra course credits in undergraduate linguistics courses. None of the participants took part in the other experiments of the current study.

Stimuli

Twenty-four test sentences and 48 filler sentences were prepared for the experiment. Each test sentence had four conditions. In all conditions, there is a GEN-POSS construction, in the Conditions A and C, the noun is inflected with the GEN-marker whereas in the Conditions B and D it is inflected with the NOM-marker. The POSS-marked noun always appeared as the eighth word in the sentence (in Region 8) and the noun that it forms a dependency (i.e., the overtly or the covertly Genitive-marked noun) was in sentence initial position; so in each sentence there were six words intervening the GEN-POSS construction. Both the presence of the GEN-marker on the subject and the finiteness of the embedded clause were manipulated. There were four conditions in the study. (6) illustrates a sample set from the experiment (See Appendix A for all of the sentence sets).

(6) Condition A:

a. Profesör-ün$_i$ pro bütün sabah park-ta koşu yap-tı

professor-GEN whole morning park-LOC running do-PAST.3SG

diye t_i diz-i çok ağrı-dı.

as knee-POSS.3SG a lot hurt-PAST.3SG

Condition B:

b. Profesör bütün sabah park-ta koşu yap-tı

professor-NOM whole morning park-LOC running do-PAST.3SG

diye pro diz-i çok ağrı-dı.

as knee-POSS.3SG a lot hurt-PAST.3SG

Condition C:

c. Profesör-ün$_i$ pro bütün sabah park-ta koşu yap-tığ-ı için

professor-GEN whole morning park-LOC running do-DIK-POSS.3SG for

t_i diz-i çok ağrı-dı.

knee-POSS.3SG a lot hurt-PAST.3SG

Condition D:

d. Profesör bütün sabah park-ta koşu yap-tığ-ı için

professor-NOM whole morning park-LOC running do- DIK-POSS.3SG for

pro diz-i çok ağrı-dı.

knee-POSS.3SG a lot hurt-PAST.3SG

“The professor’s knee ached a lot as he ran the whole morning at the park.”

In Conditions A and C, the sentence started with a GEN marked noun, and in Conditions B and D the noun was NOM-marked. In other words, in Conditions A and C, the NOM-subject of the embedded clause is not given explicitly, and in Condition B and D, the GEN-marked noun is not given explicitly. I assume that when the NOM-marked noun and the GEN-marked noun are not overtly present in the sentence, pro occupies their underlying position. Hence, what has been referred to as overt GEN/NOM conditions throughout the thesis can also be regarded as overt/ covert GEN-marker.

Also, in order to see the effects of finiteness of the embedded clause, in Conditions A and B a finite embedded clause marked was used with the complementizer "diye" whereas in Conditions C and D we used the "için" phrase which has taken the non-finite embedded clause with the nominalizer -DIK. Each participant only saw one condition from each sentence set. After each sentence was presented, the participants were asked a comprehension question the answer of which was a 'Yes' or a 'No'.

Procedure

Four experiments are reported in Chapter 4 and 5. They are all self-paced reading experiments. The details of how the experiments were conducted and how the data were analyzed are given below. As there are not any fundamental differences with respect to the way the experiments were carried out, I will only provide a brief summary of the methodology of the following experiments.

Participants were tested in small groups of 5-8 people in a language laboratory. Sentences were presented on a PC using Linger software (http://tedlab.mit.edu/~dr/

Linger/) in non-cumulative self-paced reading paradigm (Just, Carpenter, & Woolley, 1982). At the beginning of each sentence, the words were masked by dashes, and as participants pressed the space bar, one word appeared while the previous ones were masked again. A Yes/No question was asked after each sentence. If the answer is correct, another trial started immediately, if it is incorrect first feedback was provided. The experimenter informed the participants that they would read sentences in Turkish and were expected to answer comprehension questions. Furthermore, they were instructed that each one of them would read different sentences and it was possible that some of them would finish early, and when they finished the experiment they could leave the laboratory. Since the experiments were conducted with groups, each participant was given a pair of sound proof ear plugs so that they would not get distracted by any noise in the room. Participants were asked to read the sentences at a natural pace and answer the questions as correctly as possible. Figure 1 illustrates the presentation of the sentences on the computer screen.

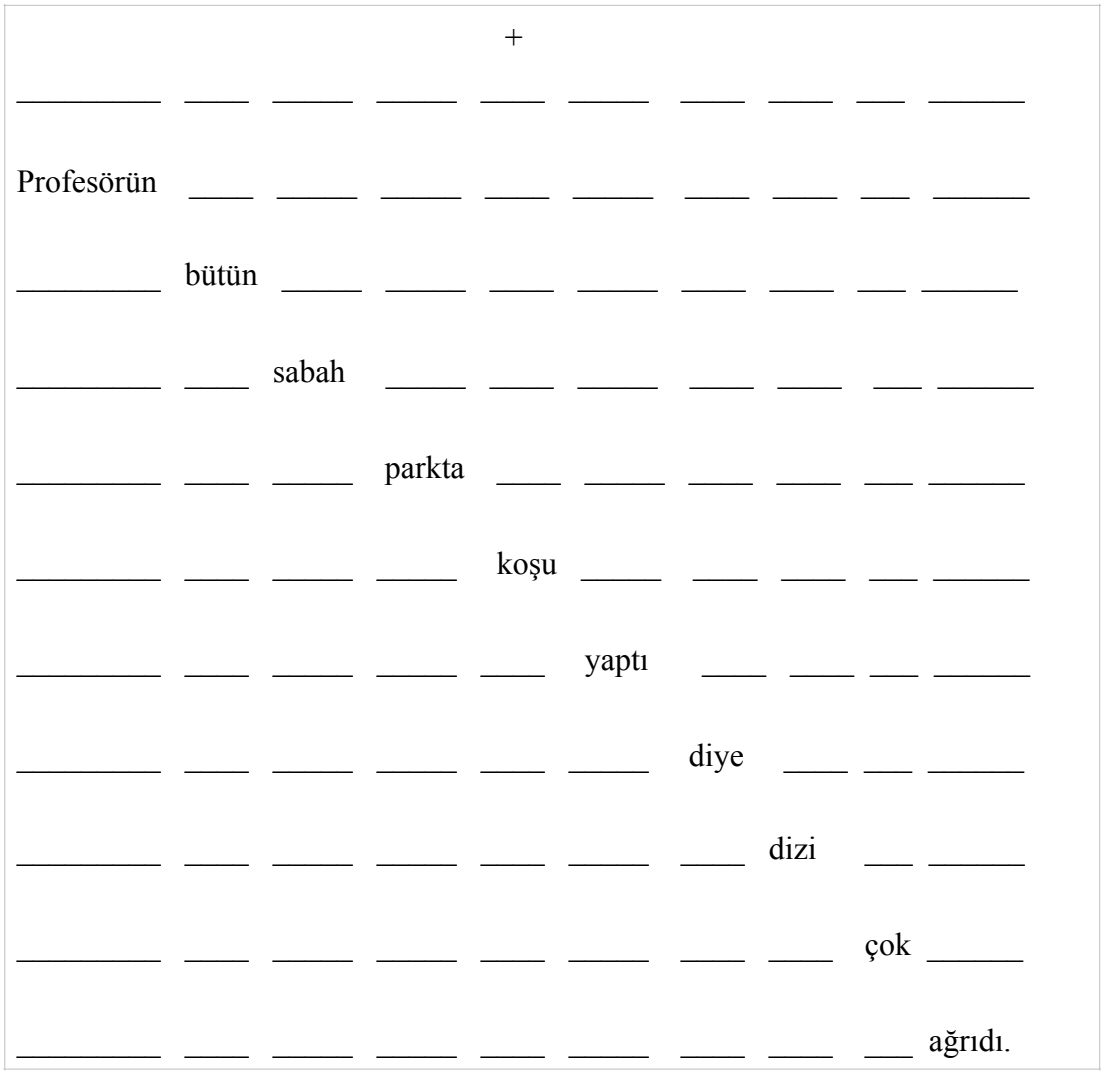


Fig. 1 Illustration of the presentation of the sentences in non-cumulative self-paced reading task

4.2.2 Results

In order to exclude extreme reading time (RT) values, RTs shorter than 150 ms and longer than 4000 ms were trimmed from the data prior to analysis. Furthermore only the sentences for which the comprehension question was answered correctly were analyzed. Comprehension question accuracy was high (89%) and did not show a significant difference across conditions. There were not any participants whose accuracy level was below 80%. Average RTs for each region in four conditions are given in Table 6 and represented graphically in Figure 2.

Table 6. Average RTs (in ms) for Experiment 1 (PgenNP)

	1	2	3	4	5	6	7	8	9	10
A	695	547	510	584	563	589	579	493	452	689
B	571	516	497	561	570	539	507	457	456	643
C	640	536	492	535	567	562	495	489	437	597
D	596	495	487	579	545	517	514	460	450	586

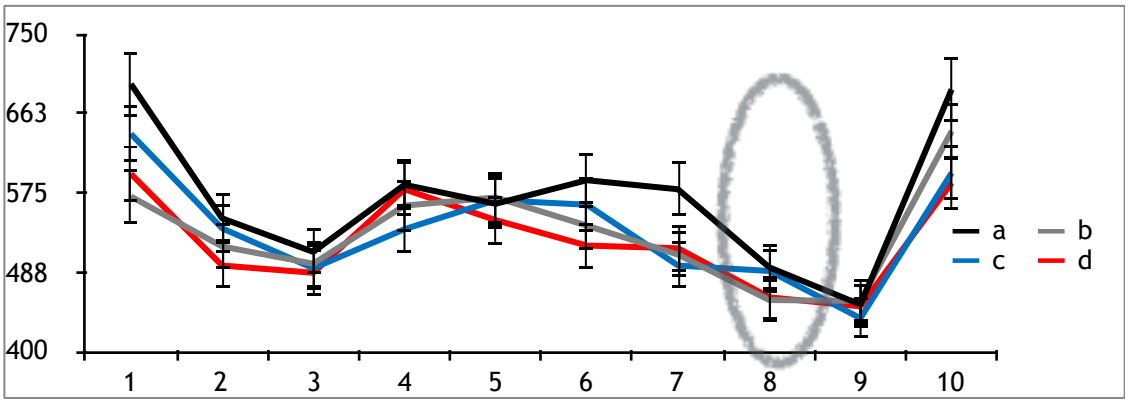


Fig. 2 Average RTs (in ms) for PgenNP

A 2x2 repeated-measures ANOVA was conducted with case marker type (NOM/GEN) and the finiteness of the embedded clause (finite/non-finite) as within subjects factors. The first critical region for our analysis was Region 1, in which the noun showed NOM/GEN alternation. In this region, there was a main effect of the case marker. The NOM-marked noun (in Conditions B and D) was read significantly faster than the GEN-marked noun (in Conditions A and C) by both subject and item analyses [$F_1(1, 27) = 19.61$ $p < .01$; $F_2(1, 23) = 10.65$ $p < .01$]. The second critical region in this experiment was Region 7 in which either a finite or non-finite complementizer occurred. In this region, the interaction was significant in both the subject and the item analyses [$F_1(1, 23) = 5.80$ $p < .05$; $F_2(1, 23) = 5.45$ $p < .05$]. The pairwise comparisons showed that Condition A (GEN & Finite) was read

significantly slower than condition B (NOM & Finite) (579ms vs. 507ms) and Condition C (GEN & non-finite) (495ms) ($p < .05$). On the other hand, there was no significant difference between Conditions A (GEN & Finite) and D (NOM & non-finite) ($p > .10$) (579ms vs. 514ms). The main focus of this experiment was Region 8. There was a significant effect of case marker in both the subject and item analyses [$F_1 (1, 27) = 3.42$ $p <. 10$; $F_2 (1, 23) = 4.74$ $p < .05$]. The POSS-marked noun was read slower when the sentence started with a GEN-marked noun as in Conditions A and C compared to a NOM-marked noun in Condition B and Condition D. There was no interaction with the finiteness of the embedded verb in the subject and item analyses [$p > .10$]. In Region 10, the effect of finiteness of the embedded clause on the verb of the matrix clause was significant in the subject analysis [$F_1 (1,27) = 4$, $p < .05$] and marginal in the item analysis [$F_2 (1, 23) = 3.29$ $p < .10$] The matrix verb *ağrıdı (*ached) was read faster in Conditions C and D, i.e in Finite clauses compared to Conditions A and B, i.e in Non-Finite clauses. No interaction effect was observed with the case marker type in subject analysis [$p > .10$].

Discussion

This experiment investigated whether the overt presence of a GEN-marked noun and the finiteness of the embedded clause affect the processing load of the matrix sentence or more specifically of the POSS-marked noun, and different effects were observed in various regions. The data showed that it took the participants longer to read (i) the GEN-marked noun compared to the NOM-marked noun, (ii) the POSS-marked noun when a GEN-marked noun was previously encountered in the sentence

and (iii) the matrix verb after reading a finite-embedded clause. In what follows, we go over these findings and how we interpret them.

To start with, the results revealed that the participants took longer time to read the GEN-marked noun compared to the NOM-marked noun in the sentence initial position. This latency might be due to several factors. First, it might be the case that the participants expect the sentence to start with a subject, which is obligatorily NOM-case marked in Turkish. Also, the GEN-marker might be cognitively loaded because of an expectation of dependency formation. As discussed in Chapter 3, when there is a GEN-marked noun in the sentence, the second noun of the possessive construction is POSS-marked except for colloquial usage, so the participants predicted a POSS-marked noun or a nominalized verb to appear somewhere in the sentence; either right after the GEN-marked noun or after a number of intervening words. Expectation of a dependency relation upon encountering the GEN-marker might be giving rise to a longer reading of the GEN-marked noun.

The presence of the GEN-marker affected the processing of the POSS-marked noun as well. The main hypothesis of the experiment was that the GEN-marker would lead to a difference in RTs of the POSS-marked noun. The findings supported this prediction. The POSS-marked noun was read slower when the possessor was explicitly stated in the sentence with a GEN-marker. This might be due to two reasons. First, in the conditions in which the GEN-marked noun is overtly present, it has moved out of its underlying position, leaving behind a trace (t). Once the POSS-marked noun is encountered in the sentence, the human parser might search for a noun with a GEN-marker in memory and reconstruct it back to its

underlying position to close the dependency. Second, when the GEN-marker is not overtly expressed in the sentence, there is a short distance (local) dependency between pro and the POSS-marked noun. Forming a long distance dependency might be more costly than forming a short distance dependency, which might account for longer reading latencies when the GEN-marked noun is overtly expressed in the sentence. The two experiments reported in Chapter 5 compare short distance dependencies and long distance dependencies. The data obtained from these experiments do not suggest that short distance dependencies are easier to process than long distance dependencies; hence it is possible that retrieving the GEN-marked noun to its underlying position accounts for longer RTs on the POSS-marked noun.

The prediction concerning the finiteness of the embedded clause on the processing of the matrix clause was partially confirmed. The hypothesis was that reading a finite vs. non-finite embedded clause would affect processing the rest of the matrix clause. For the POSS-marked noun, no effect of finiteness was seen; it was read at similar speeds irrespective of whether it occurred after a non-finite clause or a finite-clause (Conditions C & D). The effect of finiteness was observed at the end of the matrix sentence, though. The participants were slower at reading the matrix verb after reading a finite embedded clause in the same sentence.

Overall results from Experiment 1 (P_{gen}NP) suggest that both the presence of a GEN-marker and the finiteness of the embedded verb play a role in the processing of the matrix clause. Interestingly, these effects occurred in distinct regions. The overt/covert GEN alternation affected the processing load of the POSS-marked noun and the complementizer used in the embedded verb as predicted, whereas the effect of the finiteness of the embedded verb was significant only at the matrix verb.

Chapter 3 presented a discussion on the syntactic and morphological similarities between GEN-POSS bearing NPs and VPs. In order to understand the overall effects of the GEN-marker in sentence processing, another experiment that examined the VP domain was conducted. In what follows, the stimuli and the findings from Experiment 2 (P_{gen} DV) are reported.

4.3 Experiment 2: Presence of GEN in embedded clauses (P_{gen} DV)

This experiment investigates the long distance dependency relation between the GEN-marked noun and the POSS-marked nominalized verb which functions as the predicate of an embedded clause. Similar to Experiment 1, the primary goal has been to observe the effects of having an overt GEN-marked noun on the processing of POSS-marked embedded word, but a nominalized verb instead of a possessive noun. I expect a difference in the RTs of the embedded verb when a GEN-marked noun has been encountered in the sentence initial position. Below are given two hypotheses that can be entertained from a syntactic and a parsing point of view.

(i) What do/may parsing accounts suggest about the processing of P_{gen}DV?

Expectation-based parsing accounts suggest that the human parser is constantly guided by the information deduced from the properties of the words it has encountered in the sentence; and expectancies about the upcoming information are formed and updated all along the processing (Levy, 2008). Based on this claim, it is foreseen that an expectancy for a POSS-marked item (which could be a noun or a nominalized verb) will be created upon encountering a GEN-marked noun in the sentence. A sample set that compares the use of the GEN-marker and the NOM-marker in deverbal sentences is given in Table 7.

Table 7. Sentences with GEN vs. NOM-marked Noun for Experiment 2 (PgenDV)

	1	2 3 4 5 6	7	8 9 10
4a.	Öğrencinin	tüm dönem ders çalışarak sınavı	geçmesiyle	okuldaki öğretmenler mutlu_oldu.
4b.	Öğrenci		geçmesiyle	okuldaki öğretmenleri mutlu_etti.

