

STRUCTURAL PRIMING IN TURKISH GENITIVE-POSSESSIVE
CONSTRUCTIONS

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**STRUCTURAL PRIMING IN TURKISH GENITIVE-POSSESSIVE
CONSTRUCTIONS**

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

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ABSTRACT

STRUCTURAL PRIMING IN TURKISH GENITIVE-POSSESSIVE CONSTRUCTIONS

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This study addresses the question of the mental representation and processing of language by investigating “structural priming” in Turkish Genitive-Possessive (GEN-POSS) constructions. Structural priming is the facilitating effect of having already experienced a structural form on its subsequent processing. We investigate this phenomenon on a construction pair in Turkish, which shares the same external GEN-POSS morpho-syntactic template despite having distinct grammatical categories. The structures under scrutiny are possessive noun phrases (e.g. “Korsan, [prens-es-**in**(GEN) öykü-**sün**(POSS.3SG)]-ü hatırladı.” which means: *The pirate remembered [the princess’s story].*) and embedded noun clauses with nominalized verbs as predicates (e.g. “Korsan, [prens-es-**in**(GEN) gül-**düğ**(VN)-**ün**(POSS.3SG)]

-ü hatırladı.” which means: *The pirate remembered [that the princess (had) laughed/was laughing].*)

The results of the study which consists of a series of production and comprehension experiments with various methodologies (written sentence completion, self-paced reading and eye-tracking) indicate that structural priming might access the morpho-syntactic level of representation in Turkish. Priming seems sensitive to the distinction between the phrasal *vs.* clausal nature of structures. During the processing of GEN-POSS constructions, the grammatical information regarding the constituents is accessed. Complex forms are further decomposed if processing resources are available. Overall, language production and comprehension seem to operate on the same structural representations but through different mechanisms. In addition, the study also contributes to the understanding of structural priming as a methodological paradigm and to the establishment of a bridge between the processing and theoretical linguistic analysis of Turkish nominalized verbs. To conclude, this study pioneers in exploring structural priming in Turkish and opens way to future research in this line.

Keywords: structural priming, Turkish, genitive-possessive constructions, noun clauses, nominalization

ÖZ

TÜRKÇE İLĞİ-İYELİK YAPILARINDA YAPISAL HAZIRLAMA

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Bu çalışma dilin zihinsel gösterimi ve işlenmesi sorusunu Türkçe ilgi-iyelik yapılarında “yapısal hazırlama”yı incelemek suretiyle ele almaktadır. Yapısal hazırlama, dilsel bir yapıyı daha önce işlememiş olmanın, ilerideki işleme süreçlerini kolaylaştırması etkisidir. Bu olgu, aynı dış biçimdizimsel çerçeveyi paylaşan, ancak farklı dilbilgisel kategorilere ait olan bir yapı çifti üzerinde ele alınmaktadır. Bu yapılar iyelik bildiren (belirtili) ad tamlamaları (örn. “Korsan, [prens-es-**in(İLGİ)** öykü-**sün(İYELİK.3TK)**]-ü hatırladı.”) ile yüklemi adlaşmış eylemlerden oluşan yantümceler, yani ad tümcecikleridir (örn. “Korsan, [prens-es-**in(İLGİ)** gül-**düğ(EA)**-**ün(İYELİK.3TK)**]-ü hatırladı.”).

Yazılı tümce tamamlama, kendi-hızıyla okuma ve göz izleme gibi çeşitli yöntemler kullanılarak gerçekleştirilen bir dizi üretim ve anlama deneyinden oluşan çalışmanın sonuçları, yapısal hazırlamanın Türkçede biçim-dizimsel düzeyde etkili olabileceğini göstermektedir. Hazırlama etkisinin yapıların öbekselle veya (yan)tümceselle doğalarının ayırımına duyarlı olduğu görülmektedir. İlgi-iyelik yapılarının işlemlenmesinde, yapının bileşenleri ile ilgili dilbilgiselle bilgiye ulaşılmaktadır. Genel olarak, dilin üretimi ve anlaşılması süreçleri aynı gösterimler üzerinde ancak farklı mekanizmalar ile çalışmaktadır. Ayrıca, bu çalışma yapısal hazırlamanın yöntemsel bir paradigma olarak anlaşılmasına ve Türkçedeki adlaşmış eylemlerin işlemlenmesi ve kuramsal-dilbilimselle çözümlenmesi arasında bir köprü kurulmasına katkıda bulunmaktadır. Sonuç olarak, çalışma Türkçede yapısal hazırlama konusunda öncü niteliktedir ve gelecekte bu alanda yapılacak araştırmalara zemin hazırlamaktadır.

Anahtar Kelimeler: yapısal hazırlama, Türkçe, ilgi-iyelik yapıları, ad tümcecikleri, adlaşma

This thesis is dedicated to all those people who always believed in me, who were always there for me with their love, and whom I will never stop loving...

To my family, my friends, all my loved ones...

In particular, I dedicate this thesis to:

My mother, my father and my brother, who mean everything to me,

to:

my dear “Potti”, my best friend forever,

and to:

my one and only “Murat”,

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LIST OF ABBREVIATIONS

ABL	Ablative
ACC	Accusative
ADJ	Adjective
COM	Comitative
DAT	Dative
DER	Derivational Suffix
FUT	Future
GEN	Genitive
IMPF	Imperfective
INF	Infinitive
LOC	Locative
MOD	Modality
NEG	Negation
NOM	Nominative
NP	Noun Phrase
PASS	Passive
POSS	Possessive
PL	Plural
PF	Perfective
REL	Relativizer

SG	Singular
SOV	Subject-Object-Verb
TAM	Tense/Aspect/Modality
VN	Verb Nominalization Morpheme

CHAPTER 1

INTRODUCTION

1.1 Motivation

The relation between language and mind is a topic that has occupied and fascinated generations of researchers for ages (Chomsky, 1968). How do we humans translate our feelings and the ideas in our minds into words and sentences that we articulate (Levelt, 1989)? Then, how do we (and our interlocutors) make sense of the strings of sounds that we perceive? In other words how is language decoded to access the meaning it conveys (e.g. Gleitman & Liberman, 1995)? Although the production (in forms of speaking, writing, or signing) and comprehension (in forms of listening, reading and visuo-spatial perception) of language are cognitive abilities that most of us can handle very rapidly, unconsciously and seemingly effortlessly in our daily lives (Osherson, 1995), it is still not completely understood how the knowledge of language is represented in the mind and what psycholinguistic processes underlie the encoding and decoding of this knowledge. This thesis aims to contribute to the understanding of the linguistic representations in the mind and the processes operating on these representations, making language production and comprehension possible. How can we as scientists learn about the nature of these abstract

representations and processes? There are various techniques that different disciplines adopt to scrutinize this issue (Cutler, 2005, among others).

One possible way is to investigate the languages of the world and the properties of the structure of “language”, as linguistics does (Aronoff & Rees-Miller, 2002, among many others). Another legitimate technique is to record brain activity during language processing to find the temporal and topographical patterns of such processing (e.g. Friederici, 1995, 2002; Poeppel & Marantz, 2000; Indefrey, 2007), which is what neurolinguists do. Computational modeling is also another method adopted by applied computational linguistics (e.g. Sproat, Samuelsson, Chu-Carroll & Carpenter, 2002). Finally, another way to investigate the representation and processing of language is to employ psychological experimentation (e.g. Garrod, 2006). In the light of the aims of the present thesis, we had recourse to this last type of method and conducted controlled language experiments.

Specifically, we addressed a psycholinguistic phenomenon called “structural priming” (Bock, 1986), which is based on the idea that repetition facilitates language processing, as will be explained in more detail below. The aspects of the knowledge of language that are prone to being repeated should be represented mentally at some level (Pickering & Ferreira, 2008). On this ground, the present thesis adopts an experimental psycholinguistic approach to language production and comprehension so as to investigate the representation of language and the processing mechanisms of the two modalities. To attain this goal, structural priming in a specific pair of structures from Turkish, which share the same outer morpho-syntactic template despite their distinct grammatical category, is put under scrutiny. This structure pair consists of genitive-possessive (GEN-POSS) constructions with possessive NPs and embedded noun clauses.

To sum up, the motivation for the present study is the ambition to contribute to the understanding of the relation between language and mind, by investigating structural priming in a specific construction pair in Turkish. Consequently, the thesis adopts a multi-dimensional perspective. First, it helps to contribute to the establishment of a

bridge between psychology of language and theoretical linguistics. Moreover, by focusing on a specific language, it seeks to add cross-linguistic variation to linguistic experimentation. It embraces structural priming both as a psycholinguistic phenomenon relevant to ease processing through repetition; and as a methodological paradigm. Furthermore, by focusing on both production and comprehension, and their interaction, this study investigates language processing comprehensively. Finally, it strives to shed some light on not only the mechanisms of language processing; but also on the linguistic representations on which such processing mechanisms operate.

1.2 Scope and Topic

1.2.1 Scope

The present dissertation constitutes a psycholinguistic investigation of the mental representation and processing of language, a main capability of human cognition. As a means to this end, it employs the psycholinguistic phenomenon called “structural priming” in the examination of a certain morpho-syntactic construction of Turkish. Although it is in close interaction with theoretical linguistics, a complete formal analysis of the constructions under scrutiny, namely, “Turkish GEN-POSS constructions” falls beyond the scope of this research. In order to investigate structural priming in Turkish, this study makes use of behavioral experimentation on both the production and comprehension of language through a variety of methodological tasks.

1.2.2 Topic

As indicated in the title, the topic of this study is “structural priming in Turkish GEN-POSS constructions”. We investigate the phenomenon called *structural priming* in both the production and comprehension of Turkish and also between these

two modalities. Structural priming is basically the ease of processing of a linguistic form due to its structural similarity to a previously processed form (Bock, 1986). Due to the nature of Turkish, in the context of the present study the structures that are subjected to possible priming effects are morpho-syntactic constructions. The specific constructions chosen for the study are possessive “Noun Phrases” (NPs) (1) and “Noun Clauses” (2) with nominalized verbs as predicate. The reason why these constructions were chosen as the basis of the study is that they constitute a special pair with identical external GEN-POSS morphology, but with constituents of different grammatical categories.

(1) Korsan, [prens **-in** hikaye **-sin**] -i hatırla -dı
 pirate princess-**GEN** story **-POSS.3SG** -ACC remember -PF.3sg
 “The pirate remembered the princess’s story.”

(2) Korsan, [prens **-in** gül **-düğ-ün**] -ü hatırla -dı.
 pirate princess-**GEN** laugh-**VN''POSS.3SG** -ACC remember-PF.3sg
 “The pirate remembered that the princess (had) laughed/was laughing.”

1.3 General Aims and Research Questions

1.3.1 Introduction

The general aims and research questions of the present study are three-fold: exploratory, theoretical and methodological. The study is *exploratory* in nature, as it is the first structural priming study in Turkish. Its core objective is to provide answers to a number of *theoretical* questions on the representation and processing of language. It also has some *methodological* aims which complement its exploratory and theoretical aspects. This section presents these three lines of general aims and

related research questions. The research questions and interrelated sub-questions are illustrated in Figure 1.1.

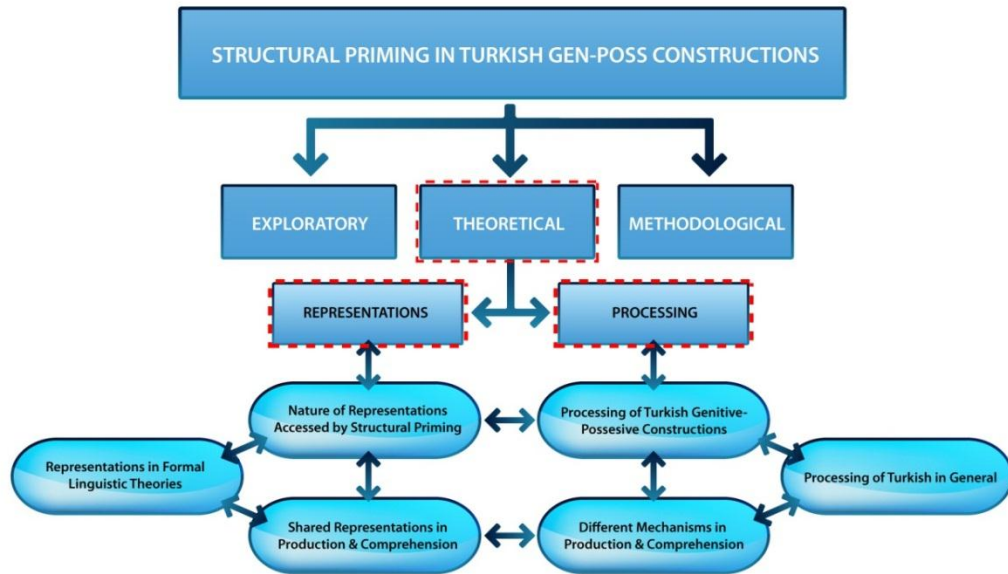


Figure 1.1 General Research Questions

1.3.2 Exploratory Aim and Research Question

Exploratory Aim

To the best of our knowledge, this is the first structural priming study in Turkish. It aims to reveal whether there is such priming in this language. It tests priming in a specific construction which reflects the special morpho-syntactic properties of Turkish, for the first time. The investigation of priming in this new pair (of nouns

and nominalized verbs) is likely to shed light on aspects of structural priming that the previous research studying other forms in other languages could not unravel. The present study is also the first one to systematically scrutinize the processing of Turkish nouns and nominalized verbs in GEN-POSS constructions by adult native speakers. It should be noted that throughout this thesis, the term *processing* is used to refer to the computational processes going on not only during language comprehension, but also during production.

Exploratory Research Question

In accordance with the exploratory aim, the basic research question addressed in this study is whether there is structural priming in possessive nouns and nominalized verbs of Turkish GEN-POSS constructions. In other words, the study has a descriptive dimension in exploring structural priming in a new alternation from a language which is typologically different from those widely examined in the structural priming literature.

1.3.3 Theoretical Aims and Research Questions

Theoretical Aims

The main purpose of this thesis is to shed light on some unanswered theoretical questions regarding structural priming and the mental representation and processing of language. On the one hand, we make use of the particular typological properties of the Turkish language to better understand the representations structural priming accesses. On the other hand, we employ structural priming as a means to study the processing and representation of Turkish GEN-POSS constructions. The research questions that we will address from the perspective of both production and comprehension will also have some bearing on formal linguistic analyses of the constructions under scrutiny.

Theoretical Research Questions

The basic exploratory question gives rise to two interrelated veins of theoretical inquiry: general research questions on the mental representation and processing of language, which are in turn elaborated by means of more specific questions addressed in the various experiments. These questions and the relations between some of them are presented in Figure 1.1 and more visibly in Figure 1.2 which is reproduced from it.

We will address these general questions through some more specific questions that will be further elaborated in the relevant chapters in the light of our hypotheses regarding each of them, which will also be presented in more detail later.

A. Questions on Representations

A.1 Nature of Representations Structural Priming Accesses:

What is the level and nature of the mental linguistic representations that structural priming accesses?

- Is the level of representation accessed by priming purely syntactic, purely morphological or morpho-syntactic for Turkish (in the context of GEN-POSS constructions)?
- Are the representations structural priming taps specified as phrasal *versus* clausal?
- For the morphologically complex forms, what level of representation does priming access: The root¹ information, the suffix information or both?

¹ Throughout the thesis, we use the term “root” to indicate the smallest, non-derived form of lexical items and the term “stem” to express forms to from which new lexical items can be derived by the insertion of affixes. For instance we consider the word *teach* to be a verbal root and the word *teacher* to be a nominal stem derived from that verbal root.

A.2 Shared Representations in Production and Comprehension:

Are the representations accessed by priming shared between the language production and comprehension systems?

- Is there priming in a comprehension-to-production task?

A.3 Representations in Formal Linguistic Theories:

Are the representations accessed by priming parallel to the formal representations assumed by linguistic theories?

- Are the properties of the representations of GEN-POSS constructions compatible with the relevant linguistics literature?

B. Questions on Processing

B.1 Processing of Turkish GEN-POSS Constructions:

How are Turkish GEN-POSS constructions processed?

- Are the GEN-POSS constructions processed as a single syntactic unit or are they decomposed into their constituents?
- Is there a difference in the processing loads of simple nouns and complex nominalized verbs in GEN-POSS constructions that are of the same length in terms of syllable number?
- Are the complex nominalized verbs further decomposed into their morphemes? If they are, is this decomposition subject to any constraints?

B.2 Different Mechanisms in Production and Comprehension:

Are the processing mechanisms the same or different in language production and comprehension?

- Are the same structural priming effects observed in the production tasks and in the comprehension tasks?

B.3 Processing of Turkish in General:

What does the study of structural priming reveal about the general processing strategies in Turkish?

- Does sentence processing in Turkish reflect incrementality², especially with respect to the Subject-Object-Verb (SOV) word order?

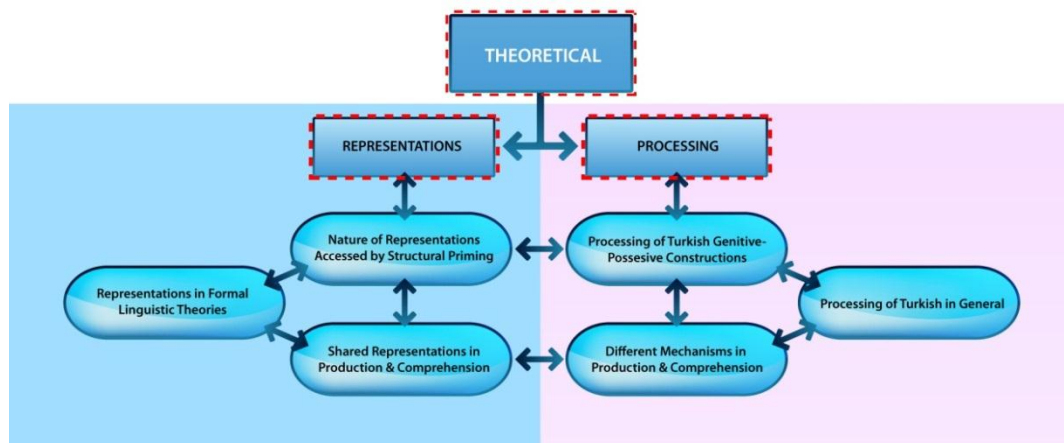


Figure 1.2 Theoretical Research Questions (Extracted from Figure 1.1)

² For a fully incremental sentence processing model, underscoring the role of lexical heads in parsing German (verb second and verb final sentences), see Konieczny, Hemforth, Scheepers, and Strube (1997).

As illustrated in Figure 1.2 which is extracted from Figure 1.1 for emphasis, the theoretical research questions in both groups are related to the others within the same group. In addition, there is strong parallelism between questions in A1 and B1, and A2 and B2 given the interactions between representations and mechanisms.

These finer-grained questions will not constitute a specific chapter in the dissertation but will rather be addressed in relevant sections on different experiments. Nevertheless, the related findings will be evaluated together to shed light on the big picture in the general discussions chapter.

1.3.4 Methodological Aims and Research Questions

Methodological Aims

A final aim of the present research is to contribute to the understanding of structural priming as a methodological paradigm. Through the use of a variety of online and offline techniques to investigate structural priming of the same linguistic construct, this study allows for a systematic methodological comparison. In addition, the experiments designed to answer the main theoretical research questions bring along some observations relevant to structural priming as an experimental methodology.

Methodological Research Questions

The basic methodological questions are as follows:

- Is structural priming in production and especially comprehension dependent on the lexical repetition of the matrix verb, even in a head-final language like Turkish?
- Are there differences in the robustness of different online and offline tasks in revealing structural priming effects?

1.4 Contributions

This study fills important gaps in the literature by addressing the research questions mentioned above. As such it contributes to several areas of research. The contributions can be grouped into six general categories:

- i. contribution as a pioneer study in structural priming research in Turkish,
- ii. contributions to the literature on the processing of Turkish,
- iii. contributions to formal linguistics,
- iv. contributions to the structural priming literature,
- v. methodological contributions, and
- vi. contributions to cognitive science

1.4.1 Contribution as a Pioneer Study in Structural Priming Research in Turkish

As the first structural priming study in Turkish, this dissertation opens way to future priming studies in different aspects of the language. The findings of the present experiments pave the way for further questions that call for inquiry. There is great potential in the investigation of structural priming in a head-final, agglutinative language with word order flexibility like Turkish, which is typologically distinct from other widely investigated languages. In embarking on this line of research this pioneer study provides a basis for future investigations on different structures with different methodologies.

1.4.2 Contributions to the Literature on the Processing of Turkish

The psycholinguistic investigation of sentence processing in Turkish is still a young and developing field of research. This study contributes to the expansion of this field by the investigation of the processing of subordinated nominalized clauses and possessive NPs which share the same external morphological template (see sentences (1) and (2) in section 1.1.2). It provides important information on the morpho-syntactic processing of these specific constructions. In addition, it also improves the current understanding of more general aspects of processing of Turkish sentences. Given the unique typological characteristics of Turkish, progress in this area is indispensable for a more comprehensive understanding of the universal and cross-linguistic aspects of language processing.

1.4.3 Contributions to Formal Linguistics

By scrutinizing the priming and processing of the two types of GEN-POSS constructions, the present study provides significant empirical findings that could be used as an additional source of information for formal analyses of these constructions. In particular, the linguistic analyses on the nominalization of verbs through various suffixes in embedded noun clauses are expected to benefit from the empirical results of this study.

1.4.4 Contributions to the Structural Priming Literature

This study contributes to the structural priming literature by providing information on the level of representation which is accessed through the empirical investigation of a structure demonstrating both phrasal and clausal properties as a result of the morpho-syntactic properties of Turkish. As mentioned above, unlike the languages often investigated in the structural priming literature (e.g. English, Dutch, etc.) Turkish is an agglutinative language with a rich morphology. Exploring structural

priming in this language will therefore fill an important gap in the literature. In addition, examining the target structures within the SOV word order, this study also contributes to the resolution of a debate regarding the dependence of structural priming on the matrix verb of the sentence during comprehension. Finally, as it will be explained in the methodological contributions section, the study is also significant in comparing structural priming in comprehension and production through different online and offline techniques.