According to expactation-based parsing models, an expectancy for the embedded verb is created upon encountering the GEN-marked noun, which would yield shorter RTs on the embedded verb in Region 7 which carries the POSS-marker in (4a) compared to (4b) in which the noun is NOM-marked.

(ii) What do/may syntactic accounts suggest about the processing of P_{gen}DV?

As discussed in the previous chapter, the GEN-marked noun in (4a) is generated within vP, and it moves to the specifier position of AgrNP to be assigned a GEN-marker. Note that the GEN-marked noun and the POSS-marked embedded verb are not adjacent in the underlying representation since the words that come in between belong to the VP adjunct, which directly adjoins to the VP node. Hence, the GEN-marked noun does not cross any constituent when it moves to the specifier position of the AgrNP, and it should not pose a challenge to retrieve it back to its underlying position to establish the dependency relation with the embedded verb. Given this representation, no significant difference in the RTs of Region 7 in (4a) and (4b) is expected.

Also, I am also interested in finding out whether the effect of the overt GEN-marker in the sentence on the POSS-marked nominalized verb depends on the choice of the nominalizer. In other words, do -mA attached nominalized verbs and -(y)Iş

attached nominalized verbs show similar RT speeding or latencies when they form a dependency relation with a GEN-marked noun? Even though both forms morphologically have a very similar function, recall that -(y)Iş is more nominal-like than -mA, hence the former might behave like possessive NPs with respect to the effect of the GEN-marker on processing complexity of the dependency whereas the latter might exhibit a different pattern. A sample set from the experiment is shown in Table 8.

Table 8. Sample Set of Sentences with -mA vs. -(y)Iş Nominalizers for Experiment 2 (PgenDV).

	1	2 3 4 5 6	7	8 9 10
5a.	Öğrenci-nin	tüm dönem ders çalışarak sınavı	geçmesiyle	okuldaki öğretmenler mutlu_oldu.
5b.	Öğrenci-nin		geçişiyle	

Given that -(y)Iş more nominal-like, the nominalized verb in Region 7 is expected to be read faster in (5b) compared to (5a).

4.3.1 Materials and method

Participants

The participants were 28 native speakers (16 female, 12 male; mean age: 22.08) from Boğaziçi University community. All had normal or corrected-to-normal vision. They participated in the experiment voluntarily or for extra course credit in undergraduate linguistics courses. None of the participants took part in the other experiments of the current study.

Stimuli

Twenty-four sets of experimental sentences and 48 fillers were prepared for the experiment. Each set was composed of four conditions. In all conditions, there was a complex sentence structure with an Adverbial Phrase and GEN-POSS deverbal construction. The POSS-marked embedded verb was the seventh word in all sentences, and if the GEN-marker was overtly present, it was in the sentence initial position. In half of the sentences, the embedded verb was nominalized with -mA and in the other half with -(y)Iş.

Similar to Experiment 1, there were four conditions in Experiment 2; two conditions targeting the role of overt GEN-marker in the sentence and two conditions to test the effects of the nominalized type. A sample set of experimental sentences is given in (6).(All data sets are given in Appendix B).

(6)

Condition A:

a. Öğrenci tüm dönem ders çalışa-arak sınav-ı pro geç-iş-i-yle
student all semester lesson work-ArAk exam-ACC pass-(y)Iş-POSS.3SG-COM
okul-da-ki öğretmen-ler-i mutlu et-ti.
school-LOC-ki teacher-PL-ACC happy make-PAST.3SG

"The student pleased the teachers at school by passing the exam studying all semester."

Condition B:

b. Öğrenci-nin$_i$ tüm dönem ders çalışa-arak sınav-ı t_i

student- GEN all semester lesson work-ArAk exam-ACC

geç-iş-i-yle okul-da-ki öğretmen-ler mutlu ol-du

pass-(y)Iş-POSS.3SG-COM school-LOC-ki happy make-PAST.3SG

"The teachers at school were pleased with the fact that the student passed the exams by studying all semester."

Condition C:

c. Öğrenci tüm dönem ders çalışa-arak sınav-ı

student whole semester lesson work-ArAk exam-ACC

pro geç-me-si-yle okul-da-ki öğretmen-ler-i mutlu et-ti.[20]

pass-mA-POSS.3SG-COM school-LOC-ki happy make-PAST.3SG

Condition D:

d. Öğrenci-nin$_i$ tüm dönem ders çalışa-arak sınav-ı

student - GEN whole semester lesson work-ArAk exam-ACC

t_i geç-me- si-yle okul-da-ki öğretmen-ler-i mutlu et-ti.[21]

pass-mA-POSS.3SG-COM school-LOC-ki happy make-PAST.3SG

In Condition A and Condition C, the embedded subjects bore the GEN-marker whereas in Conditions B and D, it carried the NOM-case. When the GEN-marked noun was not overtly stated in the sentence (in Conditions A and C), I

[20] The English translation is the same with that of (6a).

[21] The English translation is the same with that of (6b).

assume there is pro in the structure before the nominalized verb. When the GEN-marker is overtly expressed in the sentence (in Conditions B and D), the subject of the matrix clause is not overt in the sentence. Also as the GEN-marked noun appears in the sentence initial position in Condition B and D, I assume it has moved out of its underlying position leaving a trace behind. In order to achieve a similar meaning with GEN/NOM alternation, the argument structure of the matrix verb was manipulated. The matrix verb was intransitive when the sentence started with a GEN-marked noun (in Conditions B and D) whereas it was causative when the sentence started with a NOM-marked noun (in Conditions A and C). Also, I aim to uncover whether the type of the nominalizer has any effect on how the embedded verb is processed; thus, in Conditions A and B we used -mA while in Conditions C and D the embedded verb was attached -(y)Iş. (6) illustrates the four conditions of an experimental set. Each participant saw only one of the conditions from one set and 48 filler sentences. After each sentence, the participants were required to answer a Yes/No question to check how well they have comprehended the sentence.

Procedure

The same self-paced reading task that was described in Experiment 1 was used in this experiment as well.

4.3.2 Results

RTs shorter than 150 ms and longer than 4000 ms per region were excluded prior to the analysis. Also, only the sentences the comprehension question of which were answered correctly were included in the analysis. The rate for comprehension

question was high (96%) and no reliable difference was found across conditions. Three items from the study due to the experimenter's error in the design process. The mean RTs for all regions are presented in Table 9 and graphically in Figure 3.

Table 9. Average RTs (ms) for Experiment 2 (PgenDV)

	1	2	3	4	5	6	7	8	9	10
A	559	498	456	481	537	592	638	591	456	564
B	598	546	486	525	576	516	682	565	484	609
C	536	525	511	504	581	561	659	618	532	664
D	607	516	514	515	560	541	708	574	456	592

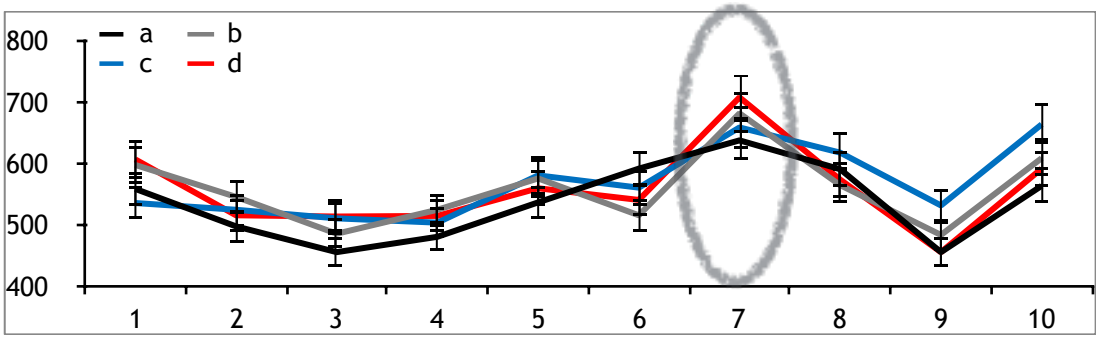


Fig. 3 Average RTs (ms) for P_{gen}DV

A 2x2 repeated measures ANOVA was conducted with case-marker type (NOM/GEN) and the nominalizer suffix type (-mA/-(y)Iş) within-subjects factors. A comparison of the RTs in Region 1 in Conditions A and C with that of Conditions B and D revealed a main effect of case marker. The GEN-marked noun was read again significantly slower than the NOM-case marked noun by both subject and item analyses [F_1 (1, 31) = 4.32 p < .05; F_2 (1, 20) = 5.68 p < .05]. In the temporal noun (for example *dönem* [term]) which occurred in Region 3 a marginal difference was found in the item analysis [F_1 (1, 31) = 1.64 p > 0.10; F_2 (1, 20) = 3.95 p < .05]. The

word was read faster in Conditions A and B than Conditions C and D, but this difference did not turn out to be significant in the subject analysis. In Region 7, a marginal effect of case marker was found in the subject analysis; the nominalized verb was read faster when the sentence started with a NOM-marked noun (as in Conditions A and C) in contrast to when the noun was GEN-marked (as in Conditions B and D) [F_1 (1, 31) = 3.01 p < .05; F_2 (1, 20) = 0.59 p > .10]. A difference in RTs with respect to the nominalizer suffix type was not observed in the subject analysis or item analysis [F_1 (1,31) = 0.44 p > .10; F_2 (1,20) = 0.87 p > .10]. In Region 9 i.e., *öğretmenler/öğretmenleri* (teachers) in Table 7, the item analysis revealed a marginal effect of the nominalizer suffix type used in the embedded clause [F_1 (1, 31) = 1.32 p > .10; F_2 (1, 20) = 3.55 p < .10], the word in Region 9 was read faster after a verb with -(y)Iş compared to -mA nominalized verbs. In this region, there was a significant interaction effect with the case marker type [F_2 (1, 20) = 4,74 p < .05], and the interaction was marginal in the subject analysis [F_1 (1, 31) = 03,39 p < .10]. Also, a marginal effect of the nominalizer suffix type was found in Region 10. The matrix verb was read faster when the embedded verb was attached -(y)Iş as opposed to the -mA suffix [F_1 (1, 31) = 3.01 p < .10], and there was a significant interaction with the case marker [F_1 (1, 31) = 6.08 p < .05]. In the item analysis the type of the nominalizer showed marginal effect [F_2 (1, 20) = 3.30 p < .10]. The interaction was marginal as well [F_2 (1, 31) = 3.68 p < .10].

Discussion

The aim of this experiment was to investigate the role of the GEN marker as well as the choice between the -mA and -(y)Iş on the processing of the nominalized verb.

The findings from the first region in Experiment 2 replicated the results obtained from Experiment 1 (P_{gen}NP). It took participants considerably longer to read the first word when it was a GEN-marked as opposed to a NOM-marked noun. As previously discussed, this finding suggests that the GEN-marked noun is cognitively more loaded, because it tells the parser that a POSS-marked word will appear in the sentence; i.e. it signals the starting point of a dependency. Similar to Experiment 1 (P_{gen}NP), there was a difference in the RTs of the POSS-marked word depending on the presence of the GEN-marker, albeit marginal. The POSS-marked nominalized verb was read slower when the GEN-marked noun was overtly present in the sentence. This finding suggests that the participants retrieve the GEN-marked to its underlying position to form the necessary link with the nominalized verb which results in reading latencies.

The experiment also investigated whether the choice of the nominalizer suffix would lead to any difference in the processing load of the embedded verb. As discussed in Chapter 3, though -mA and -(y)Iş have morphologically the same function, which is creating deverbal nouns, the latter is more nominal like. Nonetheless the findings did not show any discrepancy in the processing of the embedded verb with respect to the nominalizer type, which suggests that they affected the cognitive load of the embedded verb to a similar degree.

An analysis of the RTs of the matrix verb across the conditions has revealed intriguing results. Participants took less time to read the matrix verb after having read an embedded clause with the -(y)Iş nominalizer compared to -mA. This finding suggests that the choice of the nominalizer which did not affect the RTs of the embedded verb seems to affect the processing load of the rest of the sentence. As

discussed earlier, the argument structure of the matrix verb depended on the case marker (NOM vs. GEN) in sentence initial position. The results did not reveal any significant difference between the intransitive verbs and causative verbs. Although there was marginal interaction effect between the case marker type and the nominalizer type on the matrix verb, the argument structure of the verb did not affect the RTs of the verb directly.

To summarize, the results from this experiment revealed that the NOM/GEN alternation affected the processing load of the POSS-marked noun as well as the nominalized verb. The nominalizer type showed a mild effect on the processing of the matrix verb even though the processing load of the nominalized verb did not vary depending on the nominalizer suffix.

4.4 Summary

In this chapter, I have presented two experiments that examined the role of presence of the GEN-marker on the processing of the POSS-marked word. The results showed that the GEN-marked noun is read slower compared to the NOM-marked noun both in the NP and the VP domain, which suggests that it takes a considerable amount of cognitive resources to process the GEN-marker, in other words the GEN-marker is cognitively loaded. Also, it took the participants longer to read the POSS-marked word when the GEN-marked noun was overtly expressed in the sentence. I believe that this latency is due to retrieval of the GEN-marked on from memory; the GEN-marked noun has to be retrieved to its underlying position to form the dependency. Finally, the choice of the nominalizer suffix did not affect the RTs of the embedded verb; the data suggest that there is not a considerable difference in the processing

loads of -(y)Iş nominalizers and -mA nominalizers, indicating that the verbal/ nominal status alone do not determine their processing load in Turkish.

CHAPTER 5

THE ROLE OF DISTANCE IN PROCESSING GEN-POSS LONG DISTANCE DEPENDENCIES

5.1 Introduction

Experiment 1 (P_{gen}NP) and Experiment 2 (P_{gen}DV) have shown the effect of overt presentation of the GEN-marked noun in the sentence on the processing load of the GEN-POSS long distance dependencies. Another factor that might play a role in the processing complexity of a long distance dependency is the distance between the head and the dependent forming the dependency relation. This section attempts to answer the following question: Would the distance between the GEN-marked noun and the POSS-marked noun or POSS-marked embedded verb have any significant effect on the processing time of the POSS-marked item? More specifically;

i) Are the RT of the POSS-marked item and the distance from the GEN-marked noun directly proportional, i.e., does processing the long distance dependency get harder as the distance between the related pairs increases, as proposed in Dependency Locality Theory (Gibson 2000)?

ii) Are they inversely proportional, i.e., does the distance between the dependents of the dependency facilitate processing as assumed by Konieczny's (2000) Anti-locality Theory?

iii) Is distance irrelevant as McElree, Foraker, and Dyer (2003) claim in their Content-Addressable Retrieval Theory?

To answer these questions two experiments were designed each one testing the effect of the linear distance from the GEN-marked noun to the POSS-marked word, which can be a noun or a nominalized verb. Experiment 3 (D_{gen}NP) targets the NP domain, and Experiment 4 (D_{gen}DV) addresses the VP domain. Prior to the presentation of each experiment, I will lay out the predictions of the sentence processing models - as discussed in Chapter 2- for the Turkish data; which will then be ensued by the experimental sentences and analysis. Finally, I discuss which sentence processing model(s) the data support and whether there is any parallelism between the GEN-marked NPs and the GEN-marked non-finite embedded clauses.

5.2 Experiment 3: The role of distance in NPs (D_{gen}NP)

This experiment aims to unpack the effect of distance between the GEN-marked noun and the POSS-marked noun in long distance dependencies. Below are the hypotheses based on the sentence processing models focused on this study; locality accounts, anti-locality accounts and content addressable retrieval model.

i) Locality accounts: Since the underlying source of difficulty in processing arises due to the linear distance between the head and dependent in a long distance dependency, both DLT and EIC propose that as the number of intervening words between the GEN-marked noun and the POSS-marked noun increases, it gets harder to process the dependency. So we expect the RTs on the POSS-marked noun to be shortest when the GEN-marked noun and POSS-marked noun are adjacent, and to get systematically longer when distance in between increases. Let us recall how Hawkins (1994) and Gibson (2000) calculated processing load and adapt their metrics to Turkish data.

As introduced in Chapter 2, the core of Early Immediate Constituents (EIC) is how quickly a Constituent Recognition Domain (CRD) can be recognized through its immediate constituents. Hawkins claimed that when there is more than one alternative word order, the human parser would opt for the one with the highest IC-to-word ratio. High Immediate Constituent (IC)-to-word ratio is achieved when the immediate constituents of a CRD appear close to one another in the sentence. In this experiment, we used a possessive NP in which an embedded clause was inserted. As exemplified in Table 10, the number of ICs was kept constant and the number of non-ICs in the PossP was manipulated by changing the word order. Four conditions of a sample experimental sentence is given in Table 10 for a comparison of IC-to-word ratio.[22]

Table 10. Sample Set of Sentences from Experiment 3 (DgenNP)

	1	2	3	4	5	6	7	8
A	Bütün	sabah	parkta	koşu	yaptı	diye	profesörün	dizi
B	Bütün	sabah	parkta	profesörün	koşu	yaptı	diye	dizi
C	Bütün	sabah	profesörün	parkta	koşu	yaptı	diye	dizi
D	Profesörün	bütün	sabah	parkta	koşu	yaptı	diye	dizi

In all conditions, there are two ICs: the GEN-marked noun *profesörün* (the professor's) and the POSS-marked noun *dizi* (his/her knee). The last IC of this domain always appears in the eighth region. Since the first IC appears in different positions, the number of non-ICs; hence the total number words of the CRD is different across conditions. Table 11 shows the IC-to-word ratio for each condition.

[22] The English glosses and translations are given in the subsequent section.

Table 11. IC-to-Word Ratios for DgenNP Sentences

		ICs	sum of words	ratio
adjacent	Condition A	2	2	% 100
extraposed	Condition B	2	5	% 40
	Condition C	2	6	% 33.3
	Condition D	2	8	% 25

The IC-to-word ratios across conditions clearly show that Condition A is the preferable word order whereas Condition D is the least favorable one. According to EIC, the processing load is expected to increase from Condition A to Condition D.

Similar to EIC, DLT also takes distance into account while calculating the processing load of a long distance dependency. Notwithstanding, Gibson (2000) proposed that only new discourse referents consumed computational resources for processing. Hence, the amount of EUs spent for a long distance dependency is calculated on the basis of the new discourse referents that intervene between the head and the referent. Now, let us take a sample sentence from the present experiment and calculate how many EUs are spent for establishing the GEN-POSS dependency.

Table 12 demonstrates the words forming the GEN-POSS dependency in Condition A of a sample sentence set from the experiment. The sentence starts with *bütün* (whole). It is a closed class (function) word, and it does not introduce any new noun or event, so no EU is spent for this word.[23] The same holds for the complementizer *diye* (so that). Apart from these two words, every word introduces a

[23] I assume that closed-class words do not introduce any new discourse referent. Although neuropsychological studies have not provided conclusive results on the distinction between the open class (content) and closed class (function) words yet, it has been shown that closed class words elicit much smaller N400 effect compared to open class words (Petten & Kutas, 1991; Münte et al., 2001).

new noun or event/action into the structure; so one EU is spent for each of them. Note that the word pairs that are integrated together (*bütün sabah* [the whole morning], *koşu yaptı* [did jogging] and *profesörün dizi* [the professor's knee]) occur together. No discourse referent comes in between the head and the dependent of the dependency, so extra EUs are not required for the structural integration of any word.

Table 12. The Total Integration Cost in EUs for Condition A in Experiment 3 (DgenNP)

Condition A	Bütün	sabah	parkta	koşu	yaptı	diye	profesörün	dizi
New discourse referent	0	1	1	1	1	0	1	1
Structural integration	0	0	0	0	0	0	0	0
Total	0	1	1	1	1	1	1	1

In Condition B, the GEN-marked noun is separated from the POSS-marked noun, there are two new discourse referents that come in between, so the structural integration cost is 2 for the POSS-marked noun as shown in Table 13. As a result, the total amount of EUs spent for processing the long distance dependency increases, and becomes 3. The integration costs of the others word remain the same.

Table 13. The Total Integration Cost in EUs for Condition B in Experiment 3 (DgenNP)

Condition B	Bütün	sabah	parkta	profesörün	koşu	yaptı	diye	dizi
New discourse referent	0	1	1	1	1	1	0	1
Structural integration	0	0	0	0	0	0	0	2
Total	0	1	1	1	1	1	0	3

The distance is longer in Condition C. Here, the GEN-marked noun appears as the third word in the sentence, and POSS-marked noun is available only after 3 new discourse referents. So, the structural integration cost is higher as shown s shown in Table 14.

Table 14. The Total Integration Cost in EUs for Condition C in Experiment 3 (DgenNP)

Condition C	Bütün	sabah	profesörün	parkta	koşu	yaptı	diye	dizi
New discourse referent	0	1	1	1	1	1	0	1
Structural integration	0	0	0	0	0	0	0	3
Total	0	1	1	1	1	1	0	4

Finally, in Condition D, the GEN-marked noun appears in sentence initial position; there are four new discourse referents intervening. The total amount of EUs spent for the POSS-marked noun adds up to 5 as shown in Table 15.

Table 15. The Total Integration Cost in EUs for Condition A in Experiment 3 (DgenNP)

Condition D	Profesörün	bütün	sabah	parkta	koşu	yaptı	diye	dizi
New discourse referent	1	0	1	1	1	1	0	1
Structural integration	0	0	0	0	0	0	0	4
Total	1	1	1	1	1	1	0	5

The sum of EUs spent for the POSS-marked noun in all conditions is given in Table 16. It can be clearly seen that as the distance between the GEN-marked noun

and the POSS-marked noun increases, so do the EUs spent for the POSS-marked noun.

Table 16. The Sum of EUs for the POSS-marked Noun in Experiment 3 (DgenNP)

		EUs spent for the POSS-marked noun
adjacent	Condition A	1
extraposed	Condition B	3
	Condition C	4
	Condition D	5

A comparison of EUs across conditions suggest that there should be increasing processing complexity from Condition A to Condition D; hence RTs are expected to be shortest in Condition A and longest in Condition D.

ii) Anti-locality accounts: Since expectations about the second pair of the dependency become clearer as the human parser processes words that come after the first pair; increasing distance is expected to facilitate the processing of the second pair (Konieczny, 2000). Hence, RTs on the POSS-marked noun should decrease from Condition A to Condition D.

iii) Content-addressable retrieval: As words are retrieved from memory based on their features, the human parser is expected to look for a word with [+GEN] upon encountering a POSS-marked word. As the search is content-addressable rather than linear or hierarchical, the position of the GEN-marked noun does not affect the retrieval time. Also as there is only one word with [+GEN] feature in the sentences,

there will not be any interference effect; hence, no statistically significant difference in RTs is expected in the POSS-marked noun across conditions.

5.2.1 Materials and method

Participants

Twenty-eight native speakers of Turkish from the Boğaziçi University community participated in the experiment (15 female, 13 male; mean age: 22.8). All had normal or corrected-to-normal vision. They participated in the experiment voluntarily or for extra course credit in undergraduate linguistics courses. None of the participants took part in the other experiments of the current study.

Stimuli

There were 24 test sentences and 48 fillers in this experiment. All sentences had a long distance dependency construction with GEN-POSS, and a finite embedded clause. There were four conditions for each test sentence. The POSS-marked noun appeared as the eighth word (i.e., in Region 8) across conditions, but the position of the GEN-marked noun varied.[24] A sample set of sentences is given in (1). For all the sentence sets, see Appendix C.

[24] I could keep the number of the words in the sentence across conditions the same and manipulate the linear distance between the GEN-marked noun and the POSS-marked noun by varying the position of the GEN-marked noun in the sentences. However, I am aware that this scrambling strategy changes the scope relations in the sentences. Some reviewers of the sentences have pointed out that in Condition A, for example, the interpretation is "the professor ran the whole morning" whereas in Condition C the interpretation is "the professor's knee hurt the whole morning". Although the interpretation of the time adverbial might not be the same across conditions, I believe it does not directly affect the processing load of the GEN-POSS dependency in the sentence.

(1) Condition A:

a. Bütün sabah park-ta koşu yap-tı diye profesör-ün
whole morning park-LOC running do-PAST.3SG for professor-GEN
diz-i çok ağrı-dı.
knee-POSS.3SG a lot ache-PAST.3SG

Condition B:

b. Bütün sabah park-ta profesör-ün$_i$ koşu yap-tı diye
whole morning park-LOC professor-GEN running do-PAST.3SG for
t_i diz-i çok ağrı-dı.
knee-POSS.3SG a lot ache-PAST.3SG

Condition C:

c. Bütün sabah profesör-ün$_i$ park-ta koşu yap-tı diye
whole morning professor-GEN park-LOC running do-PAST.3SG for
t_i diz-i çok ağrı-dı.
knee-POSS.3SG a lot ache-PAST.3SG

Condition D:

d. Profesör-ün$_i$ bütün sabah park-ta koşu yap-tı diye
professor-GEN whole morning park-LOC running do-PAST.3SG for
t_i diz-i çok ağrı-dı.
knee-POSS.3SG a lot ache-PAST.3SG

"The professor's knee ached a lot as s/he ran the whole morning at the park."

In (1a), the GEN-marked noun and the POSS marked noun are adjacent; so there are not any words intervening. In Condition B, the GEN-marked noun appeared before the embedded verb, so there were three words in between. In Condition C, the GEN-marked noun was the third word in the sentence, so there was one more word intervening. And finally, in Condition D, the GEN-marked noun was in sentence initial position; so the POSS-marked noun appeared after six intervening words. Each participant saw one of the conditions for each test sentence. A Yes/No question is asked after each sentence to test comprehension and to ensure attention.

Procedure

The procedure was the same non-cumulative self-paced reading task described in detail for Experiment 1.

5.2.2 Results ($D_{gen}NP$)

Prior to the analysis, RTs were trimmed again, so the data shorter than 150 ms and longer than 4000 ms were considered outliers and excluded from the analysis. Also, just in the other experiments, the sentences for which the comprehension question was answered incorrectly were not included in the analysis. The accuracy rate for the comprehension questions was 89%, and there was no statistically significant difference across conditions. Average RTs for all regions in all conditions are presented in Table 17 and and Figure 4.

Table 17. Average RTs (ms) for Experiment 3 (DgenNP)

		1	2	3	4	5	6	7	8	9
A	502	470	528	533	535	482	485	496	464	557
B	484	481	521	640	600	547	518	479	461	610
C	467	477	542	607	535	575	525	512	467	640
D	576	523	512	521	517	522	468	480	448	582

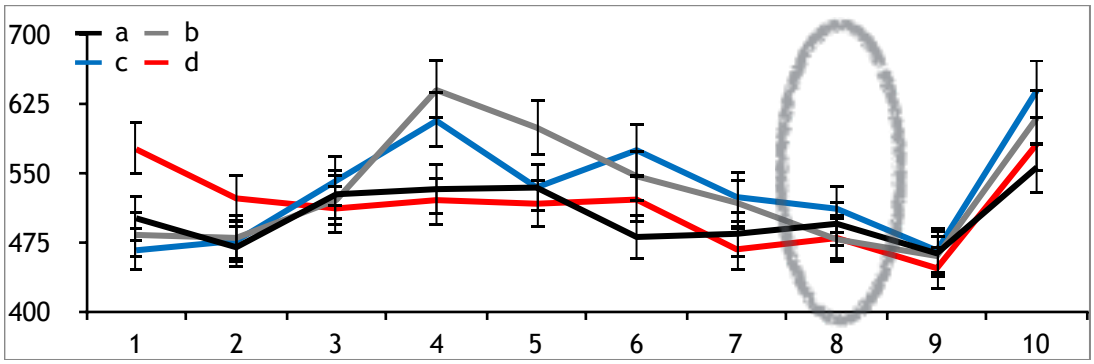


Fig. 4 Average RTs (ms) for DgenNP

In Region 1, there was a main effect of the GEN-marker [F_1 (3, 81) = 7,35 $p < .01$ F_2 (3, 66) = 5.34 $p < .01$]. The GEN-marked noun in Condition D was read slower than the quantifier in Conditions A, B and C. There was no significant difference across conditions In Regions 2 and 3 ($p > .10$). There was a main effect of the GEN-marker in Region 4 in the subject analysis [F_1 (3, 81) = 4,82 $p < .01$], but this effect was not significant in the item analysis ($p > .10$). In Region 5, there was a significant effect in the subject analysis [F_1 (3, 81) = 2,85 $p < .05$], the word *koşu* (running) in Condition B was read slower than those in the other conditions; however, this difference was not significant in the item analysis ($p > .10$). A similar pattern was seen in Region 6, a significant effect was found in the subject analysis [F_1 (3, 81) = 2,98 $p < .05$]. The verb *yaptı* (he/she did) was read slower in

Condition C was read significantly slower compared to the other words that occurred in this region across conditions. This difference was not significant in the item analysis ($p > .10$). In Region 7, the complementizer *diye* (for) in Condition C was read significantly slower than its counterparts across the conditions in the subject analysis [F_1 (3, 81) = 3,25 $p < .05$], such a difference was not significant in the item analysis ($p > .10$). The critical region in this experiment was Region 8 in which the POSS-marked noun occurred. No statistically significant difference in the RTs was found in this region across conditions [F_1 (3, 81) = 0.56 $p > .10$; F_2 (3, 66) = 0.53 $p > .10$], i.e., the POSS-marked noun was read at similar speeds in all conditions. The differences in Region 9 and Region 10 across the conditions were not significant ($p > .10$).

Discussion

This experiment investigated whether the distance between the GEN-marked and POSS-marked nouns would have any effect on the processing of the long distance dependency. Results did not reveal any significant effect of distance from the GEN-marked noun on the RTs of the POSS-marked noun. This finding is not compatible with any model that considers distance as the main source of processing complexity. Recall that both EIC and DLT predicted RTs to be the slowest when the GEN-marked noun appeared in sentence initial position and then to systematically get faster as the GEN-marked noun occurred closer to the POSS-marked noun, but the findings did not support this claim. Anti-locality accounts cannot account for this finding either because there was no facilitation effect when several words intervened between the GEN-marked noun and the POSS-marked noun. That the participants read the POSS-

marked noun at a similar speed across conditions suggest that they were able to retrieve the GEN-marked noun with the same ease and speed no matter where it occurred in the sentence. This finding can be interpreted as providing evidence for the Content-addressable Retrieval Model. When the participants encountered the POSS-marked noun, a search for a noun with [+GEN] feature in the sentence started. Since there was only one noun with the GEN-marker in all conditions, there was no difference in its retrieval speed between the adjacent and extraposed conditions. It is of importance to note that in Chapter 6 we are going to have a thorough discussion of which models fit the Turkish data by comparing the results from all experiments in this study.

Experiment 3 has shown the effects of the proximity between the GEN-marked noun and the POSS-marked noun, so another experiment was designed to examine the role of distance between the GEN-marked noun and the POSS-marked nominalized verb. In the following section, I present the stimuli and the results from Experiment 4.

5.3 Experiment 4: The role of distance in VPs ($D_{gen}DV$)

This experiment targets the GEN-POSS dependencies in embedded clauses to see which sentence processing theory could explain the dynamics of long distance dependencies in Turkish and if the results form a unified picture with the results from Experiment 3. First, let us go over locality accounts, anti-locality accounts and content addressable retrieval model and discuss the predictions of each model for the GEN-POSS dependency relation in non-finite embedded clauses.

i) Locality accounts: As discussed in the previous sections, locality accounts predict the processing load to be greater as the distance between the head and the dependent of the long distance dependency grows. Now, let us go over EIC and DLT and discuss how under Hawkins' (1994) and Gibson's (2000) accounts the processing load of the sentences used in the present experiment would be calculated.

Hawkins suggested that all daughters of a maximal projection must be encountered to identify the mother node. As shown in (2) PP is the maximal projection for the sentences that we use in Experiment 4. Inside the PP, there are two projections: an AgrNP and a VP.

(2)

[PP [AgrNP Öğrenci-nin [TP [vP tüm dönem ders çalışarak sınavı geç]-me]-si]-yle]

In the present experiment, the position of the GEN-marked noun was manipulated so that the distance between the GEN-marked and the POSS-marked constituents varied. This manipulation made possible to measure whether the processing load of the sentences depends on how quickly and easily the AgrNP projection can be identified as proposed by EIC. The conditions of a sample sentence from the experiment is given in Table 18 to help apply Hawkin's metrics to measure the processing load of each condition.[25]

[25] English gloss and translation for these sentence is given in the following section.

Table 18. Sample Sentence Set for Experiment 4 (DgenDV)

A	Öğrencinin	tüm	dönem	ders	çalışarak	sınavı	geçmesiyle
B	Tüm	dönem	öğrencinin	ders	çalışarak	sınavı	geçmesiyle
C	Tüm	dönem	ders	çalışarak	öğrencinin	sınavı	geçmesiyle
D	Tüm	dönem	ders	çalışarak	sınavı	öğrencinin	geçmesiyle

Notice that there are three ICs in AgrNPs across conditions: the verb *geçmesiyle* (by passing), the object *sınavı* (the exam), and the GEN-marked noun *öğrencinin* (the student's), but the total number of the words inside the CRD varies across conditions. The IC-to-word ratio for each condition is given in Table 19.

Table 19. IC-to-Word Ratios for DgenVP Sentences

		ICs	sum of words	ratio
extraposed	Condition A	3	7	% 42.8
	Condition B	3	5	% 60
	Condition C	3	3	% 100
adjacent	Condition D	3	3	% 100

The prediction of EIC is clear: processing the AgrNP which includes a GEN-POSS dependency relation must be easiest in Condition C and Condition D and most difficult in Condition A.

As discussed in Chapter 2, Gibson calculated the amount of EU spent for each word depending on their oldness in the discourse; only the words that introduced a new discourse referent or an event consume EUs. In this section, let us

go through each condition in the experimental sentences and calculate the total amount of EUs spent for the nominalized verb.

Table 20 shows the integration cost in Condition A. As can be seen one EU is spent for all words that introduce a new referent into the discourse. The only word that does not do so is tüm (the whole), we assume closed class words do not introduce any new referent to the discourse, so no EU is spent for it.