1.4.5 Methodological Contributions

Employing a variety of tasks (sentence completion, self-paced reading and eye-tracking techniques) to investigate structural priming in production, in comprehension and between the two (from comprehension to production), the present study addresses a number of methodological questions introduced in the methodological aims and research questions section above (1.3.4). It also provides a comparison of tasks of different nature designed to test structural priming. A comprehensive picture of language competence can only be achieved with such a combined methodological approach across online and offline paradigms, as some aspects of the knowledge of language are better revealed in online tasks, while others may be better detectable in offline tasks.

1.4.6 Contributions to Cognitive Science

By focusing on the knowledge and processing of language, which is one of the most remarkable products of human cognition, this study addresses a core issue in cognitive science, namely the assumption of mental representations and computational procedures operating on these representational structures (Thagard, 2011). The relation between abstract, formal, atemporal representations and

dynamical, online processing of language is thus of great interest for the wider field of cognitive science.

On a more general level, structural priming can be considered as an instance of economy of processing given the observation that the use of information from previous encounters facilitates processing. Despite the availability of a vast domain of linguistic structure, which in principle renders freedom in the selection among possible responses, processing seems to be guided by recent information and limited in a local field within the larger domain. This is a typical sign of dynamic systems (e.g. Beer 2000; van Gelder, 1998), in which the current state depends on the previous one. In addition, by definition, structural priming is closely related to memory. Particularly, it seems to instantiate implicit, procedural memory, independently of conscious awareness (e.g. Medin, D. L., Ross, B. H. & Markman, A. B., 2005)). To conclude, the scrutiny of structural priming contributes to more general aspects of cognitive science, as well.

1.5 Organization of the Dissertation

This dissertation contains 8 chapters. The present introductory chapter is followed by two literature review chapters that provide a background in the structural priming phenomenon and in the linguistic analysis of Turkish GEN-POSS constructions, respectively. The three experimental chapters of this dissertation, namely Chapters 4, 5 and 6 are organized with respect to the nature of the task, as can be seen in Figure 1.3. The order of presentation of these main lines of experiment also follows the chronological order in which the studies were conducted.

Each experiment in these chapters will be presented with their respective specific aims, research questions (related to the general questions outlined above) and relevant hypotheses, material and method, data analysis, results and discussion sections. These experimental chapters will be followed by a general discussion chapter and finally the conclusions will be presented in the final chapter of the thesis.

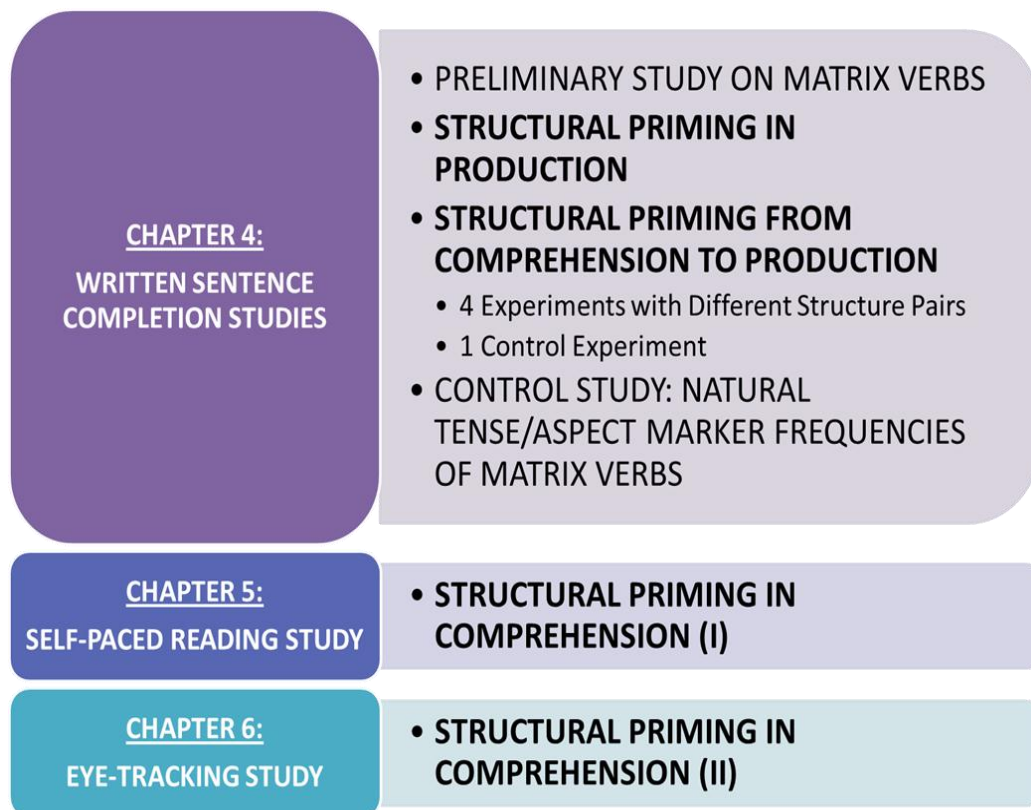


Figure 1.3: Experimental Chapters: Chapter 4, 5, and 6

CHAPTER 2

STRUCTURAL PRIMING

2.1 Introduction

This chapter aims at providing a background on those aspects of structural priming that are relevant for the upcoming experimental chapters, rather than presenting a complete review of the extensive literature on the phenomenon³. To that end, we first introduce the notion and briefly touch on its historical development. Then, some crucial properties regarding the phenomenon are outlined. In the following section, the various methodologies used to investigate priming in production, comprehension and between the two will be exemplified. After discussing the significance of structural priming for the representation of language, we will conclude this chapter by raising some unresolved questions regarding the phenomenon that the experiments in the following chapters address.

³ For such a comprehensive critical view, we refer the reader to Pickering and Ferreira (2008).

2.1.1 Notion and History

Notion

The performance of an action which is the same in some ways as previous action performed or observed by the actor is called “repetition”. Repetition is a fundamental behavioral phenomenon. It is essential in psychological experimentation as it can reflect the operation of the underlying mechanisms such as learning, development, imitation and executive control. One form of the tendency of being affected by the repetition of certain aspect of knowledge, as Pickering and Ferreira (2008) point out, is “priming”, which occurs when prior experience with a stimulus facilitates the later processing of that same stimulus or a related one (Branigan, 2007). This phenomenon is central in different domains of the cognitive psychology literature and has been scrutinized extensively. It has also been employed to investigate the nature of the knowledge of language, for instance in the form of “semantic priming”, in word recognition (McNamara, 2005). In the last few decades a ubiquitous form of priming, namely “structural priming” has received great attention in psycholinguistics (Pickering & Ferreira, 2008). Structural priming, also known as “syntactic priming” or “persistence” (e.g. Pickering & Branigan, 1999) in a narrow sense can be defined as the “tendency to repeatedly employ the same syntactic form across successive utterances” (Bock, 1986, p. 356). To provide a more comprehensive definition: it is the phenomenon “whereby the act of processing an utterance with a particular form facilitates processing a subsequent utterance with the same or a related form” (Pickering & Branigan, 1999). We adopt the latter, more inclusive definition as we consider “language processing” to cover the computation going on in both language comprehension and language production. In addition, to avoid confusion, we consistently use the term “structural priming” to refer to this phenomenon under scrutiny throughout the thesis, as the priming effects we observe are not necessarily uniquely syntactic and as the term “syntactic priming” is also sometimes used in relation to the “effects of syntactic context on lexical processing” (Pickering & Branigan, 1999). To conclude, given the observation that the tendency to be affected by the repetition of certain aspects of knowledge can inform us about

the nature of that knowledge (Pickering & Ferreira, 2008), the investigation of structural priming of linguistic constructions might enable us to gain insight into the nature of syntactic, or more generally, structural, representation (Branigan, 2007).

History

In the earlier psycholinguistic literature, priming studies were not uncommon; however, before the introduction of structural priming, these studies mostly tapped the lexical and sub-lexical levels (semantic, morphological, and phonological priming). These lexical priming experiments showed for instance that the processing time of a word such as *doctor* decreases when the subject has previously processed a semantically related word like *nurse* (Meyer & Schvaneveldt, 1971). However, there were also some early corpus studies that investigated people's tendency to repeat the syntactic forms used by their interlocutors (Pickering & Branigan, 1999; Branigan, 2007; Pickering & Ferreira, 2008): For instance, Schenkein (1980) observed that some syntactic structures were repeated in conversations between bank robbers over walkie-talkies. Another study on interviews by Weiner and Labov (1983) showed that the presence of a prior passive was a strong predictor of later passive use. In addition to these corpus studies, in an experimental study by Levelt and Kelter (1982), Dutch shopkeepers were asked questions which included a preposition or not (as in "At what time do you close?" vs. "What time do you close?"). Their answers were found to be syntactically congruent with the question ("At five o'clock." vs. "Five o'clock.")⁴. However, all these cases of structural repetition could have other possible non-syntactic explanations such as rhetorical factors or semantic relations between questions and their answers (Branigan, 2007).

These early investigations were followed by a seminal study by Bock (1986) which demonstrated that such structural persistence is present in the production of

⁴ The questions and answers with and without prepositions were originally in Dutch. "(*Om*) hoe laat gaat uw winkel dicht?" was the question with or without the preposition "*om*", and "(*Om*) vijf uur." was the corresponding answer, again with or without the preposition "*om*".

semantically unrelated sentences that do not constitute connective discourse. In this very influential study, participants were first asked to repeat either one of two alternative (prime) sentences under the guise of a memory test. One alternate was an active sentence (1) and the other was its passive counterpart (2), expressing the same truth conditional meaning. This was the priming phase of the study.

- (1) One of the fans punched the referee.
- (2) The referee was punched by one of the fans.

In the experimental phase, they were shown a semantically unrelated picture and asked to describe it. The pictures could be described with both an active and a passive sentence. For example, the picture could depict a church being struck by lightning as in the left-hand side of Figure 2.1. As a result, it turned out that the participants tended to describe the pictures using the same structure they had previously repeated. Therefore, they were more likely to describe the sample picture with an active sentence such as (1') after repeating a passive prime (1) than an active prime (2), and similarly they were more likely to use a passive (2') in their description after a passive prime (2) than after an active prime (1).

- (1') Lightning is striking the church.
- (2') The church is being struck by lightning.

The same results also holds for another alternation involving ditransitive verbs that take two objects. Ditransitive verbs like *give*, *offer*, *sell* and *read* can either take a direct object and a prepositional object (PO) recipient as in (3) or two unmarked objects, with the recipient expressed as a direct object (DO) as in (4).

- (3) A rock star sold some cocaine to an undercover agent.
- (4) A rock star sold an undercover agent some cocaine.

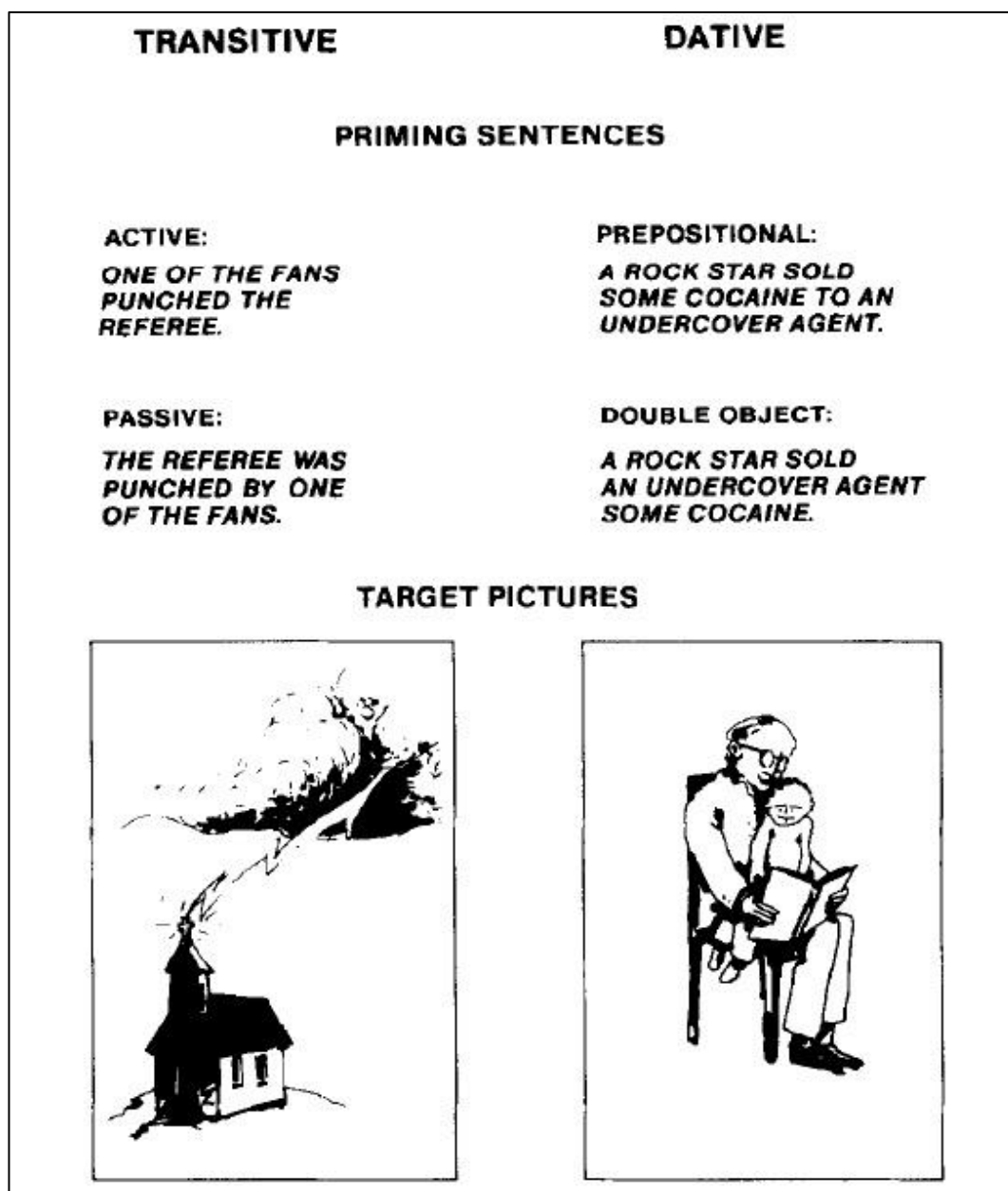


Figure 2.1: Examples of Priming Sentences and Target Pictures (Bock, 1986, p. 361)

Similarly, after repeating PO or DO primes, the participants described a picture depicting a scene with an actor and a recipient as in the one in the right-hand side of Figure 2.1. Again, they were found to get more likely to use the structure they had

previously repeated in their subsequent dative picture description: A PO sentence (3') following a PO prime (3) and a DO sentence (4') following a DO prime (4).

(3') The man is reading a story to the boy.

(4') The man is reading the boy a story.

This seminal study that showed structural priming in unrelated sentence pairs paved the way for a great number of experiments that examined various properties of the phenomenon, some of which are presented in the following section.

2.1.2 Properties of Structural Priming

A series of subsequent studies revealed some crucial properties of structural priming. Mainly, these studies verified that the effects found by Bock (1986) were indeed syntactic and did not result from lexical, thematic or metrical correspondences between the target and the prime.

First, the finding that there is priming between PO sentences with different prepositions (priming from 5a to 5c) in addition to sentences with identical prepositions (priming from 5b to 5c) eliminated the possibility that the observed effects are lexical in nature (Bock, 1989):

(5) a. The secretary baked a cake *for* her boss.

b. The secretary took a cake *to* her boss.

c. The girl handed the paintbrush *to* the man.

Furthermore, Bock and Loebell (1990) demonstrated that the effect is not thematic or event structural either, since the locative *by*-phrase in (6) was found to prime the agentive *by*-phrase of a passive sentence as in (2) and the locative prepositional

phrase in (7) primed non-locative prepositional phrases as in (3). Therefore, the observed effects cannot be due to a tendency to repeat thematic roles.

(6) The foreigner was loitering *by the broken traffic light*.

(7) The wealthy widow drove an old Mercedes *to the church*.

Finally the lack of priming between sentences with similar metrical properties but different constituent structures such as (8a) which is a non-finite clause and (8b) which is a prepositional phrase rules out the effect of metrical correspondence, as well (Bock & Loebell, 1990).

(8) a. Susan bought a book to study.

b. The girl gave a brush to the man.

These findings verified that the observed effects were indeed due to repetition of the structural form (Pickering & Branigan, 1999). Subsequent studies revealed structural priming effects using a variety of experimental methods in different modalities. They demonstrated that structural priming persists not only in language production and comprehension, but also bi-directionally between the two (Branigan, Pickering, Liversedge, Stewart & Urbach, 1995), as will be discussed in the following Methodologies section (2.2).

In conclusion, structural priming has been investigated in different constructions, in different languages and in various populations such as children, bilinguals and aphasics and as such has been the subject of an extensive literature (Pickering & Ferreira, 2008).

2.2 Methodologies

In this section, we present a selection of representative methodologies in uni-modal (in language production or in language comprehension) and in bi-modal (between language comprehension and production) structural priming to provide a basis for the methodology used in our experiments and to give a flavor of the methodological richness in this literature.

2.2.1 Structural Priming in Production

Bock (1986)'s seminal study and the follow-up studies that verified that the observed effects were indeed structural (Bock, 1989; Bock & Loebell, 1990) all investigated structural priming in spoken language production.

In addition, structural priming was also scrutinized in written language production studies. In a sentence completion study (Pickering & Branigan, 1998), subjects completed sentence fragments. In the prime sentences (9) and (10), either PO [(9a)/(10a)] or DO [(9b)/(10b)] completions could be correct; whereas in target sentences both were possible as in (11). The verb in the prime and target sentences could either be the same as in (9) and (11) (*showed-showed*) or different as in (10) and (11) (*gave-showed*):

- (9) a. The racing driver showed the torn overall . . .
b. The racing driver showed the helpful mechanic . . .
- (10) a. The racing driver gave the torn overall . . .
b. The racing driver gave the helpful mechanic . . .
- (11) The patient showed . . .

This study demonstrated that the way subjects completed target sentences was influenced by their completion of the prime sentences. It also indicated that in written language production, priming does occur when the prime and target contain different verbs; but the effect is stronger when the same verb is repeated. With additional experiments, this study also showed that priming was not affected by whether the tense, aspect and number of the verb stayed the same or differed between the prime and the target. These results led the authors to extend the lexical access model of Roelofs (1992, 1993; Levelt, Roelofs & Meyer, 1999) to include syntactic information in the lemma stratum, which will be explained in more detail in the discussion of the “lexical boost” concept in the section on the role of lexical repetition of the matrix verb in priming.

Sentence completion was also used as a task to investigate priming in spoken language production by Branigan, Pickering, Stewart and McLean (2000), where the participants repeated similar PO/DO fragments and completed the sentences in spoken language. This study showed priming effects which did not decay even when there was an intervening filler or temporal delay of equal length.

To conclude, structural priming in language production has become a well-established phenomenon in the literature and studies on production-to-production priming have been considerably informative about the representations involved in language production (Pickering & Ferreira, 2008).

2.2.2 Structural Priming in Comprehension

Despite the overall prominence of comprehension studies over production studies in the general psycholinguistics literature, there have been surprisingly fewer studies addressing structural priming in comprehension than those investigating the phenomenon from the production perspective (Pickering & Ferreira). The reason might be that structural priming is more obvious and has been historically detected first in production than in comprehension (see section 2.1.1). In production priming,

the production itself serves as the dependent variable whereas in comprehension priming the dependent variable must be defined separately. It was not until recently that structural priming in comprehension started to be directly assessed and evidence for such priming effects are also relatively more elusive than the robust effects observed in production (Branigan, 2007).

There were some early precursors of comprehension-to-comprehension priming experiments such as an investigation by Mehler and Carey (1967) which revealed that the auditory presentation of sentences with a certain syntactic structure facilitated the processing of sentences with the same form.

A more direct investigation of structural priming in comprehension was an expression-picture matching study by Branigan, Pickering and McLean (2005). This study involved prepositional phrase (PP) attachment ambiguities such as (12).

(12) The waitress prodding the clown with the umbrella

The PP *with the umbrella* can be attached either to the verb phrase (VP) “prodding the clown”, which is called “high-attachment” or to the object NP “the clown”, called “low-attachment”.

As illustrated in Figure 2.2, in the priming phase of the study, a picture disambiguated the sentence as either low or high attachment. In the experimental phase, both the picture and the sentence were ambiguous. The participants tended to choose the interpretation of the target that matched the structure of the prime, more often and more quickly. However, this priming effect occurred only when the prime and the target contained the same verb and not when they contained different verbs.