Table 20. The Total Integration Cost in EUs in EUs for Condition A in Experiment 4 (DgenDV)

Condition A	Öğrencinin	tüm	dönem	ders	çalışarak	sınavı	geçmesiyle
New discourse referent	1	0	1	1	1	1	1
Structural integration	0	0	0	0	0	0	4
Total	0	1	1	1	1	1	5

As for the structural integration, the sentence starts with *öğrencinin* (the student's), and it is not integrated with another word yet. The second word and the third word are integrated together and interpreted as *tüm dönem* (whole semester). As there is no intervening material between these two words, no EU is spent for the integration of the fourth word *dönem* (term) into the structure. The same holds for the following two words, *ders* (lesson) and *çalışarak* (by working) which are integrated together. Yet again there is no need to spend any EU for the structural integration at this point. The predicate *geçmesiyle* (by passing) has two arguments *sınavı* (the exam) and *öğrencinin* (the student's). To be integrated with the former, no EU is spent whereas the latter is four new discourse referents away; hence 4 EUs

are spent for the structural integration. The total number of EUs spent for the nominalized verb adds up to 5 EUs; one for introducing a new event and four for structural integration.

In Condition B, the distance between the GEN-marked noun and the POSS-marked nominalized verb is shorter, so only the structural integration cost differs from Condition A as shown in Table 21.

Table 21. The Total Integration Cost in EUs in EUs for Condition B in Experiment 4 (DgenDV)

Condition B	Tüm	dönem	öğrencinin	ders	çalışarak	sınavı	geçmesiyle
New discourse referent	0	1	1	1	1	1	1
Structural integration	0	0	0	0	0	0	3
Total	0	1	1	1	1	1	4

In Condition C, the distance is even shorter; hence, the structural integration cost for the embedded verb is considerably less as shown in Table 22.

Table 22. The Total Integration Cost in EUs EUs for Condition C in Experiment 4 (DgenDV)

Condition C	Tüm	dönem	ders	çalışarak	öğrencinin	sınavı	geçmesiyle
New discourse referent	0	1	1	1	1	1	1
Structural integration	0	0	0	0	0	0	1
Total	0	1	1	1	1	1	2

Finally in Condition D, the GEN-marked noun and the POSS-marked nominalized verb occur adjacent in the sentence. Yet, the verb has to be integrated both with the GEN-marked noun and the *sınavı* (the exam); hence the total integration cost for the verb is the same with Condition D as shown in Table 23.

Table 23. The Total Integration Cost in EUs s for Condition D in Experiment 4 (DgenDV)

Condition D	Tüm	dönem	ders	çalışarak	sınavı	öğrencinin	geçmesiyle
New discourse referents	0	1	1	1	1	1	1
Structural integration	0	0	0	0	0	0	1
Total	0	1	1	1	1	1	2

The EUs spent for the embedded verb in all conditions are summarized in Table 24. As can be seen as the distance gets smaller, the number of EUs decrease, as well.

Table 24. Summary of Predicted Integration Costs for POSS-marked Embedded Verb

		EUs spent for the verb
extraposed	Condition A	5
	Condition B	4
	Condition C	2
adjacent	Condition D	2

In short, DLT predicts the processing load of the embedded verb to be smaller in Conditions C and D compared to Conditions A and B. Hence, RTs should be longer in Conditions A and B compared to others.

ii) Anti-locality accounts: Since the processing of each word that comes between the pairs of a dependency restricts the choice of the second word, distance is expected to facilitate processing long distance dependencies. Given that the RTs of the POSS-marked item should show anti-locality effect; hence the RTs are expected to be shorter as there are more words in between. In other words, the nominalized verb should be read fastest in Condition A and slowest in Condition D.

iii) Content-addressable retrieval model: Since retrieval from memory is not achieved through a node by node search, linear or structural distance is not a determinant of the processing complexity of a long distance dependency. Therefore, upon seeing the POSS-marked item, the human parser looks for [+GEN] feature in the sentence. As there is only one word with this feature, it is retrieved at the same speed and with ease regardless of the position of the GEN-marked noun in the sentence. For this reason, similar RTs are expected in the embedded verb across conditions.

5.3.1 Materials and method

Participants

Twenty-eight native speakers of Turkish from the Boğaziçi University community participated in the experiment (15 female, 13 male; mean age: 23.1). They were all right handed and had normal or corrected-to-normal vision. The participants took part in the experiment voluntarily or for extra credit in undergraduate linguistic courses.

Stimuli

Twenty-four sets of sentences and 48 fillers are used in the experiment. Each experimental set was made up of four conditions. A non-finite embedded clause with GEN-POSS construction appeared in all conditions. The POSS-marked item was the embedded verb, which appeared as the seventh word in the sentence. The position of GEN varied across conditions. A sample sentence set is given in (3). (See Appendix D for all experimental sentences.)

(3)

Condition A:

a. Öğrenci-nin tüm dönem ders çalış-arak sınav-ı
student-GEN all semester lesson work-ArAk exam-ACC
geç-me-si-yle okul-da-ki öğretmen-ler mutlu ol-du.
pass- mA-POSS.3SG-COM school-LOC-ki teacher- PL happy be-PAST.3SG

Condition B:

b. Tüm dönem öğrenci-nin ders çalış-arak sınav-ı
all semester student-GEN lesson work-ArAk exam-ACC
geç-me-si-yle okul-da-ki öğretmen-ler mutlu ol-du.
pass- mA-POSS.3SG-COM school-LOC-ki teacher-PL happy be-PAST.3SG

Condition C:

c. Tüm dönem ders çalış-arak öğrenci-nin sınav-ı
all semester lesson work-ArAk student-GEN exam-ACC
geç-me-si-yle okul-da-ki öğretmen-ler mutlu ol-du.
pass- mA-POSS.3SG-COM school-LOC-ki teacher- PL happy be-PAST.3SG

Condition D:

d. Tüm dönem ders çalış-arak sınav-ı öğrenci-nin
all semester lesson work-ArAk exam-ACC student-GEN
geç-me-si-yle okul-da-ki öğretmen-ler mutlu ol-du.
pass- mA-POSS.3SG-COM school-LOC-ki teacher-PL happy be-PAST.3SG
"The teachers at school were pleased with the fact that the student passed the exam by studying all semester."

In Condition A, the GEN-marked noun appeared in the sentence initial position, so there were five words between the GEN-marked noun and the POSS-marked nominalized verb. In Condition B, the GEN marked noun was closer as three words intervened the dependency. In Condition C, there was only the direct object of the embedded clause between the two. Finally, the distance was minimal in Condition D; GEN-marked noun and POSS-marked nominalized verb were juxtaposed.

Procedure

The details of the presentation of sentences were identical to Experiment 1, 2 and 3.

5.3.2 Results ($D_{gen}DV$)

Prior to the analysis of the data, we have removed all RTs less than 150 ms and greater than 4000 ms as outliers. Furthermore we have only included sentences for which the comprehension questions were answered correctly. The accuracy rate for the comprehension questions was 97%, and there was no reliable difference across conditions.

Average region-by-region reading times for all four conditions are given in milliseconds in Table 25 and graphically presented in Figure 5.

Table 25. Average RTs (in ms) for Experiment 4 (DgenDV)

	1	2	3	4	5	6	7	8	9	10
A	819	593	578	647	715	668	850	668	536	746
B	520	512	750	669	723	665	853	612	557	761
C	543	514	565	655	768	732	1057	632	541	799
D	546	510	572	657	675	876	1059	704	562	770

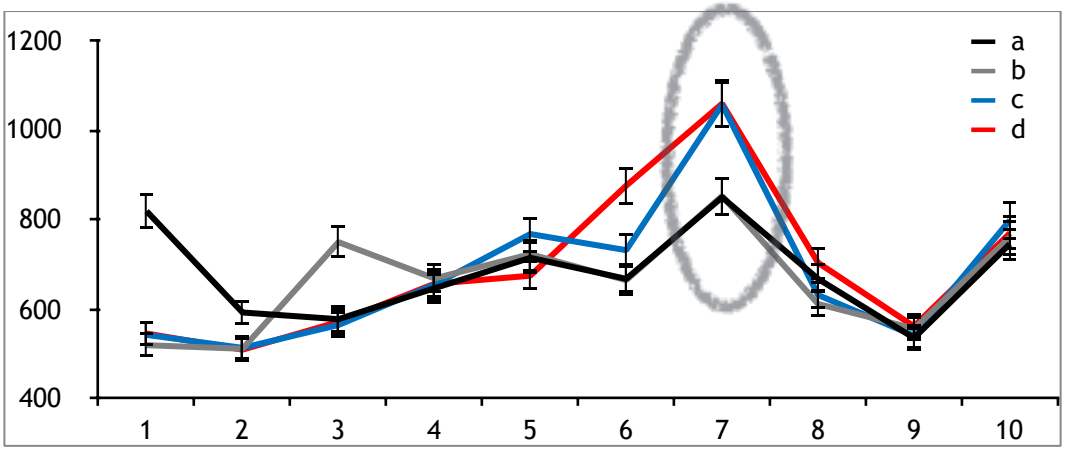


Fig. 5 Average RTs (in ms) for DgenDV

The data were subject to one-way repeated measures ANOVA to investigate whether there was any effect of the distance between the GEN-POSS markers on the RTs of the nominalized verb when there were five-words (Condition A), three-words (Condition B) and one word (Condition C) in between or when the GEN-marked noun and the POSS-marked nominalized verb were adjacent (Condition D). In Region 1 there was a main effect of the GEN-marker both in the subject and the item analyses [F_1 (3, 81) = 13.85 $p < .01$; F_2 (3, 69) = 14.61 $p < .01$]. The GEN-marked noun was read slower than the quantifier *tüm (*whole) in Conditions B, C and D. In Region 2 the word *tüm (*whole) was read significantly slower in Condition A than the words that occurred in this region in Conditions B, C and D [F_1 (3, 81) = 3.62 $p < .05$; F_2 (3, 69) = 2.90 $p < .05$]. There was a main effect of the GEN-marker in Region 3 in both the subject and the item analyses [F_1 (3, 81) = 8.42 $p < .01$; F_2 (3, 69) = 5.99 $p < .05$]. The GEN-marked noun in Condition B was read slower compared to the other noun that occurred in this region in Conditions A, C and D. In Regions 4 and 5, there was no significant effect in the subject or the item analysis ($p > .10$). There was a significant effect of the GEN-marker in Region 6 [F_1 (3, 81) = 15,26 $p < .01$; F_2 (3, 69) = 4.05 $p < .05$]. It took the participants longer to read the GEN-marked noun compared to the other nouns that occurred in this region. The critical region in this experiment was Region 7 in which the nominalized verb occurred. The results have shown a significant effect of distance in both subject and item analyses [F_1 (3, 81) = 10.04 $p < .05$; F_2 (3, 69) = 5.25 $p < .01$]. The pairwise comparisons showed that there was not a statistically significant difference between Conditions A and B ($p > .10$) in F_1 and F_2, both were read at similar speeds. A comparison across the conditions revealed that the POSS-marked noun was read

significantly faster in Conditions A and B compared to Conditions C and D ($p < .05$ in F_1 and F_2). There was no significant difference between Condition C and Condition D ($p > .10$ in F_1 and F_2). In Region 8 there was a marginal effect [F_1 (3, 81) = 2,6 $p < .10$], the word *okuldaki* (the one(s) at the school) was read significantly slower in Condition D compared to the other conditions. This difference was not significant in the item analysis ($p > .10$). In Regions 9 and 10, no significant effect was found ($p > .10$).

Discussion

The goal of this experiment was to see whether the linear distance between the GEN-marked noun and the nominalized verb affected the processing of the long distance dependency that they formed. The data showed that the nominalized verb was read faster when the GEN-marked noun came in sentence initial position and in the third position. The RTs increased significantly when it occurred adjacent to the nominalized verb or only separated from it with one word. This finding lies in sharp contrast with locality accounts. Recall that both EIC and DLT predicted that RTs should be shorter when the linear distance from the GEN-marked noun was shorter. The results revealed just the opposite; as the number of intervening words increases, participants took less time to read the nominalized verb. The intervening words guided the participants and helped them form expectations with respect to the embedded verb that would occur in the sentence. Just as in the D_{gen}NP Experiment, this finding is in line with anti-locality effect.

Still, there are two reasons why we should be cautious about interpreting these results as a strong indication of anti-locality effect. First, no significant

difference in the RTs was observed on the embedded verb between Condition A, when the GEN-marked noun came in sentence initial position and Condition B, when it followed the time adverb. Likewise, there was not a statistically significant difference between Condition C, in which one word intervened the dependency and Condition D in which there was not any word in between. It appears that the four conditions can be treated as falling into two groups: long distance (three-five words) and short distance (up to two words). The processing of the nominalized verb was facilitated in the long distance condition compared to short distance. The second reason for this dissociation between the short and the long conditions might be the adverbial clauses. The "-ArAk" adverbial clause follows the GEN-marked noun in the long distance but precedes it in the short distance group. Note that this type of non-finite embedded clause does not bear any agreement morphology. Its subject is mostly implicit in the sentence and when it is overtly expressed, it is in the NOM-case. Yet, in all our test items the subject of this adverbial clause was interpreted as the GEN-marked noun, so there is a semantic dependency established between the GEN-marked noun and the predicate of this adverbial clause. This backward dependency formation in the short condition might cause a bigger challenge compared to the forward dependency formed in the long distance. The increased RTs in the embedded verb in the short distance group – namely Conditions C and D – might be a spillover effect from the preceding processing complexity.

5.4 Summary

This chapter presented two experiments to test whether the distance between the members of GEN-POSS dependencies in NPs and embedded clauses lead to any

difference in the RTs of the POSS-marked word. The results contradicted the predictions of locality accounts as the RTs did not vary based on the proximity between the members of the dependency in either NPs or embedded clauses. The data showed that the POSS-marked noun was read at similar speeds irrespective of the position of the GEN-marked noun in the sentence, which suggests that the GEN-marked noun was retrieved at the same ease and speed across conditions. This is in line with content-addressable retrieval model. The embedded clauses; however, showed a different pattern. The nominalized verb was read faster when it was separated from the GEN-marked noun. It took the participants longer to process the POSS-marked nominalized verb when the distance is shorter; so the data showed anti-locality effect. When the data from D_{gen}NP and D_{gen}DV are considered together, it is clearly seen that the findings do not support locality accounts as the distance between the GEN-marked noun and the POSS-marked word has not led to any processing difficulty. Here; however, the similarity between NPs and the embedded clauses stop as an anti-locality effect is observed in embedded clauses while distance has not shown any significant effect in NPs. In the following section I discuss the possible reasons why distance between the members of a GEN-POSS dependency showed distinct effects on the processing load of the POSS-marked noun and the POSS-marked nominalized verb.

CHAPTER 6

GENERAL DISCUSSION AND CONCLUSIONS

6.1 General Discussion

This study investigated the role of the GEN-marker and the distance between the GEN-marked noun and the POSS-marked word in processing GEN-POSS long distance dependencies in Turkish. The existing literature on long distance dependencies has treated various types of dependencies (such as determiner-noun, subject-verb etc.) as behaving in a uniform way. It has been shown that the asymmetry between the processing complexities of SRC and ORCs can be accounted for through locality accounts (Gibson, 2000), and subject-verb agreement can be explained through anti-locality accounts (Konieczny, 2000) or content-addressable retrieval model (McElree, Foraker, & Dyer, 2003), and all of these models have claimed that their premises can apply to all long distance dependencies. However, I would like to suggest that each dependency relation may have its own characteristics and should be treated on this own; therefore a GEN-POSS dependency may have its own dynamics. It might be even possible that the GEN-POSS dependencies in the NP domain differ from those in the VP domain in terms of processing. Hence, I focused on GEN-POSS dependencies in both domains to test the predictions of several sentence processing models. Throughout the thesis following questions were discussed: Does the overt presence of a GEN-marked noun in the sentence affect the processing load of the related POSS-marked word? Is proximity a strong determinant of processing complexity in long distance dependencies? Is there any parallelism between NPs and embedded clauses that conform to the GEN-POSS template in

terms of processing? Does finiteness of an embedded clause have any effect on the processing of the matrix clause? Is there any difference in terms of the processing load between -mA nominalized verbs and -(y)Iş nominalized verbs? To answer these questions, first some influential sentence processing accounts were reviewed such as locality accounts (Hawkins, 1990; Gibson, 2000) anti-locality accounts (Konieczny, 2000) and content addressable retrieval model (McElree et al., 2003) in Chapter 2. Then, I examined the GEN-POSS construction in both NPs and embedded clauses from a theoretical point of view in Chapter 3. In Chapters 4 and 5 four self-paced reading studies were reported that investigated the role the presence of the GEN-marker and the distance between the GEN-marker and the POSS-marker could play in processing GEN-POSS long distance dependencies in NPs and embedded clauses. In what follows, a summary of the findings is presented, and the aforementioned questions are discussed in the light of the data obtained from experiments reported in this study.

6.1.1 Presence of GEN-marker

The effect of the overt presence of the GEN-marker on the processing of the POSS-marked word was tested in Experiments 1 (P_{gen}NP) and 2 (P_{gen}DV). Both experiments showed that it took the participants more time to read an overtly GEN-marked noun as opposed to a covertly GEN-marked noun, which surfaces as a NOM-marked noun in the sentence initial position. The reading latencies observed at the GEN-marked noun might be due to two reasons. First, as Turkish is a SOV language, participants might be in anticipation of a sentence that starts with a NOM-marked subject. When the sentence starts with a GEN-marked noun; however, they realize

that it cannot be the subject of the matrix clause; it is either a part of a possessive construction or the subject of an embedded clause. The second explanation might be that the GEN-marker is cognitively more loaded than the NOM-marker. As we discussed in the previous sections, the presence of a GEN-marked noun has several functions and it is a sign of a dependency; either a POSS-marked noun or a nominalized verb must appear in the sentence following the GEN-marked noun. This finding is in accordance with the findings reported in Özge (2010). Implementing an auditory moving window task, Özge compared the RTs of ACC-marked nouns and GEN-marked nouns in the sentence initial position and found that the participants were faster in processing the ACC-marked nouns. She even proposed that the complexity of the GEN-marker is the underlying reason for the processing asymmetry observed between SRCs and ORCs in Turkish. Since the comparison of the GEN-marker and the NOM-marker was only in the sentence initial position in all of our experimental sentences, the findings of the present study do not provide clear evidence as to whether the reading latencies stem from the complexity of the GEN-marker or the expectancy for a NOM-marked noun in the sentence initial position.