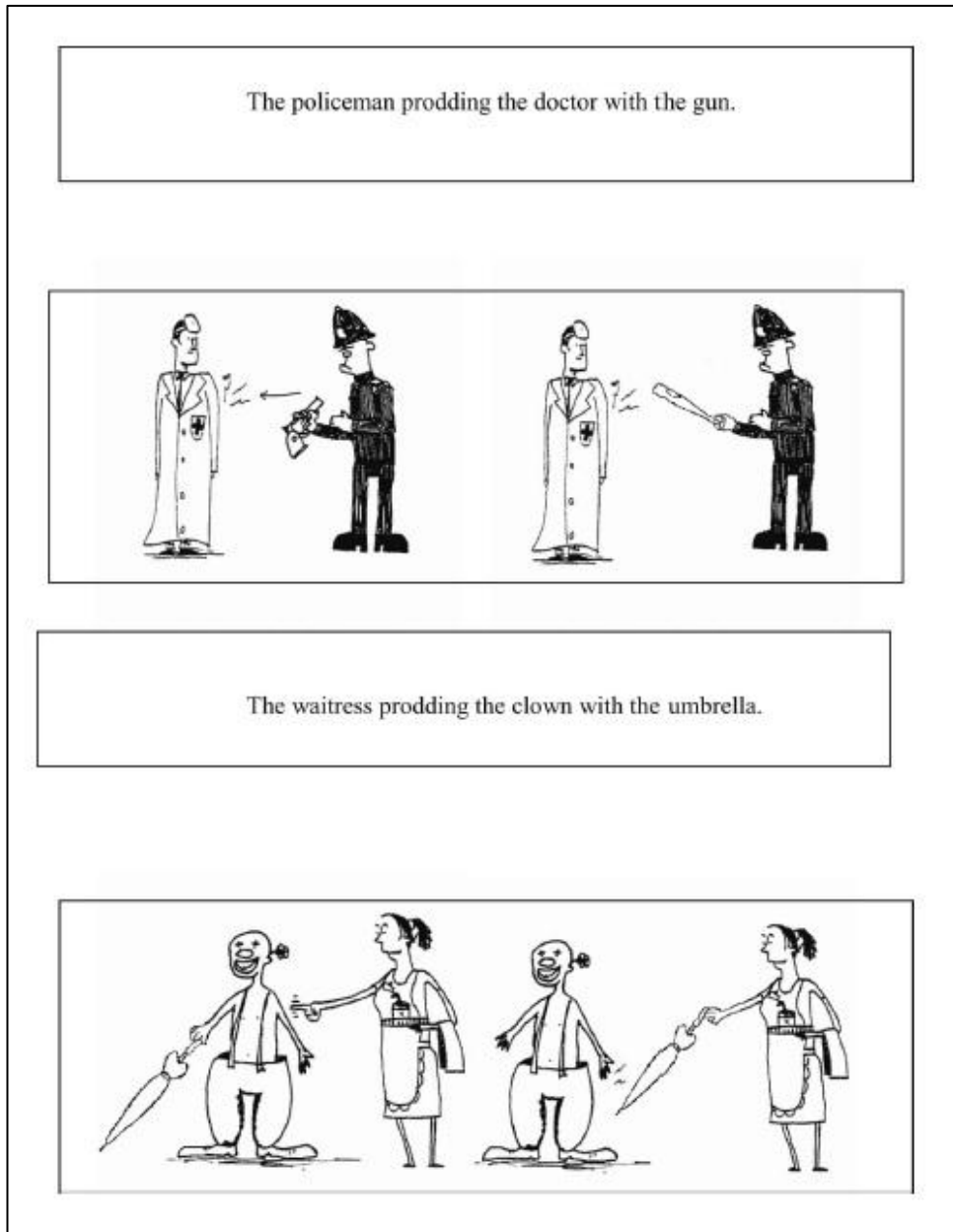


Figure 2.2: Example of a Comprehension-to-Comprehension Trial: High-Attached Prime, Ambiguous Target (Branigan *et al.*, 2005, p. 470)

Another technique used for investigating structural priming in comprehension is eye-tracking. Pickering and Traxler (as cited in Pickering & Ferreira, 2008; Branigan, 2007) used this method in their study on temporarily ambiguous reduced relatives such as (13).

(13) The defendant *examined* by the lawyer turned out to be unreliable.

The authors found that fixation durations were shorter and thus reading times were faster for such a sentence when the prime was disambiguated towards a similar reduced relative analysis than after a prime sentence disambiguated towards the main clause interpretation. However, again, it turned out that there was no priming when the verbs differed between the target and the prime.

A different eye-tracking method called the “visual world paradigm” was also used to examine structural priming in comprehension (Arai, Van Gompel & Scheepers, 2007). This method is based on the observation that listeners anticipate upcoming linguistic information and that this anticipation is reflected by their eye movements (Altmann & Kamide, 1999). Arai *et al.* (2007) first asked the participants to read (aloud) prime PO or DO sentences. Then, the participants saw a picture like Figure 2.3 and heard either a PO (14a) or a DO (14b) sentence corresponding to the picture.

- (14) a. The pirate will send the necklace to the princess.
b. The pirate will send the princess the necklace.

It turned out that while hearing the verb, participants tended to anticipatorily look at the princess (recipient) after reading a PO prime and at the necklace (patient) following a DO prime. This priming effect was again only observed when the prime and the target contained the same verb.

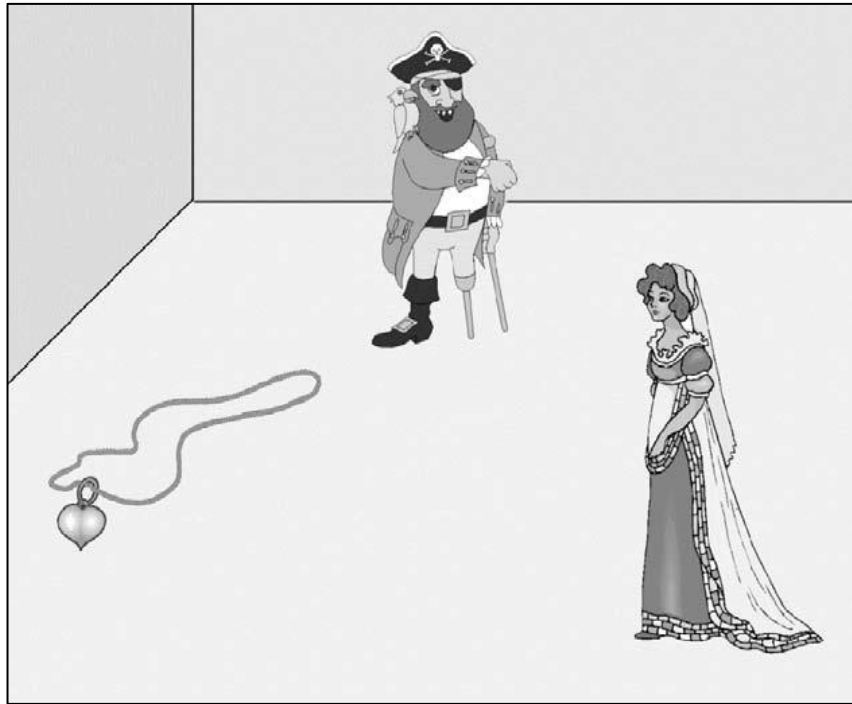


Figure 2.3: Example Scene from the Visual World Paradigm (Arai *et al.*, 2007; p. 10)

Another technique that has proved sensitive to the priming effects in comprehension is the self-paced reading paradigm. For example, Traxler and Tooley (2008) found priming effects in reduced relatives, using the self-paced moving window paradigm (Just, Carpenter & Woolley, 1982) in which the participants read sentences word by word on a computer screen. At the beginning of each trial, a series of dashes were presented on the screen in the place of the letters in the sentence. Then, the participants pressed the space bar which replaced the first set of dashes by the first word of the sentence. When they pressed it again, the first word was again replaced by the dashes and the second set of dashes was now replaced by the actual letters of the second word. This continued through the end of the sentence. Priming was measured in terms of decreased reading time, indicated by faster presses on the space bar.

Similarly, Weber and Indefrey (2009) found structural priming in German-English bilinguals during the comprehension of active and passive sentences, using a self-paced reading paradigm in which sentences were presented word by word with fixation crosses in the interval between stimuli. In this study, after reading each word, the participants pressed a button, which again provided a measure of reading time.

In addition to these behavioral methods, structural priming has also been investigated by electrophysiological and neuroimaging techniques. For instance, Urbach, Pickering, Branigan and Myler (1995) used event-related potentials (ERPs) and Weber and Indefrey (2009) used fMRI to test priming in comprehension, the details of which are beyond the scope of this thesis.

To conclude, studies in comprehension have revealed that although it may not be as robust as in production, priming persists in language comprehension, as well.

2.2.3 Structural Priming between Comprehension and Production

Studies of bi-directional priming between language comprehension and production are crucial for the issue of the shared nature of structural representation between the two modalities, which will be presented in more detail in the relevant section (2.3.2) below. Here we present two representative tasks, first for structural priming from comprehension to production and then for structural priming from production to comprehension.

Priming from Comprehension to Production

In a remarkable study, investigating whether speakers co-ordinate syntactic structure in dialogue, Branigan, Pickering and Cleland (2000) used the “confederate-scripting technique” in which pairs of speakers took turns in describing picture cards to each other and select the picture card matching their partner’s description (Figure 2.4).

Crucially, one of the interlocutors was the experimenter's confederate, following a written script while describing pictures. The scripted responses were previously manipulated in syntactic form according to the experimental condition and could dictate PO or DO constructions to serve as a prime for the naïve participant who selected the matching picture on this description and then described another picture. The study revealed that the naïve participants' descriptions tended to correspond to the form that they had heard the confederate use, indicating structural priming from comprehension to production.

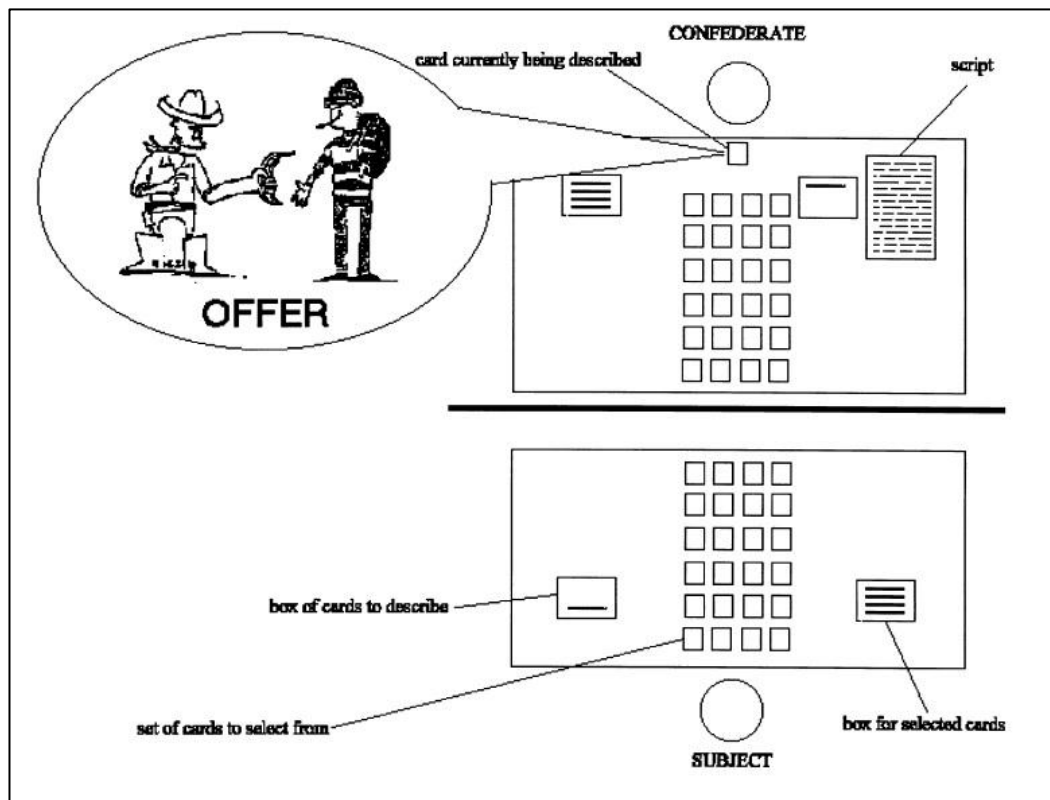


Figure 2.4: Experimental Setup for the Confederate-Scripting Task (Branigan *et al.*, 2000, p. B19)

Priming from Production to Comprehension

In addition to the above comprehension-to-production priming study, priming effects were also found from production to comprehension in a different experiment of the Branigan, Pickering and McLean (2005) study on PP-attachment, part of which was presented previously in the structural priming in comprehension section.

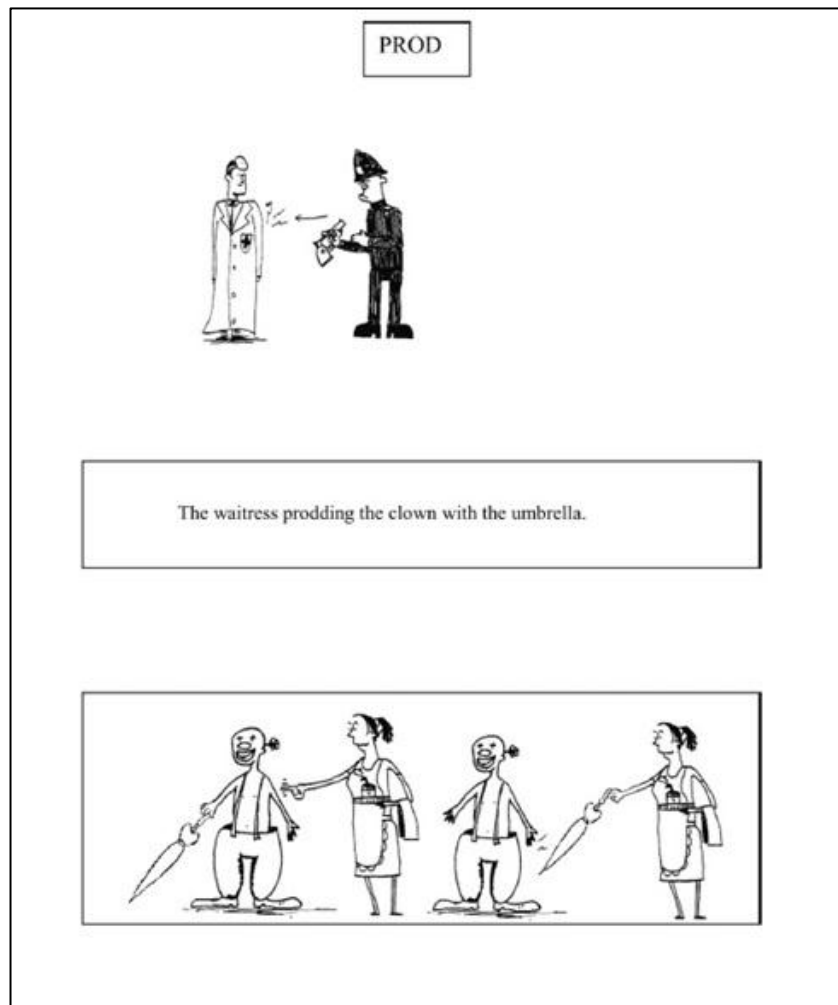


Figure 2.5: Example of a Production-to-Comprehension Trial with a High-Attached Prime
(Branigan *et al.*, 2005, p. 474)

In the production-to-comprehension priming design (see Figure 2.5), the participants first described an unambiguous picture with either high or low attachment sentences. Then, they were asked which one of the two correct alternative pictures described the ambiguous target sentence.

The results of this production-to-comprehension experiment indicated that participants were more likely to select a certain analysis in their choice of the matching picture after having described a prime picture with the same attachment type. Therefore, the comprehension of the participants was primed by their own previous production.

Overall, all these studies have demonstrated that structural priming persists not only in language production and comprehension but also between the two, with a wide range of methodologies. Especially the bi-directional persistence of priming has important implications for the representation of language, as will be more extensively discussed in the following sections.

2.3 Significance of Structural Priming

The findings of the extensive literature on structural priming have been informative in two different ways: functionally and epiphenomenally (Pickering & Ferreira, 2008). The functional value of structural priming comes from the idea that it reflects processes of learning (Chang, Dell & Bock, 2006) and serves communicative, social and imitative purposes (Pickering & Garrod, 2004). Although the functional role of structural priming is an intriguing topic of study as itself, it is its “epiphenomenal” (in Pickering & Ferreira, 2008’s terms) or “epistemic” value that is more relevant to the purposes of the present dissertation. In this section, we address the epistemic value of structural priming as a source of information for the study of mental representation and processing of language.

2.3.1 Mental Representation of Language

Psycholinguistics is a field of study which is concerned with both the mental representation of linguistic knowledge and with language processing, which is the way this knowledge is employed during production and comprehension together with nonlinguistic knowledge (Altmann, 2002; Cutler, 2005). Traditionally, psycholinguistics studies on syntactic processing have mainly focused on the processing aspect and left the investigation of the representation of language to theoretical linguistics (Branigan *et al.*, 1995). However, since the introduction of structural priming, psycholinguists have been provided with an empirical method to investigate linguistic representations.

The idea that “the tendency to be affected by the repetition of aspects of knowledge can be used to diagnose the nature of that knowledge” (Pickering & Ferreira, 2008, p. 427) and the myriad of evidence demonstrating that such a tendency persists in and between language production and comprehension led to the conclusion that structural priming taps into linguistic knowledge itself (Branigan *et al.*, 1995). Therefore, structural priming provides a powerful empirical method to shed light on the mental representation of language.

Structural priming is relevant especially for two interrelated aspects of the mental representation of language: the shared nature of the linguistic knowledge in comprehension and production, and the correspondence to the representations assumed in formal linguistic theories, which are discussed in the two subsequent sections.

2.3.2 Shared Representations in Language Comprehension and Production

In the psycholinguistic research tradition, the parser or the grammatical decoder and the formulator or the grammatical encoder have been assumed to function as parts of two distinct mechanisms, working in different directions (Kempen & Harbusch 2002; McKay, 1987; Garrett, 2000). Undoubtedly, the directionality of the translation

between strings and meanings differs in comprehension and production. However, it can be argued that these two processes interact in various ways. For instance, Pickering and Garrod (2007) have argued that during comprehension, people use the production system. More specifically, language comprehension involves the construction of simultaneous predictions at different linguistic levels, which are generated by the production system.

This theory is compatible with the body of research on the incorporation of action systems into perceptual systems in cognitive science (Hommel, Müsseler, Aschersleben, & Prinz, 2001) and implies the presence of strong links between language production and comprehension.

On the other hand, according to the “Perceptual Loop Hypothesis” (Levelt, 1989), the production system also makes use of the comprehension system for feedback at the stage of self-monitoring. According to this view, speakers edit their production *via* their comprehension system, by attending both to their internal speech before it is uttered and to their overt speech during/after production.

Beyond such mutual influence and interaction between the production and comprehension systems, it is proposed that there is a much more important parity between these two, namely shared syntactic representations (Branigan *et al.*, 1995; Branigan, Pickering & Cleland, 2000).

As presented in the previous sections, studies using structural priming paradigms, especially bi-directional priming studies, supported the hypothesis that syntactic representations are common to both the production and the comprehension systems, although the mechanisms in the two systems may be distinct.

Correspondingly, Kempen and Harbusch (2002) claim that the “internal structures” computed by the two systems are considerably similar with differences being limited to the input channel and the delivered output. They further argue that structure assembly processes are also similar, which led them to take the parsimonious theoretical stance of positing a single exemplar of the syntactic structure assembly

mechanism, called the “grammatical coder” which can switch between input channels and consequently between encoding and decoding.

It is this challenge of understanding whether syntactic representations are shared by these two systems, which has motivated this thesis to investigate structural priming from a perspective which integrates language comprehension and production.

2.3.3 Psycholinguistics and Linguistic Theory

Before discussing the status of structural priming as a bridge between experimental psycholinguistics and theoretical linguistics, the stances of different linguistic theories with respect to empirical data from psycholinguistic experimentation will be briefly outlined.

As already mentioned before, until recently psycholinguistics used to be traditionally more concerned with the processing of language, leaving the investigation of its representation to theoretical linguistics. On the other hand, theoretical linguistics can be divided into two camps with respect to the approach to mental representations: *formalists* versus *cognitivists* (Branigan *et al.*, 1995). Formalism assumes that linguistic theory aims to provide systematical generalizations about the structural properties of language, which is a collection of abstract formal objects (Katz, 1981). Consequently, properties of mental representation are not relevant for formalist linguistic theories. Conversely, cognitivism proposes that linguistic theory attempts to provide an account of language which is regarded as the mental representation of human linguistic capacities (Branigan *et al.*, 1995). This approach has been dominant in the mainstream generative grammar tradition following Noam Chomsky, who construes the study of language as part of psychology (Chomsky, 1980). Chomsky also acknowledged that in principle, evidence from psycholinguistic experiments should be relevant in the definition of the characteristics of grammars (Chomsky, 1986). However, the experimental psycholinguistic techniques available at that time were criticized for being inadequate as they did not tap into linguistic knowledge and

were mostly ignored in theory design (Branigan *et al.*, 1995; Pickering & Branigan, 1999).

There is another influential cognitive claim in linguistics, namely the “Strong Competence Hypothesis” (SCH (e.g. Bresnan & Kaplan, 1982) according to which the rules of a competence grammar might directly correspond to the stages the processor goes through during analysis. Although this assumption is appealing, it leads to a paradox when taken into account together with the strong intuition and empirical finding (revealed for instance by “garden path” effects in Bever, 1970) that language processing is incremental. Altmann and Steedman (1988) describe the paradox as follows: Left-branching grammars create trees like the one in Figure 2.6, where T stands for terminal symbols (words) and N for non-terminal symbols (phrases).

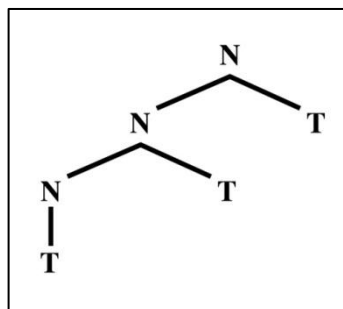


Figure 2.6: Left-Branching Tree (Altmann & Steedman, 1988, p. 193)

Assuming a rule-to-rule compositional semantics, as the sentence progresses from left-to-right, for each word an interpretation can be assigned as soon as it is syntactically incorporated into a phrase, without any problems. A right-branching

grammar, on the other hand, generates trees such as the one in Figure 2.7, which causes problems for a left-to-right parser.

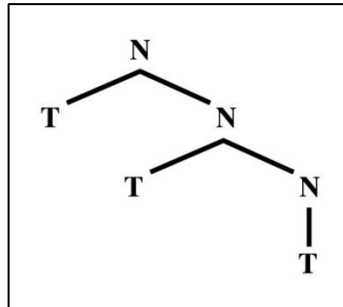


Figure 2.7: Right-Branching Tree (Altmann & Steedman, 1988, p. 194)

In this case, unless some additional tools are applied, “all comprehension must await until the end of the string, when the first complete constituent is built and can be interpreted” (Altmann & Steedman, 1988, p. 194). If human grammars are incrementally interpreted, then one would predict that left-branching structures be the norm among the languages of the world. However, this is not the case (Steedman, 1989; Altmann & Steedman, 1988). Steedman (1989) suggests that there are three alternative ways out of this paradox. One is to assume that the SCH is wrong, which is the position most linguists preferred to adopt. The second is to deny the intuitions and empirical evidence about incrementality in processing, which is what psychologists who were content with the SCH did, and the third alternative is to assume that the problem is with the syntactic theory in question and to abandon it (also suggested in Pickering & Barry, 1991). This last approach has been adopted by proponents of Lexical Functional Grammar (Bresnan, 1982), Combinatory

Categorial Grammar (Steedman, 1985; 1987; 1988) and Head-Driven Phrase Structure Grammar (Pollard & Sag, 1994).

Throughout the experiments carried out in the context of the present dissertation, we do not base our investigation of structural priming in Turkish GEN-POSS constructions on the assumptions on any specific linguistic theory. Instead, we advocate the use of psycholinguistic experimentation, specifically structural priming, for the scrutiny of not only the processing but also the representation of language. It is nevertheless possible that the level of representation accessed by the abstract priming phenomenon can be equated with the representations assumed in formal theories, as the abstract representations identified by priming are independent of meaning and sound *per se* (Pickering & Ferreira, 2008). The investigation of which formal analyses converge with which aspects of empirical findings is beyond the scope of this thesis. Nevertheless this challenging endeavor would help close the gap between theoretical linguistics and experimental psycholinguistics in the future, as Chomsky points out: “Clearly, the actual data of linguistic performance will provide much evidence for determining the correctness of hypotheses about underlying linguistic structure, along with introspective reports” (Chomsky, 1965, p. 18).

In conclusion, as Pickering and Ferreira (2008), Pickering and Branigan (1999); and Branigan *et al.* (2005) suggest, structural priming can prove valuable for the inquiry of the representation of language. These authors argue that structural priming which is found to access linguistic knowledge directly, tapping into a level of representation common to comprehension and production provides a richer and more direct source of information for linguistic theories than the traditional grammaticality judgments, as the latter already include complex cognitive processes. Therefore, linguistic theories with cognitivist claims should be open to and can highly benefit from the empirical findings of psycholinguistic studies, especially of those on structural priming.

2.4 Some Open Questions

Although our understanding of structural priming has drastically increased in the last few decades, there are still some unresolved questions about this phenomenon. The issues that are closely relevant for this thesis are the nature of representations structural priming accesses, (e.g. the extent to which they are lexically specified) and the role of lexical repetition in the persistence of priming in both language comprehension and production.

2.4.1 Nature of Representations

Despite the extensive literature on structural priming (mostly in production), the exact nature of the representations that can be primed is still not fully discovered (Pickering & Branigan, 1999).

One ongoing debate about the nature of syntactic knowledge accessed by priming is whether it is lexically independent or not (Pickering & Ferreira, 2008). On the one hand, structural priming in production occurs even when the verb of the target sentence is a different lexical item than that of the prime sentence, which implies that the representations it accesses cannot be fully lexically dependent. On the other hand, when the same verb is repeated between the prime and the target, a greater priming effect is observed in production, which implies that the representations may not be completely lexically independent, either (e.g. Pickering & Branigan, 1998). Interestingly such a “lexical boost” to priming is only discerned for open class content words, and not for function words such as prepositions and complementizers (Pickering & Ferreira, 2008). Furthermore, the findings concerning the influence of lexical repetition in comprehension are even more disparate, as it is not clear under which circumstances priming effects can be observed when the prime and the target contain different matrix verbs in comprehension tasks (Pickering & Ferreira, 2008). This will be explained in more detail in the following section.

In their account based on the lexical access model of Levelt, Roelofs and Meyer (1999; Roelofs, 1992, 1993), Pickering and Branigan (1998) explain structural priming and lexical boost in terms of the residual activation of combinatorial nodes (e.g. NP, PP) , which are akin to “phrase structure rules” (Gazdar, Klein, Pullum & Sag, 1985; Jackendoff, 1972) and lemma nodes (e.g. GIVE) which represent lexical items (Pickering & Ferreira, 2008). Figure 2.8 represents this model.

The three panels in the figure illustrate activation levels (the intensity of which is represented by the thickness of the lines) (A) before priming, (B) while the prime is produced and (C) after the prime has been produced. Accordingly, structural priming is explained in terms of the residual activation of lemma nodes, combinatorial nodes and the links between them. This model accounts for lexically independent priming in terms of the residual activation of uniquely the combinatorial nodes and lexical boost by the residual activation of both the lemma and combinatorial nodes and the link that connects the two.

To sum up, whether the level of representation that structural priming taps is lexically dependent or not is still debated.

The issue of the lexical (in-)dependence is only one aspect of the linguistic representations that can be primed, that is not fully understood. The precise nature of this level of structural representation calls for more scrutiny (Pickering & Branigan, 1999). Therefore, the investigation of a different construction from a language that is typologically different from the languages extensively studied in priming studies hitherto would contribute to the understanding of the exact nature of representations accessed by priming. In the present thesis we aim to achieve this by examining whether these representations are specified with respect to their phrasal *vs.* clausal status in Turkish, which is an agglutinative language (e.g. Lewis, 1967) with a rich morpho-syntactic structure (e.g. Csató & Johanson, 1998), allowing both phrases and clauses in the same external template. Moreover, this thesis also addresses the issue of the lexical (in-)dependence of priming by scrutinizing the influence that the repetition of the matrix verbs has on structural priming particularly in comprehension

(as explained in more detail in the following section) in a language which allows the matrix verbs to appear at the sentence-final position⁵.

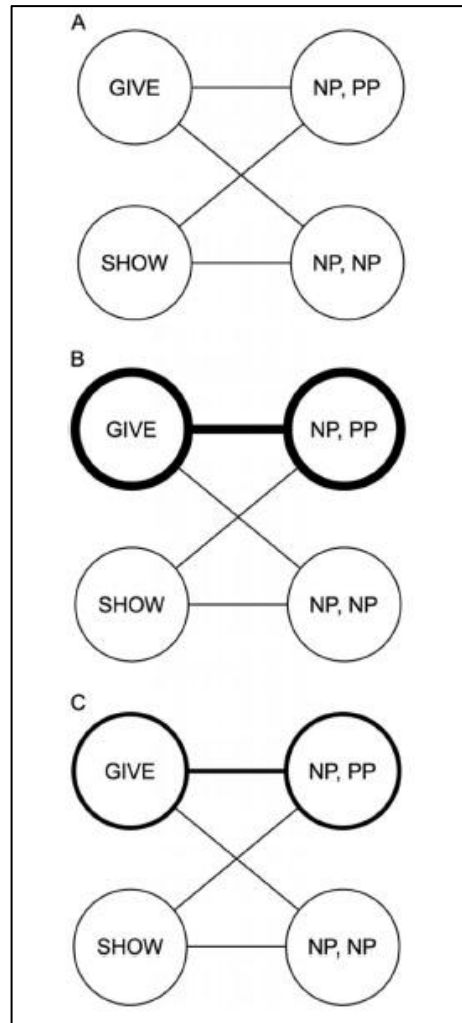


Figure 2.8: The Structural Priming Model Proposed by Pickering & Branigan (1998): GIVE and SHOW nodes are the lemma nodes and “NP, NP” and “NP, PP” nodes are the combinatorial nodes. (Pickering & Ferreira, 2008, p. 438).

⁵ Turkish has a flexible word order and although it is considered to be a canonically SOV language, it uses different word orders for different functions (e.g. Kural, 1992).

2.4.2 Role of Lexical Repetition of the Matrix Verb

A review of the general literature on structural priming demonstrates that the tendency to be affected by lexical repetition is stronger in language comprehension than in language production. There is evidence that although lexical repetition of the verb enhances priming effects in language production, it is not a prerequisite for priming as such effects are observed even when the prime and the target contain different verbs. Nevertheless, structural priming in comprehension is more volatile and the role of lexical repetition in priming in comprehension is far less understood (Pickering & Ferreira, 2008). A group of studies found that unlike in production, in comprehension, structural priming is dependent on the lexical repetition of the verb. On the other hand, there are also studies that reveal the opposite result, namely the lexical independence of priming. For example, five studies using different experimental methods (Arai *et al.*, 2007; Branigan, Pickering & McLean, 2005; Ledoux, Traxler & Swaab, 2007; Pickering & Traxler, 2008; and Traxler & Tooley, 2008) found priming when the prime and target shared the verb and not when they did not; whereas the other group of studies (Scheepers & Crocker, 2004; Thothathiri & Snedeker, 2008; and Traxler, 2008) also revealed priming effects in the absence of the lexical repetition of the verb. The partial conclusion that can be drawn from these conflicting results is that verb repetition increases priming in comprehension, however it is not clear under which conditions priming in comprehension occurs in the absence of such repetition (Pickering & Ferreira, 2008).

The present dissertation and in particular, the self-paced reading and the eye-tracking experiments presented in Chapters 5 and 6, specifically address this question on the role of verb repetition in priming during the comprehension of a head-final language, namely Turkish.

CHAPTER 3

TURKISH GENITIVE-POSSESSIVE CONSTRUCTIONS

3.1 Introduction

In this chapter, we present the two GEN-POSS constructions that are put under scrutiny in the structural priming experiments in the context of the present dissertation: Turkish Possessive NPs and noun clauses with nominalized verbs. The reason why this specific construction pair was selected was that possessive NPs and noun clauses share an identical external morpho-syntactic template, i.e. the GEN-POSS morphology despite having different (phrasal *vs.* clausal) internal structures. As such, the investigation of this pair in structural priming would shed some light on the level of representation accessed by priming. In the following sections, we first describe Turkish possessive NPs and then noun clauses with different nominalization morphemes. For the purposes of the present study, we will not critically analyze the constructions, but will rather be content with a descriptive presentation to provide a general background. In the end, we will define some criteria for distinguishing nouns and verbs to bring up the problems in the lexical categorization of nominalized verbs.

3.2 Turkish Possessive NPs

3.2.1 Properties of Turkish Possessive NPs

The NPs that express possession have the form of a GEN-POSS construction in Turkish. According to Göksel and Kerslake (2005, 2011) these constructions are “composite NPs” which consist of two consecutive NPs:

$$(NP + GEN) + (NP + POSS)$$

The first NP carries the genitive (GEN) case “-(**n**)**I**n”⁶ and expresses the possessor, modifying the second NP (e.g. *adam* “the man” in (1) below)); while the second NP carries an agreeing possessive (POSS) marker “-(**s**)**I**(**n**)”⁷ and indicates the possessed (e.g. *ev* “house” in (1) below), which is the head of the construction.

- (1) *adam-**ın** ev -**i***
 man -**GEN** house -**3SG.POSS**
 “the man’s house/the house of the man”

In such possessive NPs, the semantic relation between the possessor and the possessed can indicate true ownership as well as metaphorical relationship; for instance, in (2) this relation can indicate authorship (Kornfilt, 1997).

⁶ The capital letter in the representation of the morpheme indicates a segment that alternates according to the phonological rules of Turkish such as vowel harmony. The initial “n” is deletable and thus given in parentheses. This consonant appears in order to avoid vowel sequences and is otherwise deleted (Göksel & Kerslake, 2005).

⁷ This is the 3rd person singular form of the possessive suffix. For the complete list of the forms that the suffix can take, please see Table 3.1 below. Again, the capital letter represents a vowel that alternates according to the phonological rules of Turkish. The initial “s” is also deletable and appears to avoid vowel sequences. The final “n” is deletable as well. It is only used when another suffix follows the 3rd person singular and plural forms (Göksel & Kerslake, 2005).

- (2) Ali [Ayşe-**nin** kitab-**ın**] -1 oku -du
 Ali Ayşe-**GEN** book-**3SG.POSS** -ACC read-PF.3SG
 “Ali read Ayşe’s book”

As can be seen on sentence (2), the accusative (ACC) case marking which indicates the direct object function of the possessive NP within the main sentence is on the POSS-marked head. In addition, this construction can also play the role of possessor in a larger GEN-POSS construction as shown in sentence (3) from Göksel and Kerslake (2005, p. 183):

- (3) {{**Ayten-in** **anne -sin**} -**in** **ism -in**} -i biliyor musun
 Ayten-GEN mother-3SG.POSS -GEN name-3SG.POSS -ACC
 “Do you know *Ayten’s mother’s name*?”

A final function of these constructions is to indicate proportion or totality relations (4) or membership to a set in partitive constructions in which the modifier can be in the GEN or ablative (ABL) case (5) (Göksel & Kerslake, 2011, pp. 55-56).

- (4) para -**nin** yar-**ı**
 money-**GEN** half-**3SG.POSS**
 “half (of) the money”

- (5) resimler-**in** /-**den** birkaç-**ı**
 pictures-**GEN**/-**ABL** several-**3SG.POSS**
 “several of the pictures”

3.2.2 GEN Case and POSS Agreement

The forms that the Turkish GEN case and the corresponding POSS agreement markers can take for each person in singular and plural are demonstrated in Table 3.1 below.

Table 3.1: Genitive Case and Possessive Marking in Turkish

Function	GEN Case: -(n)In	POSS Marking: -(s)I(n)
1 st Person Singular	ben-im	-(I)m: -im, -ım, -üm, -um, -m
2 nd Person Singular	sen-in	-(I)n: -in, -ın, -ün, -un, -n
3 rd Person Singular	o-nun / -(n)In: -nin, -nın, -nün, -in, -ın, -ün, -un	-(s)I(n): -i(n), -ı(n), -ü(n), -u(n), -si(n), -sı(n), -sü(n), -su(n)
1 st Person Plural	biz-im	-(I)mİz: -imiz, -ımız, -ümüz, -umuz, -miz, -mız, -müz, -muz
2 nd Person Plural	siz-in	-(I)nİz: -iniz, -ınız, -ünüz, -unuz, -niz, -nız, -nüz, -nuz
3 rd Person Plural	onlar-ın	-lArI(n): -leri(n), -ları(n)

When the possessor and the subject of the sentence are the same, personal pronouns in GEN case are normally not used (6), they only overtly occur for contrasting/

emphasis (7) or ambiguity resolution (8) (examples from Göksel & Kerslake, 2011, p. 54-55).

(6) Bugün [**oda -m**] ʔ₁ toplay -acağ **-ım**
today room-POSS.1SG -ACC tidy -FUT -1SG
“I’m going to tidy **my room** today.”

(7) [**Ben-im oda -m**] bun-dan daha güzel
I -GEN room-POSS.1SG this-ABL more nice
“**My room** is nicer than this.”

(8) Şimdi [(**sen-in/ o -nun**) ev **-in**] -e gid -iyor -lar
now you-GEN/s/he -GEN house-POSS.2SG/3SG-DAT go -IMPF-3PL
“They’re on their way to **your/her-his house** now.”

There is also an ambiguity with respect to plurality: -lAr can express the plurality of the possessed, of the 3rd person possessor or of both. Therefore, sentence (9) is ambiguous between three different interpretations (example from Göksel & Kerslake, 2005, p. 171).

(9) a. Bilet **-ler -i** burada
ticket -PL -3SG.POSS
“**Her/his** tickets are here.”

b. Bilet **-leri** burada
ticket-3PL.POSS
“*Their* ticket is here.”

c. Bilet **-leri** burada
ticket -PL.3PL.POSS
“*Their* tickets are here.”

Göksel and Kerslake (2005, 2011) note that in informal styles the possessive suffix can be omitted when the possessor is overtly indicated as in (10)

(10) biz-im ev
we -GEN house
“our house”

Apart from such GEN-POSS structures, the 3rd person possessive suffix also plays a role in the most frequent type of noun compounds where the first noun is bare and the second noun has this -(s)I possessive suffix as in (11), which is again ambiguous (Göksel & Kerslake, 2005, 2011; example from Göksel & Kerslake, 2005, p. 104). (11) below can indicate either a “bus ticket” as a noun compound, or “someone’s (her/his) bus ticket” as a possessive NP with the GEN-marked possessor omitted.

(11) otobüs bilet -i
bus ticket -3SG.POSS
“bus ticket/her-his bus ticket”

(15) Bir gün *duyduk* [**ki** adam taşınıp gitmiş]

“One day we *heard* [*that* the man had moved away].”

However, such fully finite subordination is not very common in the language. Most subordination in Turkish is realized through nominalization through several nominalization morphemes, without overt subordinators. There are mainly three types of subordination with nominalized predicates: noun clauses, relative clauses and adverbial clauses. Noun clauses are complement clauses which function as arguments within sentences (16) just like NPs, whereas relative clauses (17) modify heads at the higher sentence level or play a pronominal role if no head exists and adverbial clauses (18) are adjuncts with adverbial functions (Kornfilt, 2003; Göksel & Kerslake, 2011; examples from Kornfilt, 2003, pp. 139, 145, 151).

(16) [Sen **-in** dün sabah ev -de yemek pişir-**diğ -in**]
you(SG)-**GEN** yesterday morning home -LOC food cook-VN-**2SG.POSS**

- i duy -du -m
-ACC hear-PF-1SG

“I heard that you had been/were cooking/cooked/had cooked food at home yesterday morning.”

(17) [Ali-nin pişir-**diğ -i**] yemek

Ali-GEN cook-VN-3SG.POSS food

“The food Ali cooked”

(18) [[Sen yemek pişir -diğ-in] **için**]
you(SG) food cook -VN-2SG.POSS **because**

ben konser-e gid-ebil -di -m
I concert-DAT go -MOD -PF -1SG

“Because you cooked, I was able to go to the concert.”

In this thesis, the focus will be on noun clauses with nominalized verbs as predicates. Accordingly we present some core properties of Turkish noun clauses in the following section.

3.3.2 Properties of Turkish Noun Clauses

Turkish noun clauses are complex NPs which play the same functions within a sentence as regular NPs: as the subject (19) or object (20) of the sentence, as a subject complement (21) or a possessor (22) (examples from Göksel & Kerlake, 2011, p. 252).

(19) [Rusça öğren-**mek**] zor

“Learning Russian is difficult”/“It’s difficult to learn Russian.”

(20) Mehmet [herkes-**in** şiir-ler-in-i beğen-**diğ-in**]-i söyle-di

“Mehmet said (that) everyone liked his poems.”

(21) Önemli olan, [Ayşe-**nin** çalış-abil-**me-si**]

“What is important is Ayşe’s **being** able to work/**that** Ayşe is able to work.”

(22) [[Ali-**nin** o kediyi al-**ma-sın-ın**] neden-**i**] yalnızlık-tı

“The reason for Ali’s **getting** that cat was loneliness.”

The predicate of the noun clause is not a fully inflected verb such as the predicate of a verbal main sentence; it is instead a verb which is nominalized by one of the five

subordinating suffixes: -mAK, -mA, -DIK, -(y)AcAK and -(y)Iş⁸. Morphologically, these suffixes occupy the slot which hosts tense/aspect morphemes in fully inflected verbs of main clauses (Kornfilt, 1997). Except the noun clauses with the infinitival -mAK and some instances of -mA, the subject of the noun clause is in GEN case and the nominalized verb carries possessive agreement with this subject (Göksel & Kerslake, 2005), which gives the clause (23a) the overall form of a GEN-POSS construction like in a possessive NP (23b).

- (23) a. Korsan [prens**es-in** gül **-düğ -ün**] -ü hatırla -dı
 pirate princess-**GEN** laugh-VN **-3SG.POSS** -ACC remember-PF.3SG
 “The pirate remembered *that the princess (had) laughed/was laughing.*”
- b. Korsan [prens**es -in** öykü-**sün**] -ü hatırla -dı
 pirate princess **-GEN** story-**3SG.POSS** -ACC remember -PF.3SG
 “The pirate remembered *the princess’s story.*”

In other words, the noun clause has the structure of an NP externally but of a verbal clause internally (e.g. Keskin, 2009; Kornfilt & Whitman, 2011a). The nominal and verbal properties of noun clauses will be discussed in further detail in section 3.4.4. For the moment it suffices to say that the reason why possessive NPs and noun clauses were chosen as the pair of interest was that they share this external morpho-syntactic GEN-POSS template despite having constituents of different grammatical roots, i.e. nouns and verbs.

⁸ As before, the capital letters in the representation of morphemes indicate those segments that alternate according to the phonological rules of Turkish such as vowel and consonant harmony. Therefore, D can take the form of t/d, K of k/ğ, I of ı/i/u/ü and A of a/e. The “y” given in parenthesis is inserted after roots that end with a vowel.

3.3.3 Nominalization Morphemes

As stated above, Turkish employs one of the five nominalization suffixes: -mAK, -mA, -DIK, -(y)AcAK, and -(y)Iş, for subordination⁹. In this section we first provide examples for each type demonstrating its general properties, and then we present a very brief outline of the various analyses on their differences. After that, we briefly mention the issue of finiteness which is closely related to nominalization, and conclude the section by providing some sample sentences that demonstrate the use of some of the subordination suffixes with certain matrix predicates to indicate the same or different meanings.

i. -mAK: Nominalizations with -mAK can be called “infinitives”. They express the citation forms of verbs and unlike the other nominalization suffixes they do not take GEN-marked subjects. Their subjects are inferred from that of the main clause embedding the noun clause (Göksel & Kerslake, 2005; sentence from p. 413).

(24) [Sokağ-a çık -mak] isti -yor -um
street -DAT go.out -VN want-IMPF -1SG
“I want [to go out].”

ii. -mA: Unlike -mAK nominalizations, most of the time -mA nominalizations have a genitive-marked subject of their own with which their POSS marker agrees. A noun clause with a predicate nominalized by the -mA suffix expresses an action, activity or state or an indirect command, request or recommendation (Göksel & Kerslake, 2005; sentence from Keskin, 2009, p. 16).

⁹ For a comprehensive historical and comparative review of corresponding subordinating suffixes in Turkic languages, we refer the reader to Johanson & Csató (1998).

- (25) [Siz **-in** gitar -1 çal **-ma -nız**] -1 isti -yor -uz
you(SG) **-GEN** guitar-ACC play **-VN -2SG.POSS -ACC** want-IMPF-1PL
“We want you to play the guitar.”

iii. -DIK: Verbs nominalized with **-DIK** also carry a POSS marker agreeing with their GEN subject. **-DIK** nominalizations denote a time simultaneous with or prior to that expressed by the predicate of the main clause. They often indicate the “factual status” of events or states; and indirect statements and questions (Göksel & Kerslake, 2005; sentence from Keskin, 2009, p. 16).

- (26) [Siz **-in** gitar -1 çal **-dığ -ınız**] -1 duy-du -k
you(SG) **-GEN** guitar-ACC play **-VN -2SG.POSS -ACC** hear-PF-1PL
“We heard your playing the guitar.”¹⁰

iv. -(y)AcAK: Nominalizations with **-(y)AcAK** are similar to those with **-DIK** in terms of their function except the fact that unlike **-DIK** nominalizations, they express a time that is relatively later than the one indicated in the superordinate clause (Göksel & Kerslake, 2005; sentence from Underhill, 1976, p. 322).