Another major finding of Experiments 1 and 2 was the effect the GEN-marked noun had on the POSS-marked word. The POSS-marked noun and the nominalized verb were read slower when the GEN-marked noun was overtly present in the sentence. Recall that experimental sentences were prepared in such a way that either the first member of the GEN-POSS dependency; i.e., a GEN-marked noun or the subject of the matrix clause; i.e. a NOM-marked noun was overtly expressed; so one of them was not explicitly stated in the sentence. When the GEN-marked noun was covert, the NOM-marked noun was semantically related to the POSS-marked

noun. When the NOM-marked noun not overtly expressed in the sentence, the referent of the GEN-marked noun was interpreted as the subject of the sentence. In both experiments, it was observed that processing the POSS-marked noun was harder when a GEN-marked noun was encountered in the sentence, which suggests that the participants reconstructed the GEN-marked noun to its underlying position and established a link with the POSS-marked noun.Therefore, the data suggest that what best accounts for longer RTs at the POSS-marked word is the fact that a dependency needs to be formed by the participants which obviously requires the reconstruction of the head of the dependency, i.e., the GEN-marked noun from the memory.

6.1.2 Distance between the members of GEN-POSS dependencies

The goal of Experiments 3 (D_{gen}NP) and 4 (D_{gen}DV) was to investigate the role of linear distance between the GEN-marked noun and the POSS-marked noun. Recall that locality accounts expected the processing load to increase as the linear distance between the members of the dependency increased whereas anti-locality accounts made the opposite claim by proposing that distance would lead to facilitation in processing long distance dependencies. The third model that was discussed was the content-addressable retrieval model which did not consider that distance would play a role in determining the processing complexity of long distance dependencies. The results from both of the experiments did not support the claims of locality accounts, because the RTs at the POSS-marked word did not show a systematic increase as the number of intervening words increased. What was rather observed was that in the NP domain, the distance did not lead to any difference in the RTs of the POSS-marked noun; so the data supported the content-addressable retrieval model. This might be

due to the fact that the speed and ease of retrieving the GEN-marked noun does not depend on distance between the members of the dependency of interest in the NP domain. The results concerning the VP domain presented a different picture; the POSS-marked nominalized verb was read faster when the GEN-marked noun was farther away in the sentence. Since the words that follow the GEN-marked noun facilitated the processing of the nominalized verb, an anti-locality effect was observed. In what follows, I discuss possible reasons as to why the role distance plays in processing long distance dependencies did not show any similarities between NPs and embedded clauses.

6.1.3 Parallelism between possessive NPs and embedded clauses

As discussed earlier, both possessive NPs and embedded clauses were examined as they fit in the same GEN-POSS template. For both the effect of the presence of the GEN-marker and the distance between the members in the processing of long distance dependency, the results from the experiments targeting each category were compared. The data from Experiments 1 and 2 showed similar results with respect to the presence of the GEN-marker; the POSS-marked word was read slower when the GEN-marked noun was overtly expressed in the sentence; so we conclude that closing an incomplete GEN-POSS dependency was costly for both nouns and nominalized verbs. The results for the distance between the GEN-marked noun and the POSS-marked word showed variety depending on the category, though. The possessive nouns were read at a similar speed no matter where the GEN-marked noun appeared in the sentence whereas it took the participants considerably longer time when the GEN-marked noun occurred close to the nominalized verb. This leads

to a puzzle: Why did distance affect processing the possessive NPs and the embedded clauses in a discrepant way? The underlying reason might be the difference between nouns and nominalized verbs in terms of processing complexity. I reckon that the nominalized verbs are cognitively more loaded compared to nouns due to their complex internal structure, which was previously proposed by Bahadır (2012). Hence, the words in that come between the GEN-marked noun and the POSS-marked word might help the parser to a greater extent in the VP domain compared to NPs.

6.1.4 Finiteness of the embedded verb

One of the goals of Experiment 1 was to find out whether finiteness of the embedded verb affected the processing of the matrix clause. A comparison of the RTs from the regions that followed a finite embedded verb with those that came after a non-finite verb revealed that it took participants a longer time to read the matrix verb after having read a finite embedded verb. Such an effect was not observed at the POSS-marked noun, though, the RTs did not vary depending on the finiteness of the embedded clause. Based on these findings, I suggest that finiteness of an embedded clause may only affect another verbal element in the sentence, which was the matrix verb in our sentences. And that may have something to do with the construction of two different propositions for two different verbs.

6.1.5 The type of the nominalizer suffix

As discussed in Chapter 3, there are five subordination suffixes that are used to create nominalized verbs. Experiment 2 tested two of these suffixes; in the test

sentences the embedded verb was either attached the nominalizer-mA or -(y)Iş. The aim was to see whether the RTs would differ with respect to the choice of the nominalizer suffix. As -(y)Iş is more nominal like, the embedded verbs with -(y)Iş were expected to be read faster than -mA attached verbs. Nonetheless, the data did not confirm this expectation; the verbs were read at a similar speed regardless of the nominalizing suffix they were attached to. This finding suggests that the processing complexity of the nominalized verb did not depend on the type of the nominalizer, both -(y)Iş and -mA render similar processing loads on the embedded verb.

6.2 Limitations of the present study and future prospects

To my knowledge, this is the first study that attempts to investigate the effect of GEN-marker on the processing of the POSS-marked word in Turkish. To that end, I acknowledge that the data raised several questions some of which could not be addressed due to the limitations of the study. Below I list these limitations and attempt to sketch some avenues for future research.

i) As the main goal of the present study was to understand the role that the GEN-marked noun played in the processing of the long distance dependencies, we limited our discussion to sentences which contain only one GEN-marked noun. Furthermore it was possible to manipulate its position by placing it in the sentence initial position or right before the POSS-marked noun and that has given us a chance of examining only the role of delay in the working memory. Further research is needed to show whether there are any interference effects or not. An intriguing characteristic of a complex sentence with an embedded clause is that

both the subject of the matrix clause and the subject of the embedded clause are encountered before any verb is reached in the sentence as shown in (1).

(1) Biz [$_{CP1}$öğretmen-in [$_{CP2}$ bütün gün kitap oku-duğ-umuz]-u
we teacher- GEN whole day book read-DIK-POSS.1PL-ACC
bil-me-sin]-i ist-iyor-uz.
know-mA-POSS.3G-ACC want-PROG-1SG.PL
"We want the teacher to know that we read books the whole day."

In (1) the sentence starts with the subject of the matrix clauses which is followed by a GEN-marked noun *öğretmenin* (the teacher's). After the time adverbial and a noun, an embedded verb appears. The first expectation of the parser would be that the embedded verb and the GEN-marked noun would form a dependency; however given that the GEN-marker and the POSS-marker do not agree in person and person, the dependency is not formed, and the parser realizes that the subject of CP2 is actually covert. The dependency with *öğretmenin* (the teacher's) is formed when the second embedded verb *bilmesini* (that he/she knows) is encountered in the sentence. The subject of the matrix clause and that of the CP1 can be changed as shown in (2).

(2) Öğretmen [$_{CP1}$biz-im [$_{CP1}$bütün gün kitap oku-duğ-un]-u

teacher we-GEN whole day book read-DIK-POSS.3SG-ACC

bil-me-miz]-i ist-iyor.

know-mA-POSS.1PL-ACC want-PROG.3SG

"The teacher wants us to know that he/she reads books the whole day."

It would be intriguing to compare the first embedded verb in (1) and (2) to see whether the mismatching GEN-marked noun lead to similar reading latencies.

ii) The results from Experiments 1 and 3 showed that when there is a GEN-marked noun in the sentence, the participants were slower to read the POSS-marked item. To understand whether this delay stems from retrieving the GEN-marked noun from the memory, a task can be designed so that it remains in the focal attention while processing the rest of the sentence. By adapting the dual task paradigm by Fedorenko, Woodbury, and Gibson (2013), participants can be given a cue word to hold in the memory and read a sentence that includes a GEN-POSS long distance dependency. This word can be the GEN-marked noun, or another word from the sentence or an irrelevant word that does not occur in the sentence. The RTs can be compared across conditions to uncover whether the cue word has any effect on processing the POSS-marked item. If the POSS-marked item is read faster when the cue word is the GEN-marked noun, it might show that long distance dependencies are hard to process because the first pair of the dependency is dislocated from the focus of attention, and has to be retrieved from memory upon encountering the second pair reached in the sentence.

A psycholinguistic investigation of the GEN-POSS long distance dependencies in Turkish has enabled to compare three prominent models (locality accounts, anti-locality accounts and content-addressable retrieval). It has also provided a basis for bridging the gap between sentence processing models and formal linguistics. Although the derivation of the GEN-marker is similar in the possessive NPs and non-finite embedded clauses, this study has shown that the GEN-POSS dependencies in the NP domain and those in the VP domain cannot be equated. In the light of the findings, it can be concluded that each long distance dependency might have its own dynamics. Hence, I believe that there is a need for a change of perspective in the current sentence processing models such that all long distance dependencies are not subject to a uniform treatment.

APPENDIX A

SENTENCES FOR EXPERIMENT 1 ($P_{gen}NP$)

1a. Profesörün bütün sabah parkta koşu yaptı diye dizi çok ağrıdı.

1b. Profesör bütün sabah parkta koşu yaptı diye dizi çok ağrıdı.

1c. Profesörün bütün sabah parkta koşu yaptığı için dizi çok ağrıdı.

1d. Profesör bütün sabah parkta koşu yaptığı için dizi çok ağrıdı.

Profesör bütün sabah parkta koştu mu? Y

2a. Şoförün bütün gece otobanda araba kullandı diye dikkati tamamıyla dağılmıştı.

2b. Şoför bütün gece otobanda araba kullandı diye dikkati tamamıyla dağılmıştı.

2c. Şoförün bütün gece otobanda araba kullandığı için dikkati tamamıyla dağılmıştı.

2d. Şoför bütün gece otobanda araba kullandığı için dikkati tamamıyla dağılmıştı.

Şoför bütün gece araba kullandı mı? Y

3a. Öğrencinin tüm dönem derslerde oyun oynadı diye notları epey düşmüştü.

3b. Öğrenci tüm dönem derslerde oyun oynadı diye notları epey düşmüştü.

3c. Öğrencinin tüm dönem derslerde oyun oynadığı için notları epey düşmüştü.

3d. Öğrenci tüm dönem derslerde oyun oynadığı için notları epey düşmüştü.

Öğrenci derslerde müzik dinledi mi? N

4a. İş adamının geçen hafta borsada para kaybetti diye birikimleri fazlasıyla azaldı.

4b. İş adamı geçen hafta borsada para kaybetti diye birikimleri fazlasıyla azaldı.

4c. İş adamının geçen hafta borsada para kaybettiği için birikimleri fazlasıyla azaldı.

4d. İş adamı geçen hafta borsada para kaybettiği için birikimleri fazlasıyla azaldı.

İş adamı geçen ay borsada para kaybetti mi? N

5a. Valinin dün gece davette tatlı yedi diye şekeri birden yükseldi.

5b. Vali dün gece davette tatlı yedi diye şekeri birden yükseldi.

5c. Valinin dün gece davette tatlı yediği için şekeri birden yükseldi.

5d. Vali dün gece davette tatlı yediği için şekeri birden yükseldi.

Vali davette tatlı yedi mi? Y

6a. İstatistikçinin geçen sabah dosyalarda güncelleme yaptı diye bilgisayarı korkunç yavaşladı.

6b. İstatistikçi geçen sabah dosyalarda güncelleme yaptı diye bilgisayarı korkunç yavaşladı.

6c. İstatistikçinin geçen sabah dosyalarda güncelleme yaptığı için bilgisayarı korkunç yavaşladı.

6d. İstatistikçinin geçen sabah dosyalarda güncelleme yaptığı için bilgisayarı korkunç yavaşladı.

İstatistikçi bu sabah dosyalarda güncelleme yaptı mı? N

7a. Araştırmacının bütün gece kütüphanede kitap okudu diye gözleri çok yoruldu.

7b. Araştırmacı bütün gece kütüphanede kitap okudu diye gözleri çok yoruldu.

7a. Araştırmacının bütün gece kütüphanede kitap okuduğu için gözleri çok yoruldu.

7a. Araştırmacının bütün gece kütüphanede kitap okuduğu için gözleri çok yoruldu.

Araştırmacı bütün gece film seyretti mi? N

8a. Yöneticinin geçen hafta denetimde stres yaptı diye sivilceleri nispeten arttı.

8b. Yönetici geçen hafta denetimde stres yaptı diye sivilceleri nispeten arttı.

8c. Yöneticinin geçen hafta denetimde stres yaptığı için sivilceleri nispeten arttı.

8d. Yönetici geçen hafta denetimde stres yaptığı için sivilceleri nispeten arttı.

Yönetici denetimde stres yaptı mı? Y

9a. Gazetecinin onca yıl her yerde sigara içti diye ciğerleri tamamen iflas etmişti.

9b. Gazeteci onca yıl her yerde sigara içti diye ciğerleri tamamen iflas etmişti.

9c. Gazetecinin onca yıl her yerde sigara içtiği için ciğerleri tamamen iflas etmişti.

9d. Gazeteci onca yıl her yerde sigara içtiği için ciğerleri tamamen iflas etmişti.

Gazeteci her yerde sigara içti mi? Y

10a. Dansçının geçen Cuma barda sarhoş oldu diye midesi bayağı bulandı.

10b. Dansçı geçen Cuma barda sarhoş oldu diye midesi bayağı bulandı.

10c. Dansçının geçen Cuma barda sarhoş olduğu için midesi bayağı bulandı.

10d. Dansçının geçen Cuma barda sarhoş olduğu için midesi bayağı bulandı.

Dansçı restoranda sarhoş oldu mu? N

11a. Şarkıcının geçen Pazar konserde türkü söyledi diye sesi hepten kısıldı.

11b. Şarkıcı geçen Pazar konserde türkü söyledi diye sesi hepten kısıldı.

11c. Şarkıcının geçen Pazar konserde türkü söylediği için sesi hepten kısıldı.

11d. Şarkıcı geçen Pazar konserde türkü söylediği için sesi hepten kısıldı.

Şarkıcı konserde türkü söyledi mi? Y

12a. Ev hanımının hafta sonu tavada balık kızarttı diye mutfağı hala kokuyor.

12b. Ev hanımı hafta sonu tavada balık kızarttı diye mutfağı hala kokuyor.

12c. Ev hanımının hafta sonu tavada balık kızarttı diye mutfağı hala kokuyor.

12d. Ev hanımı hafta sonu tavada balık kızarttı diye mutfağı hala kokuyor.

Ev hanımı tavada tavuk kızarttı mı? N

13a. Editörün dün gece evde parti verdi diye salonu feci kirlendi.

13b. Editör dün gece evde parti verdi diye salonu feci kirlendi.

13c. Editörün dün gece evde parti verdiği için salonu feci kirlendi.

13d. Editör dün gece evde parti verdiği için salonu feci kirlendi.

Editörün evi feci kirlendi mi? Y

14a. Memurun her sabah dışarıda kahvaltı etti diye parası çabucak bitmiş.

14b. Memur her sabah dışarıda kahvaltı etti diye parası çabucak bitmiş.

14c. Memurun her sabah dışarıda kahvaltı ettiği için parası çabucak bitmiş.

14d. Memurun her sabah dışarıda kahvaltı ettiği için parası çabucak bitmiş.

Memurun parası yavaş yavaş bitti mi? N

15a. Postacının bu sabah fırtınada dışarı çıktı diye şemsiyesi birden kırıldı.

15b. Postacı bu sabah fırtınada dışarı çıktı diye şemsiyesi birden kırıldı.

15c. Postacının bu sabah fırtınada dışarı çıktığı için şemsiyesi birden kırıldı.

15d. Postacının bu sabah fırtınada dışarı çıktığı için şemsiyesi birden kırıldı.

Postacı fırtınada dışarı çıktı mı? Y

16a. Kiracının iki ay terasta susuz bıraktı diye çiçekleri tamamen kurudu.

16b. Kiracı iki ay terasta susuz bıraktı diye çiçekleri tamamen kurudu.

16c. Kiracının iki ay terasta susuz bıraktığı için çiçekleri tamamen kurudu.

16d. Kiracının iki ay terasta susuz bıraktığı için çiçekleri tamamen kurudu.

Çiçekler odada mıydı? N

17a. Aktrisin her sabah evde fön çekti diye saçları oldukça yıprandı.

17b. Aktrisin her sabah evde fön çekti diye saçları oldukça yıprandı.

17c. Aktrisin her sabah evde fön çektiği için saçları oldukça yıprandı.

17d. Aktrisin her sabah evde fön çekti diye saçları oldukça yıprandı.

Aktris her sabah fön çekti mi? Y

18a.Temizlikçinin bütün gün restoranda bulaşık yıkadı diye elleri tamamen buruştu.

18b. Temizlikçi bütün gün restoranda bulaşık yıkadı diye elleri tamamen buruştu.

18c.Temizlikçinin bütün gün restoranda bulaşık yıkadığı için elleri tamamen buruştu.

18d. Temizlikçi bütün gün restoranda bulaşık yıkadığı için elleri tamamen buruştu.

Temizlikçi evde bulaşık yıkadı mı? N

19a.Kapıcının geçen sene Ramazan'da izin kullandı diye maaşı bir hayli düştü.

19b.Kapıcı geçen sene Ramazan'da izin kullandı diye maaşı bir hayli düştü.

19c.Kapıcının geçen sene Ramazan'da izin kullandı diye maaşı bir hayli düştü.

19d.Kapıcı geçen sene Ramazan'da izin kullandı diye maaşı bir hayli düştü.

Kapıcının maaşı biraz düştü mü? N

20a.Yönetmenin tüm sezon çekimlerde dublör kullandı diye programı acımasızca eleştirildi.

20b.Yönetmen tüm sezon çekimlerde dublör kullandı diye programı acımasızca eleştirildi.

20c.Yönetmenin tüm sezon çekimlerde dublör kullandığı için programı acımasızca eleştirildi.

20d.Yönetmen tüm sezon çekimlerde dublör kullandığı için programı acımasızca eleştirildi.

Yönetmenin programı eleştirildi mi? Y

21a.Sekreterin bütün gün telefonda mesaj yazdı diye şarjı sonunda bitti.

21b.Sekreter bütün gün telefonda mesaj yazdı diye şarjı sonunda bitti.

21c.Sekreterin bütün gün telefonda mesaj yazdığı için şarjı sonunda bitti.

21d.Sekreter bütün gün telefonda mesaj yazdığı için şarjı sonunda bitti.

Sekreter bütün gün telefonda mesaj yazdı mı? Y

22a.Politikacının her akşam yemekte rakı içti diye sağlığı gitgide bozulmuştu.

22b.Politikacı her akşam yemekte rakı içti diye sağlığı gitgide bozulmuştu.

22c.Politikacının her akşam yemekte rakı içtiği için sağlığı gitgide bozulmuştu.

22d.Politikacı her akşam yemekte rakı içtiği için sağlığı gitgide bozulmuştu.

Politikacı yemeklerde şarap içti mi? N

23a.Muhasebecinin geçen sene satışlarda vergi kaçırdı diye kontratı hemen sonlandırıldı.

23b.Muhasebeci geçen sene satışlarda vergi kaçırdı diye kontratı hemen sonlandırıldı.

23c.Muhasebecinin geçen sene satışlarda vergi kaçırdığı için kontratı hemen sonlandırıldı.

23d.Muhasebeci geçen sene satışlarda vergi kaçırdığı için kontratı hemen sonlandırıldı.

Muhasebecinin kontratı sonlandırıldı mı? Y

24a.Sporcunun bu hafta antrenmanda olay çıkardı diye sözleşmesi anında feshedildi.

24b.Sporcu bu hafta antrenmanda olay çıkardı diye sözleşmesi anında feshedildi.

24c.Sporcunun bu hafta antrenmanda olay çıkardığı için sözleşmesi anında feshedildi.

24d.Sporcu bu hafta antrenmanda olay çıkardığı için sözleşmesi anında feshedildi.

Sporcu geçen hafta olay çıkardı mı? N

APPENDIX B

SENTENCES FOR EXPERIMENT 2 (P_{gen}DV)

1a. Stajyer bütün hafta çizim yaparak projeyi teslim edişiyle ofisteki mimarları memnun etti.

1b. Stajyerin bütün hafta çizim yaparak projeyi teslim edişiyle ofisteki mimarlar memnun oldu.

1c. Stajyer bütün hafta çizim yaparak projeyi teslim etmesiyle ofisteki mimarları memnun etti.

1d. Stajyerin bütün hafta çizim yaparak projeyi teslim etmesiyle ofisteki mimarlar memnun oldu.

Stajyer projeyi teslim etti mi? Y

2a. Öğrencim tüm dönem ders çalışarak sınavı geçişiyle okuldaki öğretmenleri mutlu etti.

2b. Öğrencinin tüm dönem ders çalışarak sınavı geçişiyle okuldaki öğretmenler mutlu oldu.

2c. Öğrenci tüm dönem ders çalışarak sınavı geçmesiyle okuldaki öğretmenleri mutlu etti.

2d. Öğrencinin tüm dönem ders çalışarak sınavı geçmesiyle okuldaki öğretmenler mutlu oldu.

Öğrenci sınavdan kaldı mı? N

3a. Resepsiyonist gece yarısı yanlışlık yaparak alarmı çalıştırışıyla oteldeki herkesi uyandırdı.

3b. Resepsiyonistin gece yarısı yanlışlık yaparak alarmı çalıştırışıyla oteldeki herkes uyandı.

3c. Resepsiyonist gece yarısı yanlışlık yaparak alarmı çalıştırmasıyla oteldeki herkesi uyandırdı.

3d. Resepsiyonistin gece yarısı yanlışlık yaparak alarmı çalıştırmasıyla oteldeki herkes uyandı.

Resepsiyonist alarmı sabah mı çalıştırdı? N

4a. Madenci bütün yıl mesai yaparak borcu kapatışıyla memleketteki ailesine bayram ettirdi.

4b. Madencinin bütün yıl mesai yaparak borcu kapatışıyla memleketteki ailesi bayram etti.

4c. Madenci bütün yıl mesai yaparak borcu kapatmasıyla memleketteki ailesini bayram ettirdi.

4d. Madencinin bütün yıl mesai yaparak borcu kapatmasıyla memleketteki ailesi bayram etti.

Madenci borcu kapattı mı? Y

5a. Kapıcı dün akşam mangal yaparak komşuları rahatsız edişiyle apartmandaki yöneticiyi çıldırttı.

5b. Kapıcının dün akşam mangal yaparak komşuları rahatsız edişiyle apartmandaki yönetici çıldırdı.

5c. Kapıcı dün akşam mangal yaparak komşuları rahatsız etmesiyle apartmandaki yöneticiyi çıldırttı.

5d. Kapıcının dün akşam mangal yaparak komşuları rahatsız etmesiyle apartmandaki yönetici çıldırdı.

Mangal yapan kapıcı mıydı? Y

6a. Profesör geçen ay yarışa katılarak maratonu tamamlayışıyla okuldaki herkesi gururlandırdı.

6b. Profesörün geçen ay yarışa katılarak maratonu tamamlayışıyla okuldaki herkes gururlandı.

6c. Profesör geçen ay yarışa katılarak maratonu tamamlamasıyla okuldaki herkesi gururlandırdı.

6d. Profesörün geçen ay yarışa katılarak maratonu tamamlamasıyla okuldaki herkes gururlandı.

Profesör geçen ay maraton koştu mu ? Y

7a. İş adamı geçen ay kumar oynayarak sermayeyi kaybedişiyle fabrikadaki çalışanları perişan etti.

7b. İş adamının geçen ay kumar oynayarak sermayeyi kaybedişiyle fabrikadaki çalışanlar perişan oldu.

7c. İş adamı geçen ay kumar oynayarak sermayeyi kaybetmesiyle fabrikadaki çalışanları perişan etti.

7d. İş adamının geçen ay kumar oynayarak sermayeyi kaybetmesiyle fabrikadaki çalışanlar perişan oldu.

İş adamı kumarda para kazandı mı? N

8a. Editör bu hafta istifa ederek dergiyi bırakışıyla medyadaki herkesi telaşlandırdı.

8b. Editörün bu hafta istifa ederek dergiyi bırakışıyla medyadaki herkes telaşlandı.

8c.Editör bu hafta istifa ederek dergiyi bırakmasıyla medyadaki herkesi telaşlandırdı.

8d. Editörün bu hafta istifa ederek dergiyi bırakmasıyla medyadaki herkes telaşlandı.

Editör dergiyi bıraktı mı? Y

9a. Asistan geçen ay sıkı çalışarak tezi bitirişiyle bölümdeki hocaları rahatlattı.

9b. Asistanın geçen ay sıkı çalışarak tezi bitirişiyle bölümdeki hocalar rahatladı.

9c. Asistan geçen ay sıkı çalışarak tezi bitirmesiyle bölümdeki hocaları rahatlattı.

9d. Asistanın geçen ay sıkı çalışarak tezi bitirmesiyle bölümdeki hocalar rahatladı.

Asistan tezi yarım bıraktı mı? N

10a. Sunucu dün sabah tartışma çıkararak yayını terkedişiyle stüdyodaki konukları hayrete düşürdü.

10b. Sunucunun dün sabah tartışma çıkararak yayını terkedişiyle stüdyodaki konuklar hayrete düştü.

10c. Sunucu dün sabah tartışma çıkararak yayını terketmesiyle stüdyodaki konukları hayrete düşürdü.

10d. Sunucunun dün sabah tartışma çıkararak yayını terketmesiyle stüdyodaki konuklar hayrete düştü.

Yayını terkeden sunucu muydu? Y

11a. Başsavcı bu hafta toplantı düzenleyerek yenilikleri açıklayışıyla salondaki gazetecileri heyecanlandırdı.

11b. Başsavcının bu hafta toplantı düzenleyerek yenilikleri açıklayışıyla salondaki gazeteciler heyecanlandı.

11c. Başsavcı bu hafta toplantı düzenleyerek yenilikleri açıklamasıyla salondaki gazetecileri heyecanlandırdı.

11d. Başsavcının bu hafta toplantı düzenleyerek yenilikleri açıklamasıyla salondaki gazeteciler heyecanlandı.

Başsavcının açıklaması hakimleri mi heyecanlandırdı? N

12a. Pazarcı bütün hafta meyve satarak parayı denkleştirişiyle kasabadaki alacaklıları sevindirdi.

12b. Pazarcının bütün hafta meyve satarak parayı denkleştirişiyle kasabadaki alacaklılar sevindi.

12c. Pazarcı bütün hafta meyve satarak parayı denkleştirmesiyle kasabadaki alacaklıları sevindirdi.

12d. Pazarcının bütün hafta meyve satarak parayı denkleştirmesiyle kasabadaki alacaklılar sevindi.

Pazarcı giysi mi sattı? N

13a. Ev sahibi dün sabah usta getirerek kombiyi değiştirişiyle evdeki kiracıyı rahat ettirdi.

13b. Ev sahibinin dün sabah usta getirerek kombiyi değiştirişiyle evdeki kiracı rahat etti.

13c. Ev sahibi dün sabah usta getirerek kombiyi değiştirmesiyle evdeki kiracıyı rahat ettirdi.

13d. Ev sahibinin dün sabah usta getirerek kombiyi değiştirmesiyle evdeki kiracı rahat etti.

Kombi değişti mi? Y

14a. Sekreter bütün sabah oyun oynayarak raporları geciktirişiyle şirketteki yöneticileri rezil etti.

14b. Sekreterin bütün sabah oyun oynayarak raporları geciktirişiyle şirketteki yöneticiler rezil oldu.

14c. Sekreter bütün sabah oyun oynayarak raporları geciktirmesiyle şirketteki yöneticileri rezil etti.

14d. Sekreterin bütün sabah oyun oynayarak raporları geciktirmesiyle şirketteki yöneticiler rezil oldu.

Sekreter raporları zamanında hazırladı mı? N

15a. Belediye başkanı geçen yaz fevri davranarak kiliseyi yıktırışıyla mahalledeki herkesi şok etti.

15b. Belediye başkanının geçen yaz fevri davranarak kiliseyi yıktırışıyla mahalledeki herkes şok oldu.

15c. Belediye başkanı geçen yaz fevri davranarak kiliseyi yıktırmasıyla mahalledeki herkesi şok etti.

15d. Belediye başkanının yaz fevri davranarak kiliseyi belediye başkanının yıktırmasıyla mahalledeki herkes şok oldu.

Belediye başkanı kiliseyi restore ettirdi mi? N

16a. Dalgıç bütün hafta dalış yaparak enkazı arayışıyla müzedeki yetkilileri umutlandırdı.

16b. Dalgıcın bütün hafta dalış yaparak enkazı arayışıyla müzedeki yetkililer umutlandı.

16c. Dalgıç bütün hafta dalış yaparak enkazı aramasıyla müzedeki yetkililer umutlandırdı.

16d. Dalgıcın bütün hafta dalış yaparak enkazı aramasıyla müzedeki yetkililer umutlandı.

Enkazı arayan dalgıç mıydı? Y

17a. Gazeteci bütün ay röportaj yaparak yazı dizisini hazırlayışıyla dergideki editörleri rahatlattı.

17b. Gazetecinin bütün ay röportaj yaparak yazı dizisini hazırlayışıyla dergideki editörler rahatladı.

17c. Gazeteci bütün ay röportaj yaparak yazı dizisini hazırlamasıyla dergideki editörleri rahatlattı.

17d. Gazetecinin bütün ay röportaj yaparak yazı dizisini hazırlamasıyla dergideki editörler rahatladı.

Yazı dizisi hazır mı? Y

18a. Vali geçen hafta kılık değiştirerek pazarları denetleyişiyle şehirdeki esnafı tedirgin etti.

18b. Valinin geçen hafta kılık değiştirerek pazarları denetleyişiyle şehirdeki esnaf tedirgin oldu.

18c. Vali geçen hafta kılık değiştirerek pazarları denetlemesiyle şehirdeki esnafı tedirgin etti.

18d. Valinin geçen hafta kılık değiştirerek pazarları denetlemesiyle şehirdeki esnaf tedirgin oldu.

Çarşıları denetleyen zabıta mıydı? N

19a. Bağımlı hafta sonu kriz geçirerek telefonu fırlatışıyla terapideki hastaları şoka soktu.

19b. Bağımlının hafta sonu kriz geçirerek telefonu fırlatışıyla terapideki hastalar şoka girdi.

19c. Bağımlı hafta sonu kriz geçirerek telefonu fırlatmasıyla terapideki hastaları şoka soktu.

19d. Bağımlının hafta sonu kriz geçirerek telefonu fırlatmasıyla terapideki hastalar şoka girdi.

Terapide hastalar var mıydı? Y

20a. Okul korosu bütün yıl prova yaparak yarışmayı kazanışıyla kulüpteki üyeleri muradına erdirdi.

20b. Okul korosunun bütün yıl prova yaparak yarışmayı kazanışıyla kulüpteki üyeler muradına erdi.

20c. Okul korosu bütün yıl prova yaparak yarışmayı kazanmasıyla kulüpteki üyeleri muradına erdirdi.

20d. Okul korosunun bütün yıl prova yaparak yarışmayı kazanmasıyla kulüpteki üyeler muradına erdi.

Okul korosu sadece bir hafta mı prova yaptı? N

21a. Yönetmen geçen Cuma geç kalarak galayı kaçırışıyla filmdeki oyuncuları hayrete düşürdü.

21b. Yönetmenin geçen Cuma geç kalarak galayı kaçırışıyla filmdeki oyuncular hayrete düştü.

21c. Yönetmen geçen Cuma geç kalarak galayı kaçırmasıyla filmdeki oyuncuları hayrete düşürdü.

21d.Yönetmenin geçen Cuma geç kalarak galayı kaçırmasıyla filmdeki oyuncular hayrete düştü.

Geç kalan oyuncular mıydı? N

22a. Şarkıcı bütün yaz tedavi görerek alkolü azaltışıyla ülkedeki hayranlarını sevindirdi.

22b. Şarkıcının bütün yaz tedavi görerek alkolü azaltışıyla ülkedeki hayranları sevindi.

22c. Şarkıcı bütün yaz tedavi görerek alkolü azaltmasıyla ülkedeki hayranlarını sevindirdi.

22d. Şarkıcının bütün yaz tedavi görerek alkolü azaltmasıyla ülkedeki hayranları sevindi.

Şarkıcı tedavi gördü mü? Y

23a. Bahçıvan geçen hafta ağaç dikerek bahçeyi güzelleştirişiyle sitedeki yaşlıları mutlu etti.

23b. Bahçıvanın geçen hafta ağaç dikerek bahçeyi güzelleştirişiyle sitedeki yaşlılar mutlu oldu.

23c. Bahçıvan geçen hafta ağaç dikerek bahçeyi güzelleştirmesiyle sitedeki yaşlıları mutlu etti.

23d. Bahçıvanın geçen hafta ağaç dikerek bahçeyi güzelleştirmesiyle sitedeki yaşlılar mutlu oldu.

Sitedeki yaşlılar rahatsız oldu mu? N

24a. Komutan dün gece çatışmaya girip teröristleri yakalayışıyla karargahtaki askerleri cesaretlendirdi.

24b. Komutanın dün gece çatışmaya girip teröristleri yakalayışıyla karargahtaki askerler cesaretlendi.

24c. Komutan dün gece çatışmaya girip teröristleri yakalamasıyla karargahtaki askerleri cesaretlendirdi.

24d. Komutanın dün gece çatışmaya girip teröristleri yakalamasıyla karargahtaki askerler cesaretlendi.

Askerler cesaretlendi mi? Y

APPENDIX C

SENTENCES FOR EXPERIMENT 3 ($D_{gen}NP$)

1a. Bütün sabah parkta koşu yaptı diye profesörün dizi çok ağrıdı.

1b. Bütün sabah parkta profesörün koşu yaptı diye dizi çok ağrıdı.

1c. Bütün sabah profesörün parkta koşu yaptı diye dizi çok ağrıdı.

1d. Profesörün bütün sabah parkta koşu yaptı diye dizi çok ağrıdı.