- (27) [Halil **-in** gel **-eceğ-in**] -i bil -iyor -um
Halil **-GEN** come **-VN -3SG.POSS -ACC** know-IMPF -1PL
“I know that Halil will come.”

v. -(y)Iş: The subordinator **-(y)Iş**, which also takes GEN subjects, is more restricted in its functions than the other nominalization suffixes introduced above. It is mainly

¹⁰ This is the author’s (Keskin, 2009) translation. For the purposes of the present thesis, translations such as “We heard that you play/(had) played/were playing the guitar” are all acceptable and in fact, preferred.

used to indicate the manner in which an action is performed or a single instance of an event or an action. In addition to its syntactic role in nominalization, -(y)İş also functions as a derivational suffix to form (semi-)abstract nouns from verbs (Göksel & Kerslake, 2005; sentence from Keskin, 2009, p. 16).

- (28) [Siz **-in** gitar -1 çal **-ış -ımız** -1 beğen-di -k
 you(SG)-**GEN** guitar-ACC play -VN **-2SG.POSS** -ACC like -PF-1PL
 “We liked your (way of) playing the guitar.”

The factors underlying the choice of the nominalization suffix in Turkish noun clauses have been subject to linguistic inquiry and several accounts have been put forward (Erguvanlı Taylan, 1998). A critical evaluation of these approaches is beyond the scope of this thesis; therefore we only present some representative studies in order to provide a general background and to refer the reader to the relevant sources for more thorough analyses.

Traditionally -DIK/-(y)AcAK nominalizations have been called “factive nominals” whereas -mA nominalizations have been called “action nominals” (or “non-factive nominals”) (e.g. Underhill, 1976; Pamir Dietrich, 1995; Kornfilt, 1997, 2007; Keskin, 2009). In addition Kornfilt (2003) uses the terms “indicative” for -DIK/-(y)AcAK nominalizations and “subjunctive” for -mA nominalizations. In general, the earlier studies on syntactic nominalizations (e.g. George & Kornfilt, 1981; Kennelly, 1987) mostly focused on the issue within the framework of generative grammar and considered these structures as “gerunds” (van Schaaik, 2001). In most of these studies -DIK and -(y)AcAK were viewed as “tensed” nominalizers with -DIK expressing non-future reference and -(y)AcAK expressing future reference, whereas -mA was classified as the infinitive marker (Erguvanlı Taylan, 1998). -(y)İş nominalizations, on the other hand, were either not included in the studies at all or were assigned different terminology and status in different studies (van Schaaik,

2001). For example they were called: “verbal nouns” (Lewis, 1967) or “deverbal nouns” (Underhill, 1976), “true gerundives” (Kural, 1993) and “mode nominals” (*nomina modi*) (Koptjevskaja-Tamm, 1993). One study that specifically focused on the “verbal noun” -(y)Iş was by Erdal (1998). In this study he argued that the -(y)Iş suffix has two functions: one being lexical word formation and the other being the more creative grammatical nominalization.

Kural (1993) proposed that -DIK and -(y)AcAK were tense morphemes in embedded clauses¹¹, referring to the past and the future tense, respectively; while -mA and -mAK were infinitivals¹². He argued that -(y)Iş nominalizations were the only true “gerundives”, equivalent to the English *-ing*.

On the other hand, van Schaaik (2001) suggests that the “verbal nouns” with -(y)Iş are morphological nominalizations unlike the other types of nominalizations which are syntactic. In his analysis he refers to the semantic notion of “order”¹³ and proposes that the lexical semantics of the matrix verb of the sentences plays a role in the selection of the nominalization suffix.

Finally, Erguvanlı Taylan (1998) adopts a pragmatic approach to this morpho-syntactic problem and proposes that the choice of the nominalizer is motivated by modal distinctions of epistemic and deontic modality¹⁴.

To sum up, different authors have approached noun clause types differently, basing their analyses on a variety of distributional, morphological, syntactic, semantic and pragmatic criteria, which is reflected in their terminology.

¹¹ More specifically, Kural (1993) argues that the subordinate -DIK is the matrix past -DI plus an additional -K. He also suggests that the subordinate -(y)AcAK has an additional -K, as well. These observations lead him to conclude that -K is the C⁰.

¹² Kural (1993) further argues that -mAK and -mA are also connected and that -mAK is actually composed of -mA plus a final -K.

¹³ “Entity order” is a notion of Functional Grammar (e.g. Dik, 1989), which adopts a multi-level hierarchy. Each level is the domain for the construal of a different type of linguistic entity. On the highest level a fourth-order entity, namely the speech act is represented. Propositions are third order entities, events are second order entities and individuals are first order entities (van Schaaik, 2001).

¹⁴ In Erguvanlı Taylan (1998)’s account, Palmer (1986)’s definitions of epistemic and deontic modality are adopted. Basically, in this approach, epistemic modality corresponds to the speaker’s knowledge or commitment to the truth of events or states; whereas agent oriented deontic modality reflects her/his personal emotions/feelings towards propositions.

Another issue related to nominalizations is the definition of finiteness. Göksel and Kerslake (2005) and Kornfilt (2001, 2007) call nominalizations with subordination suffixes “non-finite” clauses as opposed to “finite” clauses which have the same structure as a full sentence. On the other hand, George and Kornfilt (1981) classify the noun clause in (29a) as a “non-finite” gerund and that in (29b) as the corresponding “finite gerund”, as they define a finite phrase as one whose specifier shows subject agreement (sentences from George & Kornfilt, 1981, p. 118).

(29) a. (ben) [viski -yi iç -meğ] -e razı ol -du -m
 (I) whiskey -ACC drink-VN -DAT consent -PF-1SG
 “I consented to drink the whiskey.”

b. (ben) [kız -ım -ım viski -yi iç -me -sin]
 (I) daughter-1SG.POSS -GEN whiskey -ACC drink-VN -3SG.POSS
 -e razı ol -du -m
 -DAT consent -PF -1SG
 “I consented to my daughter’s drinking the whiskey.”

The inquiry of finiteness goes beyond the investigation of nominalizations and also extends to small clauses and exceptional case marking situations, which is beyond the scope of this study. However, the lack of a consensus on the definition of finiteness makes it challenging to question whether an embedded clause is finite or not (Kornfilt, 2007). The status of nominalized clauses with respect to finiteness, then, seems to depend on how finiteness is defined.

Another interesting observation about nominalized clauses is their relation to the matrix verbs of the superordinate clauses, as noted by van Schaaik (2001) and Erguvanlı Taylan (1998). For instance, when -DIK and -mA nominalizations are the complements of the same predicate, they might express different meanings if the matrix verb is performative, i.e. a verb of saying, (30a & b) or the same meaning if

the matrix verb is emotive (31a & b) (sentences from van Schaaijk, 2001; pp. 121, 122, 123).

(30) a. Murat, Berna-nın ev -den çık **-tığ**-ın -1 söyle-di
Murat Berna-GEN house-ABL leave-VN-3SG.POSS-ACC say -PF.3SG
“Murat said that Berna (has) left the house.”

b. Murat, Berna-nın ev -den çık **-ma**'sın -1 söyle-di
Murat Berna-GEN house-ABL leave-VN-3SG.POSS-ACC say -PF.3SG
“Murat said that Berna has (had) to leave the house.”

(31) a. Murat, Berna -nın ev -den çık **-tığ**-ın -a üzül -dü
Murat Berna-GEN house -ABL leave-VN-3SG.POSS-DAT regret-PF.3SG
“Murat regretted that Berna (has) left the house.”

b. Murat, Berna-nın ev -den çık **-ma**-sın -a üzül -dü
Murat Berna-GEN house-ABL leave-VN-3SG.POSS-DAT regret-PF.3SG
“Murat regretted that Berna (has) left the house.”

To conclude, in the experiments that will be presented in the following chapters, possessive NPs were contrasted with noun clauses mostly with -DIK nominalizations. In two experiments, -(y)İş nominalizations were also examined. The reasons why these two specific types of nominalization were selected will be explained in the following chapter.

3.4 Lexical Category Status of Turkish Nominalized Verbs

In the following sections we present some basic properties of nouns and verbs in Turkish and then discuss the lexical category status of the nominalized verbs and their distinction from deverbal nouns. As nominalizations demonstrate both nominal and verbal properties, they pose a problem for category specification (Kornfilt & Whitman, 2011b). It will become evident that this is indeed the case for Turkish noun clauses.

3.4.1 Noun-Verb Distinction and Properties of Turkish Nouns vs. Verbs

In this section, we present some general criteria for lexical category specification, and evaluate the nominal-verbal distinction in Turkish in the light of these criteria. Uygun (2009) refers to certain differences in morphological and syntactic distribution and discusses derivational properties to demonstrate the existence of a nominal-verbal distinction in Turkish, with the former covering both nouns and adjectives. She suggests the following criteria (examples (32-34) are also from Uygun, 2009):

i. Capacity to occur as arguments and inflection with case + number morphology

In many languages, nominals can occur in the syntactic position of argument, i.e. can function as the subject, object, etc. of the sentence; whereas verbs cannot. This is also the situation for Turkish. Similarly, it is only nouns that can occur with case and number (plural) morphology.

- (32) a. *Çocuk-∅ kitab -1 kutu-ya koy-du*
child -NOM book -ACC box -DAT put -PF.3SG

“The child put the book in the box.”

- b. *Çocuk koş -lar-a bak -tı
 child run -PL-DAT look at -PF.3SG
 Intended meaning: “The child looked at the runners.”

ii. Attributive Modification

Only nominals and not verbs can function as attributive modifiers in NPs. Verbs can only function as modifiers as relative clauses.

- (33) a. *doktor* kadın
 doctor woman
 “(a) woman who is a doctor

- b. **koş* adam
 run man
 Int. “(a) man who runs / who is a runner.”

iii. Tense/aspect/modality/voice and polarity markers

In many languages, only verbs can take tense, aspect, modality, polarity (affirmative, negative) and voice (reciprocal, reflexive, passive, causative, anticausative, among others) affixes. In addition, verbs can syntactically occur as predicates without any additional means such as copula which is necessary for nominals.

- (34) a. Mektup -lar Ali -ye ver -il -e -me -di
 letter -PL Ali -DAT give -PASS -MOD -NEG -PF.3SG
 “The letters could not be given to Ali.”

- b. *Ali doktor -ul -a -ma -di
Ali doctor -PASS -MOD -NEG -PF.3SG
Int. “Ali could not be made doctor.”

iv. Subordinate clause forming suffixes

Subordinate clause forming suffixes such as -mA and the others presented in the previous section can uniquely be attached to verbal stems. If the predicate of the subordinate clause is nominal, then a copula is required.

v. Derivational affixes

In addition to these criteria on syntactic and morphological distribution mentioned above, the selection of derivational affixes also distinguishes nouns from verbs. While a set of derivational affixes can only be attached to verbal stems (e.g. -GI, -(I)m, -(A)y), another group of derivational affixes targets only nominal roots (e.g. -Ik, -cIl, -IA).

To conclude, although the distinction between nouns and verbs is more clear-cut than the one between nouns and adjectives¹⁵ as suggested by Uygun (2009), there is one group of expressions that constitutes a challenge for lexical category specification by virtue of having both noun-like and verb-like properties simultaneously. These expressions are nominalizations.

3.4.2 Nominal and Verbal Properties of Turkish Nominalized Verbs

As indicated earlier, the verbal predicates of Turkish noun clauses nominalized with one of the subordinating suffixes demonstrate some nominal and verbal properties

¹⁵ The criteria proposed to distinguish nouns and adjectives are beyond the scope of this thesis. We refer the reader to Uygun (2009) for a detailed discussion of this distinction.

concurrently: externally they are noun-like, whereas internally they retain some verbal properties (e.g. Keskin, 2009; Kornfilt, 2001).

With respect to the capacity to occur as arguments and inflection with case and number, which are nominal properties, nominalized verbs show noun-like behavior (except -DIK/-(y)AcAK nominalizations that do not take plural agreement) (e.g. Kornfilt, 1997). For example, noun clauses can function as subject or object in the main clause and receive the relevant case licensed by the matrix verb.

The subject-verb agreement within the noun clause is also drawn from the nominal paradigm rather than the verbal paradigm. They have the morphology of a GEN-POSS structure with the subject in GEN case and the nominalized verb carrying an agreeing POSS marker (e.g. Keskin, 2009; Kornfilt, 1997, 2003, 2007). The latter morphological slot is the locus of the tense/agreement/modality (TAM) markers in fully inflected finite verbs (e.g. Kornfilt, 2003).

Another nominal property of noun clauses is their capacity to be the object of postpositions like “için” (*because/in order to*) (George and Kornfilt, 1981). In addition, just like nouns, noun clauses with some nominalizers (with the exception of -DIK/-(y)AcAK nominalizations) can occur with determiners like demonstratives and be coordinated with the comitative conjunction -(y)lA (Kornfilt, 1997).

On the other hand, nominalizations also demonstrate some verbal behavior. First of all, nominalizers can be attached to verbs in the causative, passive and negative forms (Kural, 1993). As discussed above, nominalized verbs with -DIK and -(y)AcAK are argued to have some TAM component (although not as richly as in a fully inflected verb) and there are also some modality implications related to the indicative-subjunctive distinction on types of noun clauses (Kornfilt, 2003).

Furthermore, nominalized verbs can assign structural case to their arguments (e.g. ACC case to their objects), which is a verbal capacity genuine nominals do not have (e.g. Kural, 1993; Kornfilt, 2007). An example of this capacity is given in the tree structure presented in Figure 3.1.

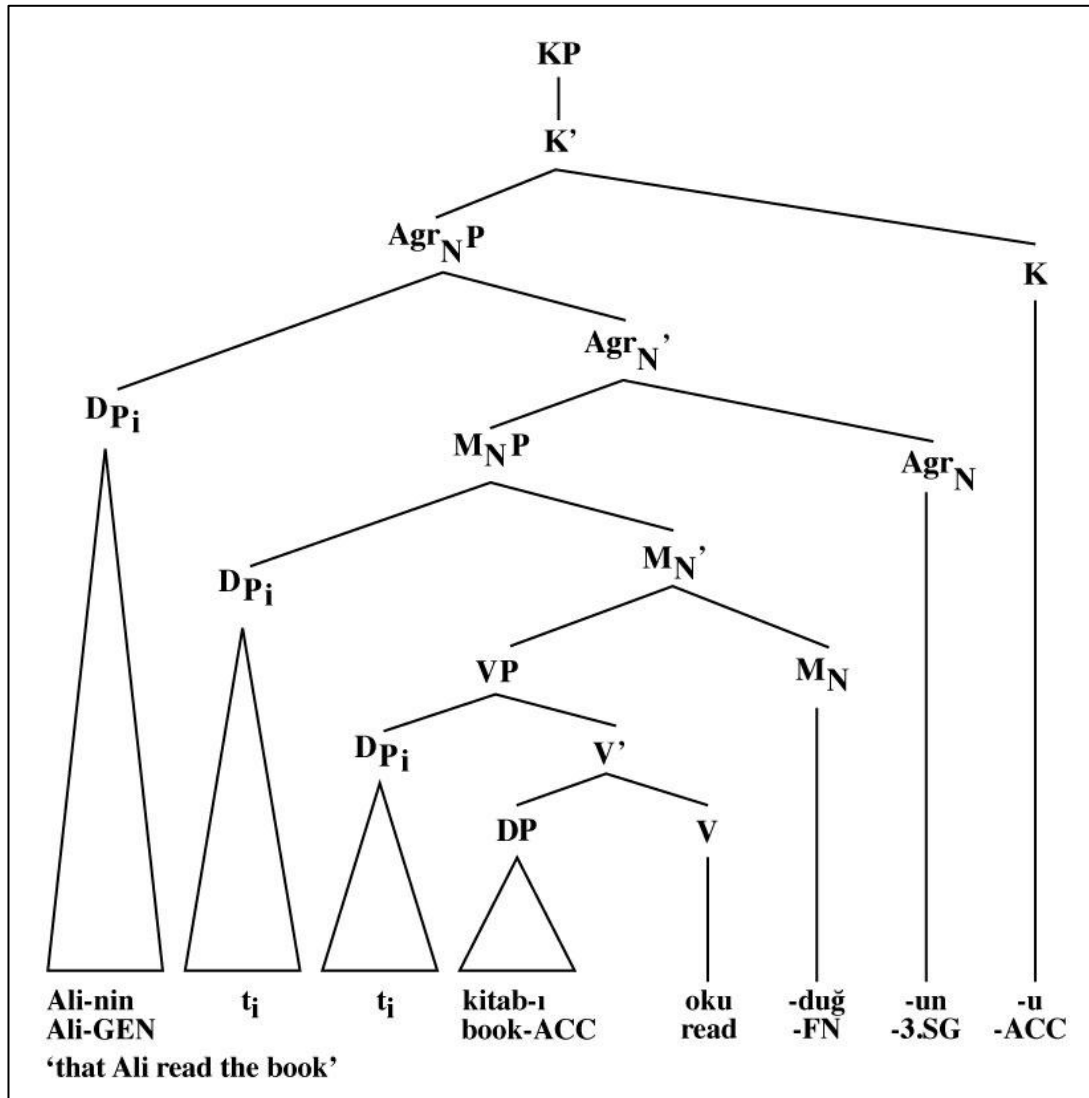


Figure 3.1: Example Tree Diagram of an ACC-Marked Subordinated -DIK Nominalization with a Direct Object (Kornfilt, 2001, p. 8)¹⁶

¹⁶ Abbreviations: *Agr*: Agreement, *Agr_NP*: Nominal Agreement Phrase, *DP*: Determiner Phrase, *FN*: Factive Nominalization, *K*: Case as a syntactic node, *KP*: Case Phrase (as a functional syntactic projection), *M_N*: Nominal Mood, *M_NP*: Nominal Mood Phrase (Kornfilt, 2001, pp. 206-7)

Finally, just like verbs, noun clauses are modified by adverbs (e.g. of frequency) and not by adjectives like true nouns (e.g. Kural, 1993; Kornfilt, 1997)

To sum up, nominalized verbs demonstrate both nominal and verbal behavior; however, the extent to which they have nominal *vs.* verbal properties changes from one nominalizer to the other, as evident from the above discussions. Overall, -DIK/-*(y)AcAK* nominalizations seem to be the most verbal of all types (Kornfilt, 1997); whereas the debated status of *-(y)Iş* nominalizations seems to be considerably more noun-like than the other types (e.g. Kornfilt, 1997; Kural, 1993, van Schaaik, 2001). The experiments presented in the following sections investigate priming effects in *-DIK* and *-(y)Iş* nominalizations in comparison with possessive NPs.

3.4.3 Comparison between Turkish Nominalized Verbs and Deverbal Nouns

Although noun clauses with nominalized verbs have both noun-like and verb-like properties, they are distinct from both fully inflected verbs (as explained previously) and non-derived nouns. Therefore, in spite of their nominal external morphology, they are not lexicalized deverbal nouns due to the verbal properties they retain. In Turkish, there is a separate group of lexical nouns that are derived from verbal stems by suffixes such as *-gI*, *-ç*, and *-(I)m*. For example, the following nouns are derived from verbal stems: “*çal-gı*” (*play[V]-musical instrument[N]*), “*inan-ç*” (*believe[V]-belief[N]*), and “*kavra-m*” (*grasp[V]-concept[N]*) (Kornfilt, 1997, p. 448-449). These deverbal nouns are syntactically indistinguishable from non-derived nouns in that they can be pluralized, preceded by indefinite article and determiners and are not marked with passive morphology; whereas nominalized verbs retain some verbal properties like passivization capacity as explained in the previous section (Kornfilt, 1997).

One interesting situation emerges with the double function of the *-(y)Iş* suffix¹⁷.

¹⁷ A similar situation can be observed for the *-mA* suffix (van Schaaik, 2001). For the present purposes, the discussion will be limited to *-(y)Iş*.

As noted in Erdal (1998), in addition to the syntactically productive nominalizer -(y)Iş which is used in subordination; there is also a derivational homophonous -(y)Iş which derives nouns from verbal stems like the other suffixes presented above (-gI, etc.). For instance: the deverbal nouns “çekiliş” (*lottery*), “yanlış” (*error*), “giriş” (*entrance*) and “çıkış” (*exit*) are stable items in the lexicon; whereas the use of the nominalizer -(y)Iş is productive. Like other nominalizers, the subordinating -(y)Iş shows some verbal properties that deverbal nouns with the -(y)Iş derivational suffixes do not. To give a few examples, nominalizer -(y)Iş can co-occur with passive and negation markers or assign case (Erdal, 1998). Finally, the process of how some nominalized verbs end up in the lexicon as deverbal nouns, namely the lexicalization process, constitutes an interesting question deserving further inquiry (van Schaaijk, 2001).

In conclusion, nominalized verbs which are distinct from deverbal nouns and which function as the verbal predicate of embedded noun clauses are put under scrutiny together with possessive NPs, in the structural priming experiments, presented in the following chapters (4-6). As the two constructions demonstrate the same external GEN-POSS morphology despite containing constituents of different grammatical types, they provide a unique alternation to be tested for the present purposes. On the basis of the linguistic background provided in this chapter, the next three chapters will present the structural priming experiments carried out with the written sentence completion, self-paced reading and eye-tracking methods.

CHAPTER 4

WRITTEN SENTENCE COMPLETION STUDIES

4.1 Preliminary Study on Matrix Verbs

4.1.1 Aim

This preliminary study constitutes the basis for the upcoming structural priming experiments. Its aim was to determine the set of matrix verbs¹⁸ the direct object of which can be both possessive NPs and noun clauses with nominalized verbs. In other words, this preliminary study investigated the frequency with which matrix verbs naturally co-occur with two types of complements, which are the two GEN-POSS constructions: possessive NPs and noun clauses.

¹⁸ We use the term “matrix verb” to refer to the main verbal predicate of the stimulus sentences. For the sentences with possessive NPs, there is only one verbal predicate which is the main or matrix verb. For the sentences with embedded noun clauses on the other hand, there are two verbal predicates: (1) the nominalized verb, which is the predicate of the subordinated noun clause and (2) the fully inflected main verb, which is the predicate of the superordinate sentence and which has the whole embedded clause as its object. We call this latter finite verb “matrix verb” as well.

4.1.2 Research Questions and Hypotheses

In accordance with the purposes of the main structural priming studies, it was necessary to determine a group of matrix verbs that take possessive NP and noun clause complements equally frequently in neutral contexts.

Therefore, the main research question addressed in this preliminary study was “which matrix verbs can be used equally frequently with possessive NP and noun clause complements in written natural language production”.

The hypothesis was that although a group of verbs can grammatically take direct objects of both types in principle, in actual language production, native speakers of Turkish would prefer to use some of these verbs with certain types of complements and others with the alternate type, as a result of which, only a subset of these verbs would be genuinely used equally frequently with both types of GEN-POSS constructions. However, we did not have a directed hypothesis with respect to which lexical items would be included in this genuinely “balanced”¹⁹ set.

4.1.3 Material and Method

The method used in this preliminary study was a written sentence completion task in which participants were asked to complete sentence fragments in any way that they liked. In this sense, this was a free sentence completion study except the fact that the acceptable grammatical completions would be the structures of interest as a result of the specific way in which we constructed the fragments.

¹⁹ Throughout the thesis, we will use the term “balanced verbs” to indicate the matrix verbs that allow both possessive NP- and noun clause-complements equally frequently.

Participants

28 native speakers of Turkish volunteered to participate in this study. Of those participants, 13 were female and 15 were male. Their mean age was 31.07 years. All the participants were computer literate.

Stimuli

In the preparation of the experimental stimuli, the first step was the selection of a set of verbs that can take not only nouns but also nominalized verbs in the GEN-POSS structure as their direct object. We checked the METU Turkish Corpus (Say, Zeyrek, Oflazer & Özge, 2004) to ensure that there were actual instances of the use of both types of constructions with the selected matrix verbs that are considered to grammatically allow both noun- and nominalized verb-complements. These verbs are indicated in Table 4.1²⁰.

By virtue of being transitive, all of these verbs can take possessive NPs as their direct object. In addition, as they are mostly verbs expressing a cognitive process or some type of communication (in the form of indirect statements), they also allow for complements that are embedded noun clauses containing a verbal predicate nominalized by the -DIK suffix (Göksel & Kerslake, 2005).

²⁰ To give a general idea of the frequencies of these matrix verbs, we report the entries for each verb from the “Word Frequency Dictionary of Written Turkish” (Göz, 2003). The numbers represent the frequency of each verb among a total of 975,141 words of a written language pool: *anla-* (to understand): 1040, *gör-* (to see): 2750, *düşün-* (to think): 1439, *gizle-* (to hide): 58, *hatırla-* (to remember): 251, *açıkla-* (to explain): 277, *onayla-* (to approve): 35, *öğren-* (to learn): 560, *duy-* (to hear): 866, *hisset-* (to feel): 386, *gözlemle-* (to observe): 32, *unut-* (to forget): 426, *anlat-* (to tell): 933, and *kanıtla-* (to prove): 56.

Table 4.1 The 14 Matrix Verbs Allowing Both Noun- and Nominalized Verb-Complements Grammatically that were Tested in the Preliminary Study

anla- (<i>to understand</i>)	öğren- (<i>to learn</i>)
gör- (<i>to see</i>)	duy- (<i>to hear</i>)
düşün- (<i>to think</i>)	hisset- (<i>to feel</i>)
gizle- (<i>to hide</i>)	gözlemle- (<i>to observe</i>)
hatırla- (<i>to remember</i>)	unut- (<i>to forget</i>)
açıkla- (<i>to explain</i>)	anlat- (<i>to tell</i>)
onayla- (<i>to approve</i>)	kanıtla- (<i>to prove</i>)

Then, in order to determine the frequencies of co-occurrence of these matrix verbs with nouns and nominalized verbs, we prepared a written sentence completion task. The experimental sentence fragments had the form of sentence (1) below.

- (1) Korsan-Ø prenses -in hatırla -dı
 pirate -NOM princess-GEN remember-PF.3SG
 “The pirate remembered the princess’s / that the princess

These sentences were composed of the NOM subject, which was always an animate noun; a second animate noun in the GEN case; the blanks to be filled in and finally the predicate of the sentence which was one of the matrix verbs from Table 4.1, inflected for past tense/perfective aspect and 3rd person singular. The same word order was used in all the following experiments, as well. The GEN-marked noun indicated that the participants needed to provide a word carrying appropriate POSS-agreement to get a grammatically acceptable form. Thus the GEN-noun could

combine with the words participants provide in the blanks which would necessarily carry a POSS agreement marker, to form either a possessive NP or a noun clause depending on whether the participants choose to use a noun or a nominalized verb. Given the fact that the construction created by the addition of the participants' completions functioned as the direct object of the sentence, the responses unavoidably had to carry the ACC case marker, as well. Consequently, the blanks in sentence (1) above could either be completed with a noun like "öykü-sü-nü" (*story-3SG.POSS-ACC*) as in (1'a) or a nominalized verb like "gül-düğ-ün-ü" (*laugh-VN-3SG.POSS-ACC*) as in (1'b).

(1') a. Korsan-Ø [presents -in öykü-sün].....'ü hatırla -dı
 pirate -NOM princess-GEN story-3SG.POSS-ACC remember-PF.3SG
 "The pirate remembered [the princess's story]."

b. Korsan-Ø [presents -in gül -'düğ-ün].....''ü hatırla -dı
 pirate -NOM princess-GEN laugh-VN-3SG.POSS-ACC remember-PF.3SG
 "The pirate remembered [that the princess (had) laughed / was laughing]."

Afterwards, the electronic booklets containing the stimulus fragments were prepared. All items were presented as individual sentence fragments. In other words, they were not related to each other and did not constitute connected discourse. In each booklet there were 7 experimental fragments and 21 filler fragments. The fillers were also sentence fragments with blanks, but were semantically unrelated to and structurally different from the experimental items (e.g. sentence 2). In order to ensure that the fillers not have any influence on the completion of the experimental fragments, the latter were construed in a way that they could be completed only with adjuncts or arguments in a different case than the ACC. For example, the filler in (2) could be completed with an adverbial phrase such as "son anda" (*at the last moment*):

- (2) Ajan, havaalanı-na son an.....-da..... ulaş -tı
agent airport -DAT last moment -LOC arrive-PF.3SG
“The agent arrived at the airport at the last moment.”

The 14 matrix verbs were presented in 2 different main versions: half of the participants read sentences with the first group of 7 verbs (the ones the left-hand side of Table 4.1) and the other half read sentences with the second group of 7 verbs (the ones on the right-hand side of Table 4.1). The reason for this division was that with all 14 matrix verbs and the 3 fillers per each experimental fragment, the task would be too long and exhausting for the participants.

The fillers were presented in a fixed order, but the experimental fragments were interspersed among the fillers in 4 different patterns. Consequently, as the 14 verbs were divided into 2 groups and as there were 4 different orderings within each group, each participant was randomly assigned to one of the 8 different versions of the 28-item (7 experimental + 21 filler fragments) booklets. A sample version of the booklets can be observed in APPENDIX A. For each sentence fragment, we prepared four empty boxes representing the blanks, as shown in Figure 4.1.

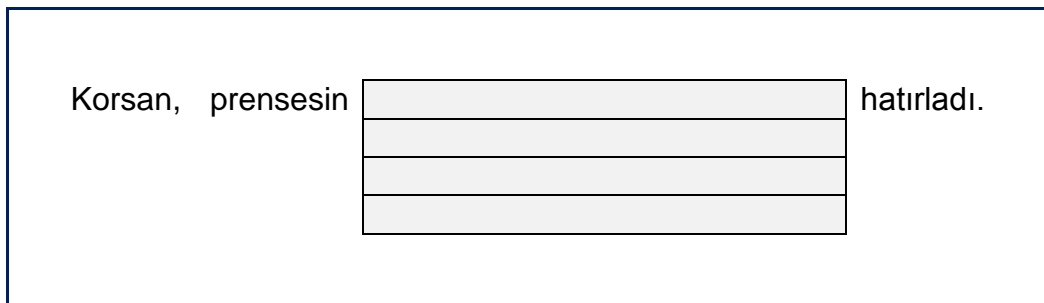


Figure 4.1: Sample Experimental Fragment from the Preliminary Study

The participants were asked to fill in at least one of these boxes. The reason why more than one empty box was provided for each fragment was that we chose to make it possible for the participants to provide alternative completions, if they preferred to do so.

Procedure

The electronic booklets of sentence fragments were sent out to participants *via* e-mail as a Microsoft Word Document attachment. In a separate attachment file, the instructions and informed consent information were presented, followed by a mini-questionnaire asking for basic demographic information and containing some questions about the participants' reading and writing habits (APPENDIX B). The body of the e-mail also contained some basic information about the study and asked the participants to respond by e-mail if they agree to participate in the study.

The instructions specified that the fragments should be completed without thinking too much and as quickly as possible. The participants were free to fill in the blanks however they like, as long as the resulting sentence was one that could be used in everyday language. They were asked to write at least one word for each fragment, but they could of course use more words in the blanks if they wished. It was indicated that only the first box needed to be filled in and that the other three boxes were optional. If they had alternative completions in mind, they could write them down in these boxes one after the other.

After reading the instructions and informed consent information, the participants responded to the questions in the survey and saved the file into their computers. Then, they completed the sentence fragments by typing their responses in the boxes and again saved the file. In the end, they sent back these two files to the experimenter as e-mail attachments. Any questions that they had, before starting the task or after completing it, were answered by the experimenter.

4.1.4 Data Analysis

The completions provided by the participants for each experimental fragment were grouped into three categories: “nominal”, “verbal” and “other”. When the completions consisted of more content than a single lexical item, they were classified according to the grammatical category of the head of the resulting construction. For instance, simple nouns like “kedi-sin-i” (*cat*-3SG.POSS-ACC), deverbal nouns like “çiz-im-ler-in-i” (*draw-ing*-PL-3SG.POSS-ACC), adjectival phrases like “masum yüz-ün-ü” (*innocent face*-3SG.POSS-ACC), and nouns modified by relative clauses like “yap-tığ-ı hata-yı” (*make-REL*-3SG.POSS *mistake*-ACC, meaning *the mistake [she] made*) were coded as “nominal completions”²¹. On the other hand, noun clauses like “hata yap-tığ-in-i” (*mistake make*-VN-3SG.POSS-ACC, meaning *that [she] made a mistake*) and embedded (*wh*-) interrogative clauses like “neden güldüğ-ün-ü” (*why laugh*-VN-3SG.POSS-ACC, meaning *why [she] laughed*) were coded as “verbal completions”. Finally, all other types of completion as well as ambiguous responses such as “geleceğini”, which can be interpreted both as a noun (“geleceğ-in-i”: *future*-3SG.POSS-ACC meaning *[her] future*) and a nominalized verb (“gel-eceğ-in-i”: *come*-VN-3SG.POSS-ACC meaning *that [she] will come*) were categorized as “other” types of completion.

4.1.5 Results

In conformity with the exploratory nature of the study, the data were analyzed descriptively. The results indicated that 13 of the 14 matrix verbs indeed yielded completions of both types. The verb “gizle-” (*to hide*), for which the METU Turkish Corpus had provided examples with both noun and nominalized verb-complements, did not receive any verbal completions in this study; in other words, the participants

²¹ To clarify the terminology, we should note that “nominal completions” (or “noun complements”) are basically the ones including “nouns” as part of possessive “NPs”; whereas “verbal” completions are the ones including “nominalized verbs”, which are part of “noun clauses” and which undergo the process of “nominalization”. Therefore, the basic “nominal” completions are distinct from and should not be confused with “nominalizations”, “nominalized verbs” and “noun clauses”, which are all “verbal” completions.

preferred to fill in the fragments containing this verb with nominal completions only. Furthermore, it was observed that fragments with some matrix verbs were more often completed with nouns whereas others were mostly completed with verbal responses and yet another group of fragments with seven “balanced” verbs were completed almost equally frequently with nouns and nominalized verbs. Figures 4.2 and 4.3 demonstrate the percentages of different completion types provided for these matrix verbs. The grouping was based on the distribution given in Figure 4.2 when the irrelevant “other” completion types were omitted and the percentages of nominal and verbal completions were calculated based on the data excluding the “others”. Figure 4.3 from which Figure 4.2 was extracted illustrates the original data including this third category.

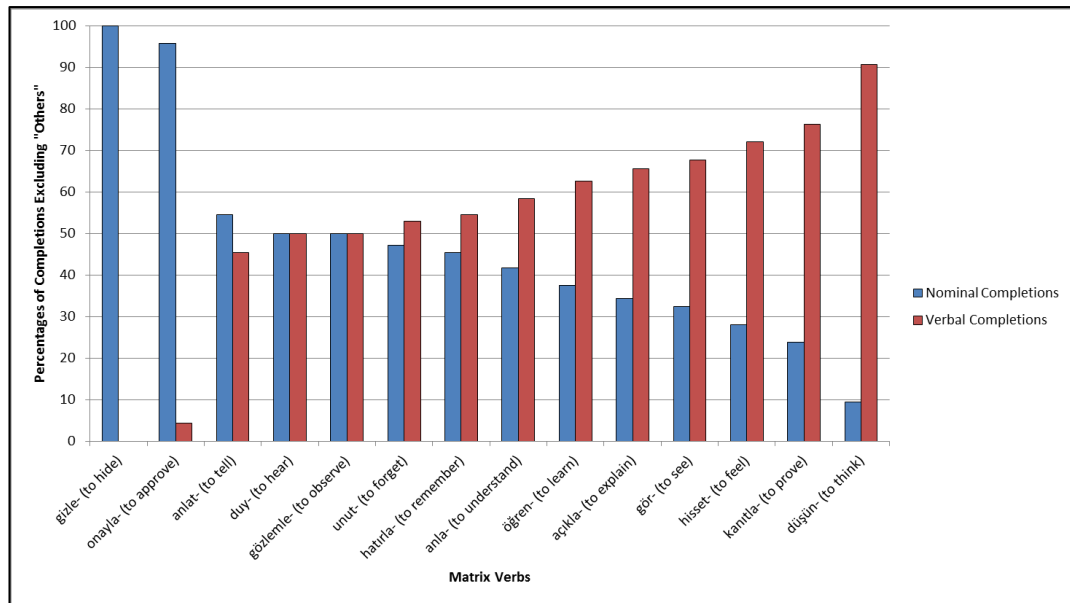


Figure 4.2: Percentages of “Nominal” and “Verbal” Completions for Each Matrix Verb (with the “Other” types of completions being excluded from the data set)

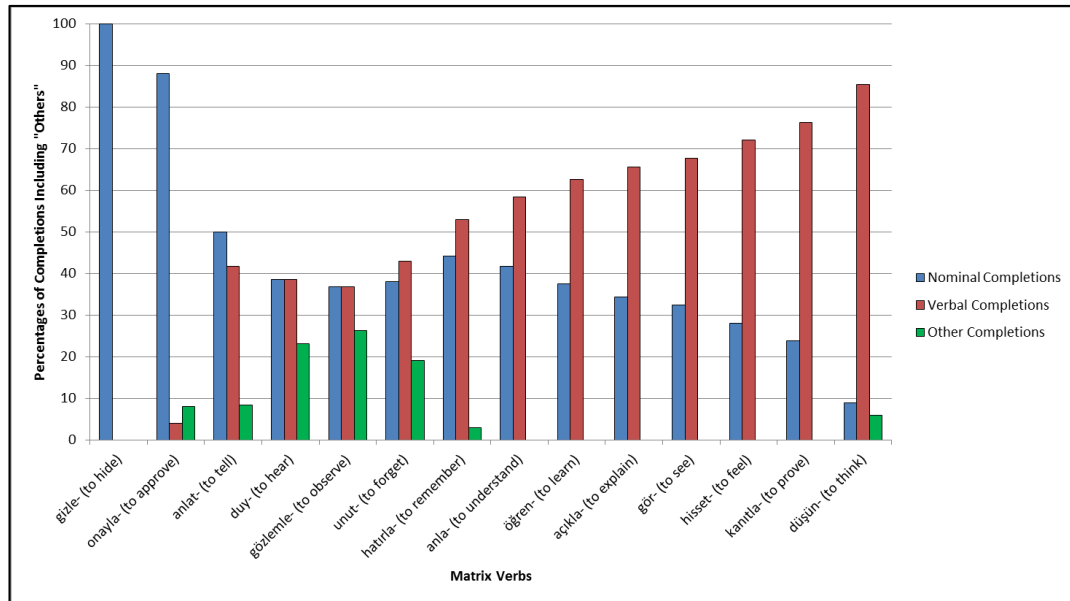


Figure 4.3: Percentages of “Nominal”, “Verbal” and “Other” Completions for Each Matrix Verb (with the “Other” types of responses being included in the data set)

In the light of these result, we divided the matrix verbs into three groups according to the type of complements with which they mostly co-occur: “nominal-biased”, “verbal-biased” and “balanced” verbs. In other words, the data provided us with a profile for each verb. It should be noted that the three verb groups were not discrete and the criteria for division was determined to meet practical considerations. In the upcoming experiments, it would not be feasible to use all 14 verbs as this would make the task too long and demanding for the participants. Moreover, as can be observed on Figure 4.2, the verbs that are grouped at the two extremities of the scale were clearly biased towards one type of complement, especially the two nominal-biased verbs: “gizle-” (*to hide*) and “onayla-” (*to approve*) and the verbal-biased “düşün-”. On the other hand, two verbs namely “duy-” (*to hear*) and “gözlemle-” (*to observe*) were perfectly balanced. For the classification of the other balanced verbs, we used the following criteria: the proportion of nominal or verbal completions would at most be 15% higher or lower than 50%, the equilibrium. In other words, the

maximum difference between the rates of nominal and verbal completions would be 30%. This gives us the grouping shown in Table 4.2.

Table 4.2 Three Matrix Verb Groups: Nominal-Biased, Balanced and Verbal-Biased

Nominal-Biased	Balanced	Verbal-Biased
gizle- (<i>to hide</i>) onayla- (<i>to approve</i>)	anlat- (<i>to tell</i>) duy- (<i>to hear</i>) gözlemle- (<i>to observe</i>) unut- (<i>to forget</i>) hatırla- (<i>to remember</i>) anla- (<i>to understand</i>) öğren- (<i>to learn</i>)	açıkla- (<i>to explain</i>) gör- (<i>to see</i>) hisset- (<i>to feel</i>) kanıtla- (<i>to prove</i>) düşün- (<i>to think</i>)

Accordingly, the verbs “gizle-” and “onayla-” constitute the nominal-biased group; whereas “açıkla-” (*to explain*), “gör-” (*to see*), “hisset-” (*to feel*), “kanıtla-” (*to prove*) and “düşün-” (*to think*) are the verbal-biased verbs. Above all, the “balanced” verbs that are used with both nominal and verbal complements almost equally frequently are these 7 verbs: “anlat-” (*to tell*), “duy-” (*to hear*), “gözlemle-” (*to observe*), “unut-” (*to forget*), “hatırla-” (*to remember*), “anla-” (*to understand*) and “öğren-” (*to learn*). These seven verbs were later used as the matrix predicate in the following structural priming studies.

4.1.6 Discussion

This study had the aim of determining the “balanced” matrix verbs that take noun and nominalized verb-complements almost equally frequently in natural written

language production. The suggestion that in Turkish native speakers might have a stronger tendency to use either possessive NPs or noun clauses for some verbs even though these verbs are grammatically capable of taking both types of complements was supported by the results. Those verbs that actually turned out to co-occur with both types to almost the same extent (i.e. “balanced” verbs) were also identified to be later used in the structural priming experiments. This ensured that the matrix verbs of the target sentences in the priming studies were not naturally biased to either nouns or nominalized verbs in neutral contexts.

In the future, a thorough corpus study to identify the co-occurrence statistics would prove valuable to complement the findings of the present experimental study.

4.2 Structural Priming of Possessive NPs vs. Noun Clauses in Production

4.2.1 Aim

The purpose of this study was to investigate structural priming in the production of Turkish GEN-POSS constructions. To the best of our knowledge, this is the first inquiry of structural priming in Turkish. It seeks to understand whether there is priming with respect to the choice of noun- and nominalized verb-complements in GEN-POSS constructions. This would shed some light not only on the level of representation that is accessed by structural priming, but also on the processing of Turkish GEN-POSS constructions.

We would also like to note that our choice of stimuli is rather different than the alternations investigated in most structural priming studies in the literature. In those studies, the pairs often consisted of structures that can convey the same truth-conditional meaning with two different forms such as the active/passive or the PO/DO alternations presented in the chapter on structural priming (e.g. Pickering &

Ferreira, 2008)²². Most priming studies in language comprehension, on the other hand, were based on the disambiguation of sentences which can have two different interpretations. The present study is different from all these studies in terms of the relationship between the items that constitute the pairs: the constructions under scrutiny here share the same identical external morpho-syntactic template (the GEN-POSS template and in addition the ACC case marking) despite involving inner constituents with roots belonging to different grammatical categories. This is in conformity with the aims, scope and research questions of the present dissertation. Given that Turkish morpho-syntax plays similar roles as those uniquely assumed by syntax in some other languages, the pair consisting of Turkish noun phrases and noun clauses provides a unique opportunity to investigate word-internal and sentence-level functioning (as well as their interaction) by means of priming.

4.2.2 Research Questions and Hypotheses

Research Question 1

Q4.1.1: Is there structural priming between a sentence fragment with a matrix verb allowing only a nominal (possessive NP) or only a verbal (noun clause with a nominalized verb) complement and a target fragment with a matrix verb that allows both? In other words does the production of a noun or a nominalized verb in a prime fragment increase the tendency to produce the same kind of GEN-POSS construction in a subsequent target fragment?

²² One exception was a study on priming in the production of high and low-attachment relative clauses in German by Scheepers (2003). Pickering and Ferreira (2008) point out that the effects found in that study might be influenced by non-syntactic, meaning-level representations. Although the present study is also different from the study by Scheepers (2003) in terms of the nature of the alternation tested, meaning-related factors might also be involved here. Given that morpho-syntax interfaces with semantics on the one hand and with phonology on the other, it is not impossible that both levels might influence priming at the morpho-syntactic level. As priming effects can presumably be observed at any linguistic level (Pickering and Ferreira, 2008), this possibility does not pose any problems for the present study. Therefore, we stick to the term “structural priming” given the morpho-syntactic properties of the constructions. However, this difference from the other studies in the literature should be kept in mind while interpreting the results (particularly those on the nature of priming) throughout the thesis.