Profesör bütün sabah parkta koştu mu? Y

2a. Bütün gece otobanda araba kullandı diye şoförün dikkati tamamıyla dağılmıştı.

2b. Bütün gece otobanda şoförün araba kullandı diye dikkati tamamıyla dağılmıştı.

2c. Bütün gece şoförün otobanda araba kullandı diye dikkati tamamıyla dağılmıştı.

2d. Şoförün bütün gece otobanda araba kullandı diye dikkati tamamıyla dağılmıştı.

Şoför bütün gece araba kullandı mı? Y

3a. Tüm dönem derslerde oyun oynadı diye öğrencinin notları epey düştü.

3b. Tüm dönem derslerde öğrencinin oyun oynadı diye notları epey düştü.

3c. Tüm dönem öğrencinin derslerde oyun oynadı diye notları epey düştü.

3d. Öğrencinin tüm dönem derslerde oyun oynadı diye notları epey düştü.

Öğrenci derslerde müzik dinledi mi? N

4a. Geçen hafta borsada para kaybetti diye iş adamının birikimleri fazlasıyla azaldı.

4b. Geçen hafta borsada iş adamının para kaybetti diye birikimleri fazlasıyla azaldı.

4c. Geçen hafta iş adamının borsada para kaybetti diye birikimleri fazlasıyla azaldı.

4d. İş adamının geçen hafta borsada para kaybetti diye birikimleri fazlasıyla azaldı.

İş adamı geçen ay borsada para kaybetti mi? N

5a. Dün gece davette tatlı yedi diye valinin şekeri birden yükseldi.

5b. Dün gece davette valinin tatlı yedi diye şekeri birden yükseldi.

5c. Dün gece valinin davette tatlı yedi diye şekeri birden yükseldi.

5d. Valinin dün gece davette tatlı yedi diye şekeri birden yükseldi.

Vali davette tatlı yedi mi? Y

6a. Geçen sabah dosyalarda güncelleme yaptı diye istatistikçinin bilgisayarı korkunç yavaşladı.

6b. Geçen sabah dosyalarda istatistikçinin güncelleme yaptı diye bilgisayarı korkunç yavaşladı.

6c. Geçen sabah istatistikçinin dosyalarda güncelleme yaptı diye bilgisayarı korkunç yavaşladı.

6d. İstatistikçinin geçen sabah dosyalarda güncelleme yaptı diye bilgisayarı korkunç yavaşladı.

İstatistikçi bu sabah dosyalarda güncelleme yaptı mı? N

7a. Bütün gece kütüphanede kitap okudu diye araştırmacının gözleri çok yoruldu.

7b. Bütün gece kütüphanede araştırmacının kitap okudu diye gözleri çok yoruldu.

7c. Bütün gece araştırmacının kütüphanede kitap okudu diye gözleri çok yoruldu.

7d. Araştırmacının bütün gece kütüphanede kitap okudu diye gözleri çok yoruldu.

Araştırmacı bütün gece film seyretti mi? N

8a. Geçen hafta denetimde stres yaptı diye yöneticinin sivilceleri nispeten arttı.

8b. Geçen hafta denetimde yöneticinin stres yaptı diye sivilceleri nispeten arttı.

8c. Geçen hafta yöneticinin denetimde stres yaptı diye sivilceleri nispeten arttı.

8d. Yöneticinin geçen hafta denetimde stres yaptı diye sivilceleri nispeten arttı.

Yönetici denetimde stres yaptı mı? Y

9a. Onca yıl her yerde sigara içti diye gazetecinin ciğerleri tamamen iflas etmişti.

9b. Onca yıl her yerde gazetecinin sigara içti diye ciğerleri tamamen iflas etmişti.

9c. Onca yıl gazetecinin her yerde sigara içti diye ciğerleri tamamen iflas etmişti.

9d. Gazetecinin onca yıl her yerde sigara içti diye ciğerleri tamamen iflas etmişti.

Gazeteci her yerde sigara içti mi? Y

10a. Geçen Cuma barda sarhoş oldu diye dansçının midesi bayağı bulandı.

10b. Geçen Cuma barda dansçının sarhoş oldu diye midesi bayağı bulandı.

10c. Geçen Cuma dansçının barda sarhoş oldu diye midesi bayağı bulandı.

10d. Dansçının geçen Cuma barda sarhoş oldu diye midesi bayağı bulandı.

Dansçı restoranda sarhoş oldu mu? N

11a. Geçen Pazar konserde türkü söyledi diye şarkıcının sesi hepten kısıldı.

11b. Geçen Pazar konserde şarkıcının türkü söyledi diye sesi hepten kısıldı.

11c. Geçen Pazar şarkıcının konserde türkü söyledi diye sesi hepten kısıldı.

11d. Şarkıcının geçen Pazar konserde türkü söyledi diye sesi hepten kısıldı.

Şarkıcı konserde türkü söyledi mi? Y

12a. Hafta sonu ocakta balık kızarttı diye ev hanımının mutfağı hala kokuyor.

12b. Hafta sonu ocakta ev hanımının balık kızarttı diye mutfağı hala kokuyor.

12c. Hafta sonu ocakta tavada balık kızarttı diye mutfağı hala kokuyor.

12d. Ev hanımının hafta sonu ocakta balık kızarttı diye mutfağı hala kokuyor.

Ev hanımı tavada tavuk kızarttı mı? N

13a. Dün gece evde parti verdi diye editörün salonu feci kirlendi.

13b. Dün gece evde editörün parti verdi diye salonu feci kirlendi.

13c. Dün gece editörün evde parti verdi diye salonu feci kirlendi.

13d. Editörün dün gece evde parti verdi diye salonu feci kirlendi.

Editörün evi feci kirlendi mi? Y

14a. Her sabah dışarıda kahvaltı etti diye memurun parası çabucak bitmiş.

14b. Her sabah dışarıda memurun kahvaltı etti diye parası çabucak bitmiş.

14c. Her sabah memurun dışarıda kahvaltı etti diye parası çabucak bitmiş.

14d. Memurun her sabah dışarıda kahvaltı etti diye parası çabucak bitmiş.

Memurun parası yavaş yavaş bitti mi? N

15a. Bu sabah fırtınada dışarı çıktı diye postacının şemsiyesi birden kırıldı.

15b. Bu sabah fırtınada postacının dışarı çıktı diye şemsiyesi birden kırıldı.

15c. Bu sabah postacının fırtınada dışarı çıktı diye şemsiyesi birden kırıldı.

15d. Postacının bu sabah fırtınada dışarı çıktı diye şemsiyesi birden kırıldı.

Postacı fırtınada dışarı çıktı mı? Y

16a. İki ay terasta susuz bıraktı diye kiracının çiçekleri tamamen kurudu.

16b. İki ay terasta kiracının susuz bıraktı diye çiçekleri tamamen kurudu.

16c. İki ay kiracının terasta susuz bıraktı diye çiçekleri tamamen kurudu.

16d. Kiracının iki ay terasta susuz bıraktı diye çiçekleri tamamen kurudu.

Çiçekler odada mıydı? N

17a. Her sabah evde fön çekti diye aktrisin saçları oldukça yıprandı.

17b. Her sabah evde aktrisin fön çekti diye saçları oldukça yıprandı.

17c. Her sabah aktrisin evde fön çekti diye saçları oldukça yıprandı.

17d. Aktrisin her sabah evde fön çekti diye saçları oldukça yıprandı.

Aktris her sabah fön çekti mi? Y

18a. Bütün gün restoranda bulaşık yıkadı diye temizlikçinin elleri tamamen buruştu.

18b. Bütün gün restoranda temizlikçinin bulaşık yıkadı diye elleri tamamen buruştu.

18c. Bütün gün temizlikçinin restoranda bulaşık yıkadı diye elleri tamamen buruştu.

18d. Temizlikçinin bütün gün restoranda bulaşık yıkadı diye elleri tamamen buruştu.

Temizlikçi evde bulaşık yıkadı mı? N

19a. Geçen sene Ramazan'da izin kullandı diye kapıcının maaşı bir hayli düştü.

19b. Geçen sene Ramazan'da kapıcının izin kullandı diye maaşı bir hayli düştü.

19c. Geçen sene kapıcının Ramazan'da izin kullandı diye maaşı bir hayli düştü.

19d. Kapıcının geçen sene Ramazan'da izin kullandı diye maaşı bir hayli düştü.

Kapıcının maaşı yükseldi mi? N

20a. Tüm sezon çekimlerde dublör kullandı diye yönetmenin programı acımasızca eleştirildi.

20b. Tüm sezon çekimlerde yönetmenin dublör kullandı diye programı acımasızca eleştirildi.

20c. Tüm sezon yönetmenin çekimlerde dublör kullandı diye programı acımasızca eleştirildi.

20d. Yönetmenin tüm sezon çekimlerde dublör kullandı diye programı acımasızca eleştirildi.

Yönetmenin programı eleştirildi mi? Y

21a. Bütün gün telefonda mesaj yazdı diye sekreterin şarjı sonunda bitti.

21b. Bütün gün telefonda sekreterin mesaj yazdı diye şarjı sonunda bitti.

21c. Bütün gün sekreterin telefonda mesaj yazdı diye şarjı sonunda bitti.

21d. Sekreterin bütün gün telefonda mesaj yazdı diye şarjı sonunda bitti.

Sekreter bütün gün telefonda mesaj yazdı mı? Y

22a. Her akşam yemeklerde rakı içti diye politikacının sağlığı gitgide bozulmuştu.

22b. Her akşam yemeklerde politikacının rakı içti diye sağlığı gitgide bozulmuştu.

22c. Her akşam politikacının yemeklerde rakı içti diye sağlığı gitgide bozulmuştu.

22d. Politikacının her akşam yemeklerde rakı içti diye sağlığı gitgide bozulmuştu.

Politikacı yemeklerde şarap içti mi? N

23a. Geçen sene satışlarda vergi kaçırdı diye muhasebecinin kontratı hemen sonlandırıldı.

23b. Geçen sene satışlarda muhasebecinin vergi kaçırdı diye kontratı hemen sonlandırıldı.

23c. Geçen sene muhasebecinin satışlarda vergi kaçırdı diye kontratı hemen sonlandırıldı.

23d. Muhasebecinin geçen sene satışlarda vergi kaçırdı diye kontratı hemen sonlandırıldı.

Muhasebecinin kontratı sonlandırıldı mı? Y

24a. Bu hafta antrenmanda olay çıkardı diye sporcunun sözleşmesi anında feshedildi.

24b. Bu hafta antrenmanda sporcunun olay çıkardı diye sözleşmesi anında feshedildi.

24c. Bu hafta sporcunun antrenmanda olay çıkardı diye sözleşmesi anında feshedildi.

24d. Sporcunun bu hafta antrenmanda olay çıkardı diye sözleşmesi anında feshedildi.

Sporcu geçen hafta olay çıkardı mı? N

APPENDIX D

SENTENCES FOR EXPERIMENT 4 ($D_{gen}DV$)

1a.Stajyerin bütün hafta çizim yaparak projeyi teslim etmesiyle ofisteki mimarlar memnun oldu.

1b.Bütün hafta stajyerin çizim yaparak projeyi teslim etmesiyle ofisteki mimarlar memnun oldu

1c.Bütün hafta çizim yaparak stajyerin projeyi teslim etmesiyle ofisteki mimarlar memnun oldu.

1d.Bütün hafta çizim yaparak projeyi stajyerin teslim etmesiyle ofisteki mimarlar memnun oldu.

Stajyer projeyi teslim etti mi? Y

2a.Öğrencinin tüm dönem ders çalışarak sınavı geçmesiyle okuldaki öğretmenler mutlu oldu.

2b.Tüm dönem öğrencinin ders çalışarak sınavı geçmesiyle okuldaki öğretmenler mutlu oldu.

2c.Tüm dönem ders çalışarak öğrencinin sınavı geçmesiyle okuldaki öğretmenler mutlu oldu.

2d.Tüm dönem ders çalışarak sınavı öğrencinin geçmesiyle okuldaki öğretmenler mutlu oldu.

Öğrenci sınavdan kaldı mı? N

3a.Resepsiyonistin gece yarısı yanlışlık yaparak alarmı çalıştırmasıyla oteldeki herkes uyandı.

3b.Gece yarısı resepsiyonistin yanlışlık yaparak alarmı çalıştırmasıyla oteldeki herkes uyandı.

3c.Gece yarısı yanlışlık yaparak resepsiyonistin alarmı çalıştırmasıyla oteldeki herkes uyandı.

3d.Gece yarısı yanlışlık yaparak alarmı resepsiyonistin çalıştırmasıyla oteldeki herkes uyandı.

Resepsiyonist alarmı sabah mı çalıştırdı? N

4a.Madencinin bütün yıl mesai yaparak borcu kapatmasıyla memleketteki ailesi bayram etti.

4b.Bütün yıl madencinin mesai yaparak borcu kapatmasıyla memleketteki ailesi bayram etti.

4c.Bütün yıl mesai yaparak madencinin borcu kapatmasıyla memleketteki ailesi bayram etti.

4d.Bütün yıl mesai yaparak borcu madencinin kapatmasıyla memleketteki ailesi bayram etti.

Madenci borcu kapattı mı? Y

5a.Kapıcının dün akşam mangal yaparak komşuları rahatsız etmesiyle apartmandaki yönetici çıldırdı.

5b.Dün akşam kapıcının mangal yaparak komşuları rahatsız etmesiyle apartmandaki yönetici çıldırdı.

5c.Dün akşam mangal yaparak kapıcının komşuları rahatsız etmesiyle apartmandaki yönetici çıldırdı.

5d.Dün akşam mangal yaparak komşuları kapıcının rahatsız etmesiyle apartmandaki yönetici çıldırdı.

Mangal yapan kapıcı mıydı? Y

6a.Profesörün geçen ay yarışa katılarak maratonu tamamlamasıyla okuldaki herkes gururlandı.

6b.Geçen ay profesörün yarışa katılarak maratonu tamamlamasıyla okuldaki herkes gururlandı.

6c.Geçen ay yarışa katılarak profesörün maratonu tamamlamasıyla okuldaki herkes gururlandı.

6d.Geçen ay yarışa katılarak maratonu profesörün tamamlamasıyla okuldaki herkes gururlandı.

Profesör geçen ay maraton koştu mu ? Y

7a.İş adamının geçen ay kumar oynayarak sermayeyi kaybetmesiyle fabrikadaki çalışanlar perişan oldu.

7b.Geçen ay iş adamının kumar oynayarak sermayeyi kaybetmesiyle fabrikadaki çalışanlar perişan oldu.

7c.Geçen ay kumar oynayarak iş adamının sermayeyi kaybetmesiyle fabrikadaki çalışanlar perişan oldu.

7d.Geçen ay kumar oynayarak sermayeyi iş adamının kaybetmesiyle fabrikadaki çalışanlar perişan oldu.

İş adamı kumarda para kazandı mı? N

8a.Editörün bu hafta istifa ederek dergiyi bırakmasıyla medyadaki herkes telaşlandı.

8b.Bu hafta editörün istifa ederek dergiyi bırakmasıyla medyadaki herkes telaşlandı.

8c.Bu hafta istifa ederek editörün dergiyi bırakmasıyla medyadaki herkes telaşlandı.

8d.Bu hafta istifa ederek dergiyi editörün bırakmasıyla medyadaki herkes telaşlandı.

Editör dergiyi bıraktı mı? Y

9a.Asistanın geçen ay sıkı çalışarak tezi bitirmesiyle bölümdeki hocalar rahatladı.

9b.Geçen ay asistanın sıkı çalışarak tezi bitirmesiyle bölümdeki hocalar rahatladı.

9c.Geçen ay sıkı çalışarak asistanın tezi bitirmesiyle bölümdeki hocalar rahatladı.

9d.Geçen ay sıkı çalışarak tezi asistanın bitirmesiyle bölümdeki hocalar rahatladı.

Asistan tezi yarım bıraktı mı? N

10a.Sunucunun dün sabah tartışma çıkararak yayını terketmesiyle stüdyodaki konuklar üzüldü.

10b.Dün sabah sunucunun tartışma çıkararak yayını terketmesiyle stüdyodaki konuklar üzüldü.

10c.Dün sabah tartışma çıkararak sunucunun yayını terketmesiyle stüdyodaki konuklar üzüldü.

10d.Dün sabahtartışma çıkararak yayını sunucunun terketmesiyle stüdyodaki konuklar üzüldü.

Yayını terkeden sunucu muydu? Y

11a.Başsavcının bu hafta toplantı düzenleyerek yenilikleri açıklamasıyla salondaki gazeteciler heyecanlandı.

11b.Bu hafta başsavcının toplantı düzenleyerek yenilikleri açıklamasıyla salondaki gazeteciler heyecanlandı.

11c.Bu hafta toplantı düzenleyerek başsavcının yenilikleri açıklamasıyla salondaki gazeteciler heyecanlandı.

11d.Bu hafta toplantı düzenleyerek yenilikleri başsavcının açıklamasıyla salondaki gazeteciler heyecanlandı.

Başsavcının açıklaması hakimleri mi heyecanlandırdı? N

12a.Pazarcının bütün hafta meyve satarak parayı denkleştirmesiyle kasabadaki alacaklılar sevindi.

12b.Bütün hafta pazarcının meyve satarak parayı denkleştirmesiyle kasabadaki alacaklılar sevindi.

12c.Bütün hafta meyve satarak pazarcının parayı denkleştirmesiyle kasabadaki alacaklılar sevindi.

12d. Bütün hafta meyve satarak parayı pazarcının denkleştirmesiyle kasabadaki alacaklılar sevindi.

Pazarcı giysi mi sattı? N

13a. Ev sahibini dün sabah usta getirerek kombiyi değiştirmesiyle evdeki kiracı rahat etti.

13b. Dün sabah ev sahibinin usta getirerek kombiyi değiştirmesiyle evdeki kiracı rahat etti.

13c. Dün sabah usta getirerek ev sahibinin kombiyi değiştirmesiyle evdeki kiracı rahat etti.

13d. Dün sabah usta getirerek kombiyi ev sahibinin değiştirmesiyle evdeki kiracı rahat etti.

Kombi değişti mi? Y

14a. Sekreterin bütün sabah oyun oynayarak raporları geciktirmesiyle şirketteki yöneticiler rezil oldu.

14b. Bütün sabah sekreterin oyun oynayarak raporları geciktirmesiyle şirketteki yöneticiler rezil oldu.

14c. Bütün sabah oyun oynayarak sekreterin raporları geciktirmesiyle şirketteki yöneticiler rezil oldu.

14d. Bütün sabah oyun oynayarak raporları sekreterin geciktirmesiyle şirketteki yöneticiler rezil oldu.

Sekreter raporları zamanında hazırladı mı? N

15a. Belediye başkanının geçen yaz fevri davranarak kiliseyi yıktırmasıyla mahalledeki herkes şok oldu.

15b. Geçen yaz belediye başkanının fevri davranarak kiliseyi yıktırmasıyla mahalledeki herkes şok oldu.

15c. Geçen yaz fevri davranarak belediye başkanının kiliseyi yıktırmasıyla mahalledeki herkes şok oldu.

15d. Geçen yaz fevri davranarak kiliseyi belediye başkanının yıktırmasıyla mahalledeki herkes şok oldu.

Belediye başkanı kiliseyi restore ettirdi mi? N

16a. Dalgıcın bütün hafta dalış yaparak enkazı aramasıyla müzedeki yetkililer umutlandı.

16b. Bütün hafta dalgıcın dalış yaparak enkazı aramasıyla müzedeki yetkililer umutlandı.

16c. Bütün hafta dalış yaparak dalgıcın enkazı aramasıyla müzedeki yetkililer umutlandı.

16d. Bütün hafta dalış yaparak enkazı dalgıcın aramasıyla müzedeki yetkililer umutlandı.

Enkazı arayan dalgıç mıydı? Y

17a. Gazetecinin bütün ay röportaj yaparak yazı dizisini hazırlamasıyla dergideki editörler rahatladı.

17b. Bütün ay gazetecinin röportaj yaparak yazı dizisini hazırlamasıyla dergideki editörler rahatladı.

17c. Bütün ay röportaj yaparak gazetecinin yazı dizisini hazırlamasıyla dergideki editörler rahatladı.

17d. Bütün ay röportaj yaparak yazı dizisini gazetecinin hazırlamasıyla dergideki editörler rahatladı.

Yazı dizisi hazır mı? Y

18a. Valinin geçen hafta kılıkdeğiştirerek çarşıları denetlemesiyle şehirdeki esnaf tedirgin oldu.

18b. Geçen hafta valinin kılık değiştirerek çarşıları denetlemesiyle şehirdeki esnaf tedirgin oldu.

18c. Geçen hafta kılık değiştirerek valinin çarşıları denetlemesiyle şehirdeki esnaf tedirgin oldu.

18d. Geçen hafta kılık değiştirerek çarşıları valinin denetlemesiyle şehirdeki esnaf tedirgin oldu.

Çarşıları denetleyen zabıta mıydı? N

19a. Bağımlının hafta sonu kriz geçirerek telefonu fırlatmasıyla terapideki hastalar şoka girdi.

19b. Hafta sonu bağımlının kriz geçirerek telefonu fırlatmasıyla terapideki hastalar şoka girdi.

19c. Hafta sonu kriz geçirerek bağımlının telefonu fırlatmasıyla terapideki hastalar şoka girdi.

19d. Hafta sonu kriz geçirerek telefonu bağımlının fırlatmasıyla terapideki hastalar şoka girdi.

Terapide hastalar var mıydı? Y

20a. Okul korosunun bütün yıl prova yaparak yarışmayı kazanmasıyla kulüpteki üyeler muradına erdi.

20b. Bütün yıl okul korosunun prova yaparak yarışmayı kazanmasıyla kulüpteki üyeler muradına erdi.

20c. Bütün yıl prova yaparak okul korosunun yarışmayı kazanmasıyla kulüpteki üyeler muradına erdi.

20d. Bütün yıl prova yaparak yarışmayı okul korosunun kazanmasıyla kulüpteki üyeler muradına erdi.

Okul korosu sadece bir hafta mı prova yaptı? N

21a. Yönetmenin geçen Cuma geç kalarak galayı kaçırmasıyla filmdeki oyuncular hayrete düştü.

21b. Geçen Cuma yönetmenin geç kalarak galayı kaçırmasıyla filmdeki oyuncular hayrete düştü.

21c. Geçen Cuma geç kalarak yönetmenin galayı kaçırmasıyla filmdeki oyuncular hayrete düştü.

21d. Geçen Cuma geç kalarak galayı yönetmenin kaçırmasıyla filmdeki oyuncular hayrete düştü.

Geç kalan oyuncular mıydı? N

22a. Şarkıcının bütün yaz tedavi görerek alkolü azaltmasıyla ülkedeki hayranları sevindi.

22b. Bütün yaz şarkıcının tedavi görerek alkolü azaltmasıyla ülkedeki hayranları sevindi.

22c.Bütün yaz tedavi görerek şarkıcının alkolü azaltmasıyla ülkedeki hayranları sevindi.

22d. Bütün yaz tedavi görerek alkolü şarkıcının azaltmasıyla ülkedeki hayranları sevindi.

Şarkıcı tedavi gördü mü? Y

23a.Bahçıvanın geçen hafta ağaç dikerek bahçeyi güzelleştirmesiyle sitedeki yaşlılar mutlu oldu.

23b.Geçen hafta bahçıvanın ağaç dikerek bahçeyi güzelleştirmesiyle sitedeki yaşlılar mutlu oldu.

23c.Geçen hafta ağaç dikerek bahçıvanın bahçeyi güzelleştirmesiyle sitedeki yaşlılar mutlu oldu.

23d.Geçen hafta ağaç dikerek bahçeyi bahçıvanın güzelleştirmesiyle sitedeki yaşlılar mutlu oldu.

Sitedeki yaşlılar rahatsız oldu mu? N

24a. Komutanın dün gece çatışmaya girip teröristleri yakalamasıyla karargahtaki askerler cesaretlendi.

24b. Dün gece komutanın çatışmaya girip teröristleri yakalamasıyla karargahtaki askerler cesaretlendi.

24c.Dün gece çatışmaya girip komutanın teröristleri yakalamasıyla karargahtaki askerler cesaretlendi.

24d.Dün gece çatışmaya girip teröristleri komutanın yakalamasıyla karargahtaki askerler cesaretlendi.

Askerler cesaretlendi mi? Y

APPENDIX E

FILLER SENTENCES

1. Ressam uyarmasına rağmen atölyedeki kuşları dışarı saldı sanıp temizlikçiyi azarladı.

Ressam temizlikçiyi övdü mü? N

2.Görevlilere göndermesine rağmen huzurevindeki yaşlılara kıyafetleri teslim etmedi sanan terzi beddua etti.

Terzi huzurevine kıyafet gönderdi mi? Y

3.Güvenliğe hatırlatmasına rağmen otoparktaki kedilere süt verilmedi sanan kütüphaneci üzüldü.

Kütüphaneci güvenlikten memnun mu? N

4.İşçilere anlatmasına rağmen tarladaki sebzelere gübre atılmadı sanan çiftçi çileden çıktı.

Tarlada sebzeler var mıydı? Y

5.Patron söylemesine rağmen caddedeki dükkanlara broşürleri dağıtmadı sanıp garsonu payladı.

Müşteri garsonu payladı mı? N

6.Öğretmenlere rica etmesine rağmen okuldaki sınıflara geziyi duyurmadı sanan müdür telaşlandı.

Müdür telaşlandı mı? Y

7.Şef uyardığı halde holdingdeki direktörlere sonuçları iletmedi sanarak kuryeyi işten attırdı.

Direktörler mi kuryeyi işten attırdı? N

8.Komiser talimat verdiği halde meydandaki protestoculara şiddet uyguladı sanarak polisi açığa aldı.

Meydanda protestocular var mıydı? Y

9.Görevlilerin üç gündür yurttaki yetimleri aç bıraktığını sanan halk ayaklandı.

Halk yetimler aç kaldı sandı mı? Y

10.Antrenörlerin haftasonu pistteki acemilere hava attığını sanan spor yorumcusu öfkelendi.

Spor yorumcusu acemilere mi öfkelendi? N

11.Sanatçıların yakın zamanda ülkedeki sorunlara çözüm üretebileceğini sanan aydınlar umutluydu.

Aydınlar sanatçıların ülkedeki sorunlara çözüm üretebileceğini sanıyor mu? Y

12.Ekonomistlerin yarın sabah borsadaki artışa açıklama getirebileceğini sanan yatırımcı sakinleşti.

Borsada düşüş mü olmuş ? N

13.Matbaacının sıkı yönetimerağmen asla basımı durdurmayacağı söylendi ve kitaplar basıldı.

Basım devam etti mi? Y

14. Kasiyer söylentilere rağmen asla parayı çalmadığını söylemedi ve şüpheleri artırdı.

Kasiyer parayı çalmadığını söyledi mi? N

15. Bankacının iddialara rağmen asla dolandırıcılık yapmadığı söylendi ve dava kapatıldı.

Dava kapandı mı? Y

16.Balıkçı akıntıya rağmen asla denize açılmam demedi ve karısını endişelendirdi.

Denizde akıntı var mıydı? Y

17.Müzisyenin baskılara rağmen asla turneye çıkmayacağı söylendi ve program iptal edildi.

Müzisyen turneye çıkacak mı? N

18. Komedyenin dedikodulara rağmen asla uçak aldığı söylenmedi ve sorular geçiştirildi.

Sorular geçiştirildi mi? Y

19.Dekoratör ısrarlara rağmen hiç deri kullanmam dedi ve koltukları iade etti.

Dekoratör deri kullanıyor mu? N

20.Reklamcı olumsuzluklara rağmen hiç ajansı kapatacağım demedi ve sabırla çalıştı.

Reklamcı çalışmaya devam etti mi? Y

21.Avukat her şeye rağmen hiç pes ettim demedi ve müvekkelini rahatlattı.

Avukat pes edeceğim dedi mi? N

22.Kadın kayıtlara rağmen hiç eşimi aldatmadım dedi ve herkesi şoke etti.

Kadın eşini aldattığını söyledi mi? N

23. Diktatörün darbeye rağmen katiyen hatalarını kabullendiği söylenmedi ve insanlar ayaklandı.

Diktatör hatalarını kabul ediyor mu? N

24.Kaptanın savaşa rağmen katiyen demir atmayacağı söylendi ve yolculuğa devam edildi.

Savaş var mıydı? Y

25.Hastanede doktoru bekleyen yaşlı hemşire yüzünden hastalara yeterince itinayla bakılmamış.

Yaşlı hemşire doktoru bekledi mi? Y

26.Yurtdışında yayıncı aradığı ünlü yazar yüzünden akşam yemeği iptal etmiş.

Ünlü yazar akşam üzeri basına yemek verdi mi? N

27.Müzede heykeltıraşı aşağılayan geçimsiz arkeolog yüzünden yemekte hiç kimse konuşmamış.

Arkeolog geçimsiz biri midir? Y

28.Teknede kaptanın tekmelediği sarhoş makinist tarafından sahil kasabasında olay çıkartılmış.

Kaptan sarhoş makinisti tekmeledi mi? Y

29.Mağazada müşteri azarladığı huysuz satıcı tarafından küçük düşürücü hakaretlere maruz kalmış.

Satıcı canayakın biri midir? N

30.Gece kulübünde manken tersleyen yakışıklı futbolcu yüzünden bar çıkışında olay çıkmış.

Gece kulübünde basketbolcu mankeni tersledi mi? N

31.Maçta santrafor sakatlayan deneyimli kaleci yüzünden soyunma odasında kavgaya karışmış.

Kaleci deneyimli biri mi? Y

32.Kahvede kamyoncuyu hırpalayan hilekar kaportacı yüzünden okey masasında defalarca hile yapılmış.

Kamyoncuya göre çaycı kaportacıyı hırpaladı mı? N

33.Sergide sanatçının kınadığı eski kültür bakanı yüzünden sert bir rüzgar esmiş.

Resepsiyonda sert bir rüzgar esti mi? Y

34.Sınırda gizli ajanı tutukladığı meşhur başkomiser tarafından aşağılayıcı şekilde tehditler savurulmuş.

Gizli ajan meşhur başkomisere çay ısmarladı mı? N

35.Düğünde sütçünün yumrukladığı kızgın tüpçü tarafından nişan töreninde de olay çıkartılmış.

Tüpçü kızgın birisi mi? Y

36.Kışlada acemi askerin gözetlediği tecrübeli yüzbaşı tarafından sabaha kadar nöbet tutulmuş.

Düşman askeri esir kampındaki banyoda intihar etti mi? N

37.Dün gece buzdolabındaki ithal içkiyi içen bebeğin babası oldukça ünlü biriymiş.

Buzdolabında ithal içki var mıydı? Y

38.Bu sabah vitrindeki kıyafeti deneyen dayımın nişanlısı yurtdışına gitmek istiyor.

Dayım nişanlı mı? Y

39.Geçen yıl yurtdışındaki sevgilisini aldatan adamın kızı turizm firmasında çalışıyormuş.

Adam turizm firmasında çalışıyor mu? N

40.Son zamanlarda kasabadaki kıraathanede çalışan bayanın kocası Ankara'da çok ünlüymüş.

Bayanın babası Ankara'da ünlü mü? Y

41.Bu yıl İzmir'deki devlet lisesinde okuyan delikanlının ablası hep televizyon izliyor.

İzmir'de devlet lisesi var mı? Y

42.Bu sabah adliyedeki kocasını bekleyen bayanın babası durmadan sigara içiyordu.

Bayan durmadan sigara içiyor mu? N

43.Hafta sonu çarşıdaki kadınlar hamamına giden enişte min halası cüzdanını evde unutmuş.

Eniştem hamama gitti mi? N

44.Geçen ay 20 yaşında kocaya giden hanımefendinin ağabeyi kumarda servetini kaybetmiş.

Hanımefendi 20 yaşında evlendi mi? Y

45.Hafta sonu İstanbul'daki mitinge parti başkanı geldiği haberi partilileri epey coşturmuş.

İstanbul'daki mitinge parti başkanı geldi mi? Y

46.Dün gece Dağ başındaki köye ayı indiği söylentisi köylüleri bayağı korkuttu.

Dağ başındaki köye kurtlar mı indi? N

47.Bir süredir Çanakkale boğazında yaban domuzu yüzdüğü haberleri balıkçıları paniğe soktu.

Balıkçılar mutlu oldu mu? N

48.Geçen yaz Avrupa’daki balayında damatın çapkınlık yaptığı iftirası gelini çok kızdırdı.

Gelinle damat Avrupa'ya balayına gittiler mi? Y

APPENDIX F

INFORMED CONSENT FORM

GÖNÜLLÜ KATILIM FORMU

Öncelikle çalışmamıza katıldığınız için teşekkür ederiz.

Bu çalışma Boğaziçi Üniversitesi Dilbilim Bölümü'nde lisansüstü öğrencisi Seda Akpınar'ın Doç. Dr. Mine Nakipoğlu danışmanlığında olduğu yüksek lisans tezi kapsamında yer almaktadır. Çalışmanın genel amacı anadili Türkçe olan yetişkinlerin okudukları cümleleri nasıl anladıkları hakkında bilgi toplamaktır. Katılımcıların bilgisayar ekranındaki cümleleri mümkün olduğu kadar doğal hızda anlayarak okuyup, her cümle için sorulan soruları mümkün olduğunca doğru ve çabuk bir şekilde cevaplamaları gerekmektedir. Çalışma yaklaşık 30 dakika sürecek olup katılım tamamen gönüllülük esasına dayanmaktır. Kişisel bilgileriniz kesinlikle gizli tutulacaktır. Ancak çalışmadaki sorulara vereceğiniz cevaplar, yüksek lisans tezimde ve konferans bildirisi, makale gibi bilimsel çalışmalarda kullanılacak olup, bunun haricinde başka bir amaç için kesinlikle kullanılmayacaktır. Çalışma sonrasında sorularınız araştırmacı tarafından cevaplanacaktır. Çalışma hakkında daha fazla bilgi almak için Seda Akpınar (e-posta: seda.akpinar@boun.edu.tr) ile iletişime geçebilirsiniz.

Tekrar teşekkürler!

Genel Sorular:

Cinsiyetiniz: K E

Yaşınız:

Konuştuğunuz yabancı diller var mı? Varsa, hangi dilleri ne düzeyde konuşuyorsunuz?

Memleket (en uzun yaşadığınız yer):

Bu çalışmaya gönüllü olarak katılıyorum ve sorulara vereceğim cevapların bilimsel yayımlarda kullanılmasını kabul ediyorum.

İsim Tarih İmza

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