Hypothesis 1

H4.1.1: The hypothesis was that target fragments would be completed with more nouns following nominal primes and with more nominalized verbs following verbal primes. We expected that having produced either a possessive NP or a noun clause would increase the tendency to produce the same kind of GEN-POSS construction in subsequent sentence fragments. To put it differently, we expected facilitating priming effects due to the repetition of a structural form. Such effects would also show that structural priming in production proves to be independent of the lexical repetition of the matrix verb, as the prime and target fragments contained different verbal predicates.

Research Question 2

Q4.1.2: A secondary but related question was about the level of representation that structural priming (in the sense of the facilitation of processing which is due to the repetition of the same type of GEN-POSS construction) accesses. The question was whether the level of representation that structural priming taps was specified with respect to the information on the phrasal *vs.* clausal status of the construction. In other words, we investigated whether the distinct phrasal *vs.* clausal properties Turkish possessive NPs and noun clauses with nominalized verbs would be primed.

Hypothesis 2

H4.1.2: We hypothesized that if the two types of GEN-POSS constructions are specified with respect to their phrasal *vs.* clausal status at the level of representation which is accessed by structural priming, then we would expect distinct priming effects for possessive NPs and noun clauses with nominalized verbs. If the GEN-POSS construction is treated as a single unit on the other hand, the two types would demonstrate the same behavior. Our prediction was that priming in this context would be sensitive to the phrasal *vs.* clausal distinction.

4.2.3 Material and Method

In this study, the methodology of choice was again written sentence completion. However, unlike the preliminary study presented in the previous chapter, the present study was designed in order to examine priming effects. Therefore, the participants were asked to fill in pairs of sentence fragments which constitute the primes and the targets.

Participants

21 native speakers of Turkish volunteered to participate in this study. Of those participants, 10 were female and 10 were male, 1 person chose not to indicate her/his gender. Their mean age was 26.48 years. All the participants were graduate students at Middle East Technical University and none of them had participated to the preliminary study.

Stimuli

In order to investigate whether there is priming between a prime fragment with a matrix verb allowing only a nominal (possessive NP) or only a verbal (noun clause with a nominalized verb) complement and a target fragment with a “balanced” matrix verb allowing both, we presented participants with sentence fragments that constituted prime-target pairs.

The “balanced” verbs such as the verb “öğren-” (*to learn*) that were found to be equally frequently used with both types of complements as a result of the preliminary study, functioned as the predicate of the target fragments (e.g. in sentence (3')) in this study. Each “balanced” matrix verb appeared twice throughout the experiment: once following a “nominal prime” and once following a “verbal prime”. “Nominal prime” fragments (3a) contained a transitive matrix verb that can only take nouns as direct objects (e.g. “kır-”: *to break*), whereas the matrix verb of the “verbal prime” fragments (3b) (e.g. “zannet-”: *to suppose*) only allowed nominalized verb-

complements. For instance the nominal prime in fragment (3a) can only be completed with a noun such as “pencere-sin-i” (*window-3SG.POSS-ACC*), while the verbal prime in fragment (3b) can only be completed with a nominalized verb such as “ayrıl-dığ-ın-ı” (*leave-VN-3SG.POSS-ACC*).

(3a) **Nominal Prime Sentence:**

Çiçekçi, berber-in kır -dı
 florist barber-GEN break-PF.3SG
 “The florist broke the barber’s”

(3b) **Verbal Prime Sentence:**

Sunucu, kameraman -in zannet -ti
 presenter camera operator -GEN suppose -PF.3SG
 “The presenter supposed that the camera operator”

(3') **Target Sentence:**

Muhasebeci, avukat -ın öğren-di
 Accountant lawyer -GEN learn -PF.3SG
 “The accountant learned the accountant’s / that the accountant”

It should be noted that the matrix verbs of the prime fragments in this study were distinct from the nominal- or verbal-biased verbs of the preliminary study such that in principle the latter can grammatically take both nominal and verbal complements, but tend to be used with one type more often than the other in production; whereas the former cannot take both types of complements, at all. They are grammatical with either nominal or verbal complements and not with both. This enabled us to manipulate the type of completion the participants provide in the prime fragment. As

for the target fragments, the choice of matrix verbs ensured that under normal circumstances, both types of complements should be expected to an almost equal extent. Any statistical tendencies towards one or the other type could thus be accounted for by the effect of the priming context.

For this experiment, we prepared 7 different stimulus sets, each containing 4 sentence fragments (two primes: one nominal and one verbal like 3a and b and two targets like 3'). Just like in the preliminary study, each sentence consisted of the NOM subject, which was always an animate noun; a second animate noun in the GEN case; the blanks to be filled in and finally the matrix verb as the predicate of the sentence. The GEN-marked noun indicated that the participants needed to provide a word carrying appropriate POSS-agreement to get a grammatically acceptable form. Thus the GEN-noun could combine with the words participants provide in the blanks which would necessarily carry a POSS agreement marker, to form either a possessive NP or a noun clause. Given the fact that the construction created by the addition of the participants' completions functioned as the direct object of the sentence, the responses unavoidably had to carry the ACC case marker, as well. The matrix verbs of the nominal primes that allowed uniquely noun complements were: "beğen-" (*to like*), "ara-" (*to look for/to call*), "al-" (*to take*), "oku-" (*to read*)²³, "getir-" (*to bring*), "öde-" (*to pay*) and "kır-" (*to break*). The matrix verbs of the verbal primes that allowed uniquely noun-clause complements were: "zannet-" (*to suppose*), "varsay-" (*to hypothesize*), "iddia et-" (*to claim*), "haber ver-" (*to inform*), "ima et-" (*to imply/to hint*), "san-" (*to presume*) and "farz et-" (*to assume*). Finally the matrix verbs of the target fragments were the "balanced" matrix verbs of the previous sentence: "anlat-" (*to tell*), "duy-" (*to hear*), "gözlemle-" (*to observe*), "unut-" (*to forget*), "hatırla-" (*to remember*), "anla-" (*to understand*) and "öğren-" (*to learn*). As mentioned above, each of the 7 "balanced" verbs were used twice (following nominal and verbal primes); however in those target fragments where the same

²³ Although a few native speakers later reported that the verb "oku-" (*to read*) can also take noun clause complements, this use does not seem to be very frequent and limited to the co-presence of an additional LOC object like "gazete-de" (*newspaper-LOC*), which was not the case in the stimuli.

matrix verb was repeated, different subjects and GEN-marked (animate) nouns were employed.

In addition to the 7 experimental sets, each containing 4 fragments, there were 42 fillers. As in the preliminary study, the filler were semantically and structurally different from the experimental items. They could not be grammatically completed with any word marked with POSS agreement and they did not contain the same matrix verb as the experimental fragments. For instance the filler in (4) below could be filled in with an adverb like “kıyasıyla” (*fiercely*). The matrix verbs of all the sentence fragments were inflected with the 3rd person singular past tense/perfective aspect marker: -DI.

- (4) Sporcu, rakibi-yle yarış -tı
athlete rival -COM compete-PF.3SG
“The athlete competed with his rival”

Consequently, 3-page A4-sized booklets each containing 70 sentence fragments with blanks (28 experimental items and 42 fillers) were created (APPENDIX C). Unlike the previous study, the stimuli were not presented in the form of electronic booklets, but rather as printed hard copies. In addition, the participants filled in the blanks using a pen or pencil instead of typing in their completions.

The ordering of the items was randomized for each participant with the condition that there were three fillers between the experimental fragments, that the targets immediately preceded their primes and that in addition to the fillers there was at least one different prime-target pair between those pairs that contained the same target matrix verb.

Procedure

The participants were handed out the 3-page stimulus booklets printed on A4 size paper, the informed consent form (APPENDIX D) and a sheet with the instructions and a mini-questionnaire asking for basic demographic information (APPENDIX E).

The aim of the study and the instructions were also presented orally by the experimenter. The participants were asked to read the instructions and informed consent form, sign the latter, respond to the questions in the survey and then complete the fragments. They were free to fill in the blanks however they liked, as long as the resulting sentence was one that could be used in everyday language. They were asked to write at least one word for each fragment, but they could use more words in the blanks if they wished.

When the participants finished the task, they submitted the completed booklets, the questionnaire and the informed consent form to the experimenter. Any questions they had at any point were answered by the experimenter. The whole process took about 20 minutes.

4.2.4 Data Analysis

In the preparation of the data for analysis, all the target completions provided by the participants in the blanks were coded as “nominal”, “verbal”, “other”, “ambiguous” and “technically problematic”. The criteria for this classification was as follows: As in the previous study, all kinds of noun phrases, adjectival phrases, and nouns modified by relative clauses like “ver-diğ-i yüzüğü” (*give-REL-3SG.POSS ring-ACC* meaning *the ring that [s/he] gave*) were coded as “nominal” completions.

On the other hand, noun clauses like “bağır-dığı-ın-ı” (*shout-VN-3SG.POSS-ACC*, meaning *that [s/he] shouted / was shouting*) and embedded (wh-) interrogative clauses like “ne yap-tığı-ın-ı” (*what do-VN-3SG.POSS-ACC*, meaning *what [s/he] did / was doing*) were coded as “verbal completions”, as in the preliminary study.

Completions which were grammatically acceptable, but different than the two expected completion types (i.e. nominal or verbal types) were coded as “other” completions. To illustrate, if a fragment such as “Adam kadın-in unuttu.” (Man woman-GEN forget-PF.3SG, meaning: *The man forgot the woman’s/that the woman.....*) was completed with “hesab-in-a bak-may-ı”(account-3SG.POSS-DAT look at-VN-ACC, resulting in: *The man forgot to look at [the woman’s] account*), which contained both a POSS-marked noun which agrees with the GEN-noun and a nominalized verb as the direct object of the matrix verb, that completion was coded as “other” type of completion.

Completions that can have two different, competing interpretations like “geleceğini” (which can be read as the noun *future* or the nominalized form of the verb *to come* due to the homophony of the derivational and nominalizer forms of the -(y)AcAK suffix) were coded as “ambiguous” completions.

Finally, when the completions did not create a grammatically acceptable sentence overall, for instance, when the participant forgot to write the second word of her/his response as in “*Adam kadınınçizimindeki (?).... hatırladı.” (possibly intended meaning: *The man forgot the (?) in the woman’s drawing.*), such completions were coded as “technically problematic”.

4.2.5 Results

The data coded as described in the previous section were subjected to a 2 x 2 Repeated Measures Analysis of Variance (ANOVA)²⁴ with the following variables:

²⁴ The ANOVAs for all the priming experiments reported in this thesis were based on participant analysis, except for study 4.4 which was analyzed on the basis of items in accordance with its specific purposes as explained in section 4.4.5.

Design: Frequency of completions

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (the grammatical category of the prime completion: nominal or verbal as manipulated by the experimenter)
- ii. “Target Type” (the grammatical category of the target completion: nominal or verbal as provided by the participant)

Dependent Variable: Frequency of target completions (We used the raw scores of nominal and verbal completions in target fragments. The range of scores was 0-7. We counted how many completions were provided for the four prime-target pairings: nominal prime-nominal target, nominal prime-verbal target, verbal prime-nominal target and verbal prime-verbal target.)

We did not choose to encode “Target (Completion) Type” as the dependent variable and compare the percentages of nominal and verbal target completions (defined as the ratio of one to the other). Instead, we opted for encoding “Target Type” as an independent variable, because our focus was on the special relation between “Prime Type” and “Target Type”. This design enabled us to test our hypothesis that there might be a special interaction between “Prime Type” and “Target Type” such that target fragments would be completed with more nominal (than verbal) complements following a nominal prime, and with more verbal (than nominal) complements following a verbal prime.

Figure 4.4 illustrates the counts of target completions in the nominal, verbal and other three types of coding categories. The following ANOVA is based on the scores of nominal and verbal completions, dismissing the three other categories, which were very infrequent as Figure 4.4 illustrates²⁵.

²⁵ The ANOVA was thus based on the raw scores of nominal and verbal completions. When the percentages of the two types of completion were recalculated after dismissing the three other

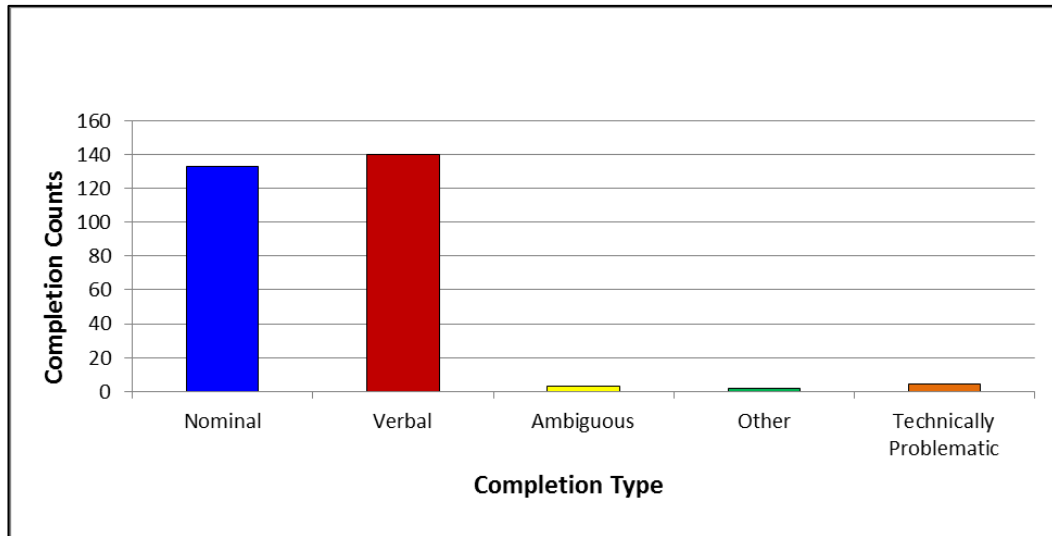


Figure 4.4: Counts of Completion Types Provided for Target Fragments

The ANOVA did not indicate any significant main effects of either “Prime Type” or “Target Type”. The latter means that participants provided an almost an equal number of nominal and verbal completions for target fragments overall, as illustrated in Figure 4.4. Although there were slightly more verbal completions than nominal completions, this difference was not statistically significant.

More crucially, the ANOVA revealed a significant interaction between “Prime Type” and “Target Type”: $F(1, 20) = 17.388, p < .001, \eta_p^2 = .465^{26}$. The crossing of the lines in Figure 4.5 represents this interaction.

categories, the ANOVA revealed the same effects as the present one. Given that there were so few such other completions, we adopted the 0-7 range of raw scores in this analysis to capture the actual proportions of nominal and verbal target completions.

²⁶ Partial eta squared (η_p^2), is a value indicating the effect size. It is defined as “a version of eta squared that is the proportion of variance that a variable explains when excluding other variables in the analysis. Eta squared is the proportion of total variance explained by a variable, whereas partial eta squared is the proportion of variance that a variable explains that is not explained by other variables”(Field, 2009, p. 791). η_p^2 ranges from 0-1. An effect of around .5, as found in the present ANOVA, is considered a medium-sized effect.

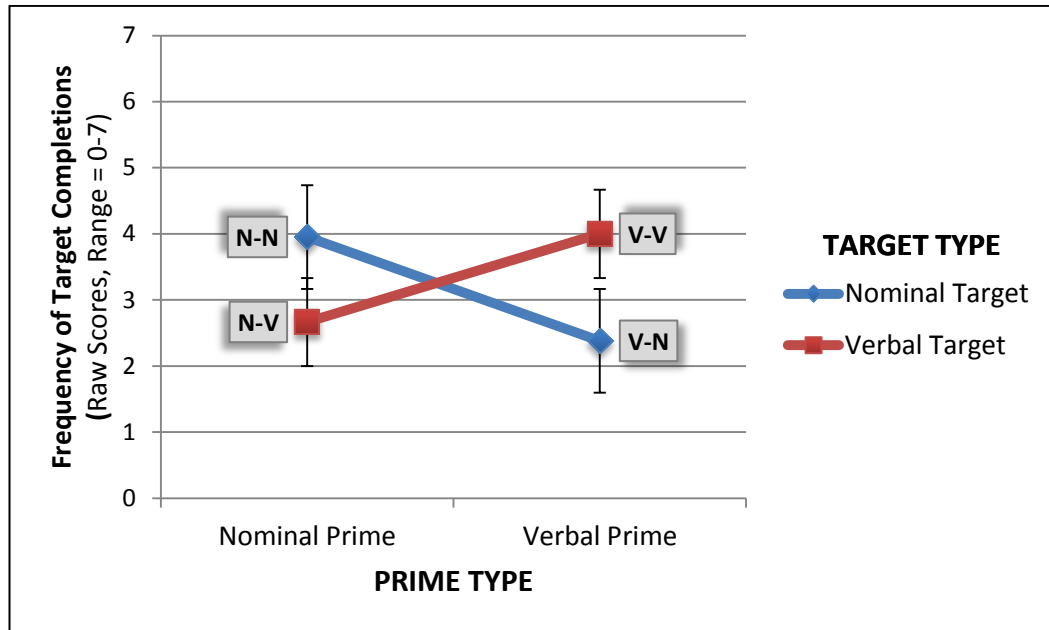


Figure 4.5: Repeated Measures ANOVA “Prime Type” x “Target Type” Interaction Plot²⁷:
Priming Study in Production

This plot (Figure 4.5) shows that participants filled in the target fragments with more nominal completions ($M=3.95$, $SE=.28$) than verbal completions ($M=2.67$, $SE=.295$) after nominal primes, and with more verbal completions ($M=4.00$, $SE=.267$) than nominal completions ($M=2.38$, $SE=.271$) after verbal primes, as expected.

4.2.6 Discussion

The results of this first structural priming study in Turkish indicated that the target fragments were completed with more nominal responses than verbal responses

²⁷ In this and all the following interaction plots the error bars denote SE (Standard Error). The data labels “N-N”, “N-V”, “V-N” and “V-V” represent the four experimental conditions: the first letter expresses the prime type and the second letter expresses the target type (whether they are nominal (N) or verbal (V)).

following a prime fragment with a matrix verb that allows only nominal complements. Similarly, the target fragments that followed a verbal prime were completed with more verbal responses than nominal responses. This statistically significant interaction indicates that there is a facilitating effect of structural priming in the written production of Turkish GEN-POSS constructions, verifying our hypothesis (H4.1.1). Furthermore, as the matrix verbs in prime and target fragments were different, it can be concluded that structural priming in the production of these constructions is independent of the lexical repetition of the matrix verb.

In addition, the absence of a significant main effect of target type suggests that participants provided an almost equal amount of nominal and verbal completions overall. This in turn indicates that the preliminary study was indeed successful in determining the “balanced” verbs that allow nominal and verbal completions equally frequently.

The results also verify our hypotheses about the level of representation accessed by structural priming (H4.1.2). The observed priming effects point to the conclusion that the structural representations identified by priming are specified with respect to the information on the phrasal *vs.* clausal nature of the constructions. This result is compatible with the findings of a research project on structural priming in English “Concealed Questions” (Bahadır & Polinsky, 2010a; 2010b; 2011), which also suggested that structural priming was sensitive to the distinction between noun phrases and embedded clauses²⁸. In addition, despite their outer noun-like morphology, noun clauses with nominalized verbs still retain some of their clausal properties.

To conclude, although nouns and nominalized verbs occur within the same outer morpho-syntactic template, participants seem to be sensitive to the constituents of that template. This implies that grammatical information regarding the syntactic type

²⁸ This project was carried out at Harvard University, in parallel with the present study and was supported by the research grant awarded to the first author during the academic year 2009-2010 by TÜBİTAK 2214 Program. We acknowledge this support. The research project will be presented in somewhat more detail in the following section (4.3), as it was comprehension-to-production study.

of the root (i.e. whether the root is nominal or verbal) might be accessible. In other words, during processing, “propositional information” (that the nominalized verb of the noun clause presumably expresses) seems to be available, as the noun clause is distinct from the noun phrase as a “clause” although it takes its agreement morphology from the nominal paradigm. Since the outer morphemes are indistinguishable, the external morpho-syntactic template (GEN-POSS agreement and ACC case marking) cannot be the source of priming. Priming effects on noun clauses can thus only be originating from the verbal root itself, the nominalization morpheme (e.g. -DIK) or both. The following set of experiments is designed to specifically address this question.

4.3 Structural Priming of Possessive NPs vs. Noun Clauses from Comprehension to Production

In this section, we present five experiments investigating structural priming from comprehension to production. Four of these experiments are the main priming studies and the fifth one is a control experiment. First, the general aim, research questions and hypotheses, material and method and data analysis that are common to all four experiments are presented. Then, each experiment is individually presented with its specific properties, results and discussion. The four main experiments in this set contrast the following constructions: Simple Nouns vs. -DIK Nominalizations (4.3.5), Deverbal Nouns vs. -DIK Nominalizations (4.3.6), Deverbal Nouns vs. -(y)Iş Nominalizations (4.3.7) and -(y)Iş Nominalizations vs. -DIK Nominalizations (4.3.8). After each experiment is exposed, the overall results are reviewed and discussed. At the end of the section, we present a tense/aspect marker control experiment (4.3.11) that investigates structural priming of simple nouns vs. -DIK nominalizations from comprehension to production with matrix verbs in different tense/aspect inflections.

4.3.1 Aim

The general aim of the four main comprehension-to-production experiments was to investigate bi-directional priming in Turkish GEN-POSS constructions (with prime-target pairs containing different matrix verbs). The reason for investigating priming from comprehension to production was that this effect would persist across modalities if the representations tapped by priming were shared by the two systems.

A second purpose of these studies was to extend the results of the previous experiment (4.2) to a wider range of grammatical root types (not only simple nouns but also nouns derived from verbs) and nominalization morphemes (-(-y)İş nominalizations in addition to -DİK nominalizations). This could enable us to identify whether the source of priming is the root or stem information, the suffixes or both. The proper source(s) of priming could not be answered by the previous experiment (4.2) so far.

By investigating nouns derived from verbs and nominalizations with a different suffix, this set of studies also seeks to provide some processing evidence for similarities and differences in the extent to which different types of nouns and nominalized verbs demonstrate noun-like and verb-like behavior.

Finally, the fifth experiment, which is a control study, aims at understanding whether the results are independent of the tense/aspect marking on the matrix verb of the sentence. This experiment also tests structural priming from comprehension to production on simple nouns and -DİK nominalizations, but unlike the other experiments in this set, the tense/aspect marker on the matrix verbs of the sentences is not uniquely the past tense/perfective aspect marker -DI, but instead, a group of different inflections. The control experiment is necessary because of the ((morpho-) phonological) similarity of the tense marker -DI on the matrix verb and the -DİK marker used in the noun clause structures.

4.3.2 Research Questions and Hypotheses

Research Question 1

Q4.2.1: Is there structural priming from comprehension to production in Turkish possessive NPs and noun clauses with nominalized verbs? More explicitly, does the comprehension of a noun or a nominalized verb in a prime sentence increase the tendency to produce the same kind of GEN-POSS construction in a subsequent target fragment? In other words, are the representations accessed by priming shared between production and comprehension?

Hypothesis 1

H4.2.1: The hypothesis was that target fragments would be completed with more nouns following nominal primes and with more nominalized verbs following verbal primes, just like in the structural priming study in production. We expected that having read either a possessive NP or a noun clause would increase the tendency to produce the same kind of GEN-POSS construction in subsequent sentence fragments. Therefore we expected facilitating priming effects of comprehension on subsequent production (irrespectively of the repetition of the same matrix verb in the prime-target pair), which would provide support to the proposition that the representations identified by priming are shared by the two modalities.

Research Question 2

Q4.2.2: Are structural priming effects observed for different types of nouns and nominalized verbs? If yes, then what is the source of these effects? Is it the root, the stem, the suffixes, or the complete form?

Hypothesis 2

H4.2.2: We hypothesized that similar effects would be found for different noun and nominalized verb types. We did not have directional hypotheses with respect to the locus of priming. However, we assumed that different result patterns would provide support for a number of possible explanations:

- If priming effects originate from the distinctions between the grammatical categories of the roots, then we can expect deverbal nouns and all nominalized verbs to show similar behavior in contrast to simple nouns.
- If the effects result from the differences between the types of the stems, then deverbal nouns should align with simple nouns rather than nominalized verbs.
- If it is the suffixes that lead to the priming effect, then derivational suffixes and subordinating suffixes might align or diverge depending on whether it is uniquely the presence/absence of suffixes that is relevant for priming. Furthermore, different types of subordinators/nominalizers might also behave alike or differently depending on whether priming is sensitive to their functional distinction.
- It is possible that the combination of the roots/stems and specific suffixes, i.e. the emerging form of the lexical item, which is the outcome of some morphological and morpho-syntactic operations, cause the observed priming effects. In this case, all the different constructions can be expected to demonstrate idiosyncratic behavior.

Research Question 3

Q4.2.3: The last question relates specifically to the processing of Turkish nominalized verbs which function as the predicate of subordinated noun clauses: To what extent do nominalized verbs show nominal and verbal properties in priming contexts? Is there a difference between -DIK and -(y)Iş nominalizations in this regard?

Hypothesis 3

H4.2.3: Given the theoretical literature review on -DIK and -(y)Iş nominalizations, we can hypothesize that -DIK might demonstrate more verbal behavior and less nominal behavior than -(y)Iş in a priming task, as well. As -(y)Iş nominalizations are considered to be less verbal than -DIK nominalizations which have some tense, aspect or modality component (e.g. with its future alternate -(y)AcAK) (see Chapter 3), we expect -DIK nominalizations to be clearly distinct from nouns; however, for -(y)Iş nominalizations, we do not have a specific hypothesis as to whether they behave noun-like or verb-like overall. We only expect them to prove “less verbal” than -DIK nominalizations in the light of the theoretical literature.

4.3.3 Material and Method

The methodology was identical in all the experiments. It was again a written sentence completion study, however this time the prime sentences were already completed when presented to the participants, the participants read these primes and completed only the target fragments. In all the experiments both the prime and the target sentences contained those “balanced” matrix verbs that can equally frequently take nominal and verbal complements. In the four experiments, primes with simple nouns, deverbal nouns, -DIK nominalization and -(y)Iş nominalizations were tested in different pairings. In the fifth experiment, regular nouns and -DIK nominalizations were investigated in sentences with matrix verbs that carry different tense/aspect markers in addition to the -DI suffix, which was ubiquitously used in all previous experiments. This experiment was a control study that was designed to understand whether the past tense/perfective aspect marker -DI in the matrix verb had an influence on priming, especially of -DIK nominalizations.

Participants

Information on the participants will be provided for each experiment separately. All the participants were adult native speakers of Turkish. Each person participated in only one of the experiments presented throughout this thesis, as not having participated in any of our previous experiments was a criterion for the selection of the participants.

Stimuli

In all the following comprehension-to-production studies, we used the written sentence completion task as in the previous studies. However, in this new set, the participants were not asked to fill in both the prime and the target fragments, as the primes were readily presented to them as complete sentences and only the targets had blanks. Therefore, they were asked to only read and understand the sentences that were complete and fill in the blanks for the incomplete fragments. This design enabled us to investigate whether their comprehension of the prime sentences facilitated the production of completions with the same type of complement as the prime. Moreover, unlike the previous study, in the present set of experiments, all the sentences contained the “balanced” verbs that were found in the preliminary study to allow both nominal and verbal complements. For prime sentences, the choice of complement type was manipulated by the experimenter and for target fragments it was up to the participant. It should also be noted that prime and targets that constituted a pair always contained lexically different matrix verbs (resulting in different combinations of the 7 “balanced” verbs: “anlat-” (*to tell*), “duy-” (*to hear*), “gözlemle-” (*to observe*), “unut-” (*to forget*), “hatırla-” (*to remember*), “anla-” (*to understand*) and “öğren-” (*to learn*)) with matching tense/aspect markers inflected for 3rd person singular. For the first four sentences the tense/aspect marker was

always -DI (past form, perfective aspect) and for the fifth control experiment, a variety of markers were tested as it will be explained in the relevant sub-section.

In this set of experiments, primes with simple nouns (e.g. 5a), deverbal nouns (e.g. 5b), -(y)Iş nominalizations (e.g. 5c) and-DIK nominalizations (e.g. 5d) were tested in different pairings and each target could be filled in with both a noun and a nominalized verb (e.g. 5').

(5) a. **Prime with a Simple Noun:**

Korsan, [prens *ad* " -in] -i öğren -di
pirate princess -GEN **name** -POSS.3sg -ACC learn -PF.3sg
“The pirate learned the princess’s **name**.”

b. **Prime with a Deverbal Noun:**

Korsan, [prens *dile* "ğ ""-in] -i öğren -di
pirate princess -GEN **wish**-DER-POSS.3sg -ACC learn -PF.3sg
“The pirate learned the princess’s **wish**.”

c. **Prime with a -(y)Iş Nominalization:**

Şoför, [yolcu -nun *uyu* -uş -un] -u gözlemle -di
driver passenger-GEN **sleep** 'VN -POSS.3sg -ACC observe -PF.3SG
“The driver observed the passenger(’s) (**manner of**) **sleep(ing)**.”

d. **Prime with a -DIK Nominalization:**

Şoför, [yolcu -nun *yorul* -duğ 'un] -u gözlemle -di
driver passenger -GEN **get tired** -VN -POSS.3sg -ACC observe -PF.3SG
“The driver observed **that** the passenger **got/was getting tired**.”

(5') **Target:**

Korsan prenses-in hatırla -dı
pirate princess-GEN remember-past.3sg
“The pirate remembered the princess’s / that the princess”

The first four studies investigate priming in the following pairs:

- i. Simple Nouns *vs.* -DIK Nominalizations
- ii. Deverbal Nouns *vs.* -DIK Nominalizations
- iii. Deverbal Nouns *vs.* -(y)Iş Nominalizations
- iv. -(y)Iş Nominalizations *vs.* -DIK Nominalizations

The fifth control experiment also tested Simple Nouns *vs.* -DIK Nominalizations, however, unlike the four main experiments, it tested these complements with sentences predicated by matrix verbs carrying different tense/aspect markers: -(I)yor (imperfective), -DI (past/perfective), -mİş (perfective/evidential), -(y)AcAK (future) and -(A/I)r (aorist); whereas in the other experiments the matrix verb was always marked with -DI.

The studies thus tested two types of nouns: simple nouns (with nominal roots) and deverbal nouns (with verbal roots turned into nominal stems *via* derivational suffixes) and nominalized verbs with two types of subordinators: -DIK and (y)Iş. As indicated in the chapter on Turkish GEN-POSS structures (Chapter 3), Turkish verbs can also be nominalized by other subordinating suffixes: namely -(y)AcAK, -mA, and mAK; however we limited our investigation to -DIK and -(y)Iş for mainly practical reasons. The set of matrix verbs that allowed both nouns and noun clauses as its direct object were not always compatible with the use of verbs nominalized by the -mA suffix following a GEN-marked noun (e.g. sentence (6)), and that the

infinitival -mAK suffix required the subject of the superordinate sentence to be identical to that of the noun clause, which was not possible in the present context given the GEN-marked noun. The future alternative of -DIK, namely the -(y)AcAK suffix was not examined, as it plays a similar function as -DIK, but is temporally limited in its use. Therefore, whole new sets of stimuli with sentences containing compatible matrix verbs and tense/aspect markers that are semantically plausible were needed to expand the range of the nominalization morphemes tested. Although this is an important and necessary research endeavor, a complete account of the differences in the processing of all types verb nominalizing suffixes is beyond the scope of this thesis. We would like to emphasize however that further investigation of these markers would help complement the results of the present study and would highly benefit from more in-depth inquiry.

- (6) *Adam kadın -ın ağla-ma -sın -ı öğren -di
 man woman-GEN cry -VN-POSS.3sg -ACC learn -Past.3sg
 Int. meaning: “The man learned (about) the woman’s (manner of) crying.”

For each of the comprehension-to-production priming experiments, we prepared sets of 5 items (e.g. Figure 4.6): 2 experimental items (prime sentence and target fragment), 3 fillers (1 empty fragment, 1 complete sentence and a 3rd one that could either be an empty fragment or a full sentence). All the matrix verbs in the set were inflected for 3rd person singular. 7 prime-target pairs appeared twice throughout each study with alternating prime types (14 experimental items) and there were three fillers per prime-target pair (42 fillers, half of which were already completed and half were left empty). Consequently, each experiment consisted of 70 items (35 complete full sentences and 35 empty sentence fragments). The fillers were the same in all the experiments whereas each experiment tested the effect of a different alternation in prime sentences (c.f. the four contrasts (i-iv)).

Bankacı, arkadaşımın	.....gezisini.....	anlattı.
Ev sahibi, misafirin	.....	hatırladı.
Uykulu bekçi	.....	esnedi.
Bakkal, çırağıyla	.....	karşılaştı.
Ziyaretçi odada	.....on dakika.....	oturdu.

Figure 4.6: Sample Page from the Comprehension-to-Production Experiment Booklet: The first sentence is the prime completed with a deverbal noun, the second is the target fragment and the other three are fillers.

As a result, we ended up with stimulus booklets printed on A5 size paper with 5 items per page. By decreasing the paper size and the number of items that were visible on one page (in comparison to the structural priming study in production), we aimed to prevent the participants from going back to the previous experimental pairs²⁹.

²⁹ Although we explicitly asked the participants to follow the order in which the items were presented and to not go back to previous fragments and change their completions, it was still not completely possible to control for this with even the altered design where we used the spiraling technique to bind the pages of the booklet and the decreased paper size and item number per page. Such a complete control was only possible in the online self-paced reading task and the eye-tracking experiment presented in the following chapters.

In addition we ensured that on each page, the first empty fragment that the participant completes was the target fragment. In other words, the fragmented empty fillers never preceded the actual target, and only the complete filler sentences could appear before the prime-target pair. Target fragments always immediately followed the prime sentences. Finally, the order of items on each booklet was individually randomized.

Procedure

The participants were handed out the 16-page A5 size spiraled booklets and the informed consent form. On the first page of the booklets were the instructions and on the second page there was a mini-questionnaire asking for basic demographic information, the remaining 14 pages contained the stimulus items (5 items per page) (For sample booklets for all five experiments, see APPENDICES, F, G, H, I, and J).

The aim of the study and the instructions were also presented orally by the experimenter. The participants were asked to read the instructions and informed consent form (APPENDIX K), sign the latter, respond to the questions in the survey and then complete the fragments. The instructions specified that there were sentences with blanks on the booklet and that the participants were asked to read each of them in the given order and by completing the empty fragments with at least one word. Their task was to fill in the blanks of the incomplete fragments without thinking too much, in any way they liked using as many words as they wished, as long as the resulting sentence was one that could be used in everyday language. They were also informed that some of the blanks were already completed; they were not supposed to make any additions to those sentences, but that they should only read them. The oral instructions also emphasized that the given order needed to be followed, and since we were interested in the natural flow, the participants should not go back to previous sentences and change their responses. It was also stressed that they were not to skip the complete sentences, but read and understand them, as well.

When the participants finished the task, they submitted the completed booklets and the signed informed consent forms to the experimenter. Any questions they had at any point were answered by the experimenter. The whole process took about 20-30 minutes.

4.3.4 Data Analysis

For all the comprehension-to-production priming experiments in this set, the completions provided by the participants for each experimental fragment, were grouped into three categories: “nominal”, “verbal” and “other”. The criteria for this classification was as follows: As in the previous studies, all kinds of noun phrases, adjectival phrases, and nouns modified by relative clauses like such as “ver-diğ-i yüzüğü” (give-REL-3SG.POSS ring-ACC meaning the ring that [s/he] gave) were coded as “nominal” completions. On the other hand, noun clauses like “hata yap-tığı-ını” (*mistake make-VN-3SG.POSS-ACC*, meaning *that [she] made a mistake*) and embedded (*wh-*) interrogative clauses like “neden gül-düğü-ünü” (*why laugh-VN-3SG.POSS-ACC*, meaning *why [she] laughed*) were coded as “verbal completions”. We should note that noun clauses with all types of nominalizers were classified as “verbal completions” and not just those that match the nominalizer in the verbal prime of the specific experiment (i.e. -DIK or (y)-Iş). Finally, all other types of completions, ambiguous responses that cannot be disambiguated in the given context, technically problematic completions and the blanks that were left empty were all coded as “other” types of completion. Given that “other” completion types were rare in all the sets, the following analyses were based on the counts of the two main target completion types: nominal and verbal. These coding criteria were adopted for all the following bi-modal priming experiments.

4.3.5 Simple Nouns vs. -DIK Nominalizations

Aim, Research Question and Hypothesis

The specific aim of the first study was to test structural priming of simple nouns vs. -DIK nominalizations from comprehension to production. Our hypothesis regarding the question of whether priming effects would be observed for this pair was that participants would tend to provide more nominal completions after reading prime sentences with regular, simple nouns and more verbal completions after reading prime sentences with -DIK nominalizations. If such an effect is found, this would imply that the level of representation accessed by priming might be specified with respect to phrasal vs. clausal distinction. As the matrix verbs of the prime and the target are different, this would further imply that any priming effects that would be found should be independent of the lexical repetition of the matrix verb of the sentence.

Material and Methods

Participants

29 native speakers of Turkish volunteered to participate in this study. Of those participants, 19 were female and 10 were male. All the participants were young adults and their mean age was 23.93 years.

Stimuli and Procedure

As indicated in the “Material and Method” section (4.3.3), the stimuli consisted of nominal and verbal prime sentences and empty target fragments with “balanced” matrix verbs that allow both nominal and verbal completions.

The nominal primes in this specific study consisted of simple, non-derived nouns, whereas the verbal primes consisted of nominalized verbs with -DIK subordination suffix.

The procedure was as explained in the “Material and Method” section (4.3.3) above.

Data Analysis, Results and Discussion

The data encoded according to the criteria presented in the “Data Analysis” section (4.3.4), were subjected to a 2 x 2 within-subjects Repeated Measures ANOVA with the following variables:

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (the grammatical category of the prime sentence: nominal or verbal as manipulated by the experimenter): Nominal primes consisted of simple nouns, verbal primes consisted of -DIK nominalizations
- ii. “Target Type” (the grammatical category of the target completion: nominal or verbal as provided by the participant): Nominal targets consisted of all types of nouns and verbal targets consisted of all types of nominalized verbs.

Dependent Variable: Frequency of target completions (Raw scores of nominal and verbal completions in the target fragments. The range was 0-7³⁰.)

The analysis did not reveal any significant main effects, but it indicated a significant interaction between “Prime Type” and “Target Type”: $F(1,28) = 4.511, p < .05, \eta_p^2 = .139$. As can be seen on Figure 4.7, this interaction shows that nominal primes

³⁰ However, as the “other” completions were disregarded, the original counts of nominal and verbal target completions did not always add up to 7.

increase the amount of nominal target completions and verbal primes increase the amount of verbal target completions, which indicates that there is priming. This finding is comparable to the previous uni-modal structural priming study in production. The present interaction is not the kind of a completely symmetrical cross-over as a comparison of Figures 4.5 and 4.7 indicates, and the gap between nominal and verbal target completions following nominal primes is smaller in Figure 4.7 than in Figure 4.5. The interaction is still significant even though it is rather asymmetrical now.

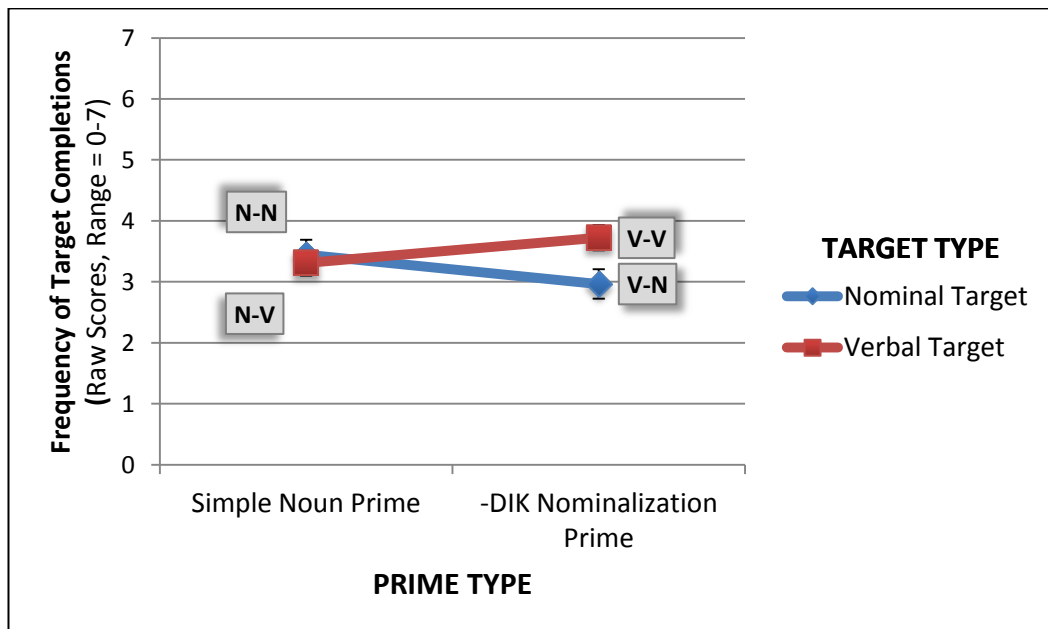


Figure 4.7: Repeated Measures ANOVA “Prime Type” x “Target Type” Interaction Plot: Comprehension-to-Production Priming Study: Simple Nouns vs. -DIK Nominalizations

To conclude, this result provides evidence for the hypothesis that structural priming persists between comprehension and production and therefore supports the proposition that structural priming taps a level of linguistic representation shared between production and comprehension. Simple nouns prime nominal completions whereas -DIK nominalizations prime verbal completions. At this level of representation, the structures seem to be specified as to whether they are phrasal or clausal. Although the interaction between prime and target completion types was asymmetric, it is still statistically significant and therefore, it still indicates priming. Furthermore, given that the matrix verbs of the prime sentences and target fragments were different, the structural priming effects from comprehension to production seem to emerge independently of the lexical repetition of the matrix verb³¹.

4.3.6 Deverbal Nouns vs. -DIK Nominalizations

Aim, Research Question and Hypothesis

The specific aim of the second study was to test structural priming of deverbal nouns vs. -DIK nominalizations from comprehension to production. The research question was whether deverbal nouns with verbal roots were distinct from non-lexicalized nominalized verbs in terms of their processing behavior in priming context. The hypothesis was that, if the root information was accessed during priming, then deverbal nouns and nominalized verbs would demonstrate similar behavior. If the grammatical category of the resulting stem turned out to be accessed, on the other hand, we would expect more noun-like behavior from deverbal nouns. The latter result would also indicate that derivational morphemes and subordination morphemes have different influences for priming of the constructions under scrutiny.

³¹ As the matrix verbs of the primes and targets of all the comprehension-to-production studies in the present section (4.3) were different lexical items, this interpretation would also apply to all the structural priming effects observed and thus will not be repeated for each individual experiment.

Material and Methods

Participants

43 native speakers of Turkish volunteered to participate in this study. Of those participants, 30 were female and 13 were male. All the participants were young adults and their mean age was 22.07 years.

Stimuli and Procedure

As indicated in the “Material and Method” section (4.3.3), the stimuli consisted of nominal and verbal prime sentences and empty target fragments with “balanced” matrix verbs that allow both nominal and verbal completions. The nominal primes in this specific study consisted of deverbal nouns: lexical nouns derived from verbal roots *via* noun-deriving suffixes, whereas the verbal primes consisted of nominalized verbs with the -DIK subordination suffix as before. The derivational suffixes used in the nominal targets were -I, GI, and -(A)K. The nouns derived from verbs by these suffixes that were employed in this study were: gez-i (*to promenade-promenade*), sor-u (*to ask-question*), başar-ı (*to succeed-success*), yanıl-gı (*to err-error*), iste-k (*to desire-desire*) and dile-k (*to wish-wish*).

The procedure was also as explained in the “Material and Method” section (4.3.3), above.

Data Analysis, Results and Discussion

As in the preceding study, the data encoded according to the criteria presented in the “Data Analysis” section (4.3.4), were subjected to a 2 x 2 within-subjects Repeated Measures ANOVA with the following variables:

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (the grammatical category of the prime sentence: nominal or verbal as manipulated by the experimenter): Nominal primes consisted of deverbal nouns, verbal primes consisted of -DIK nominalizations
- ii. “Target Type” (the grammatical category of the target completion: nominal or verbal as provided by the participant): Nominal targets consisted of all types of nouns and verbal targets consisted of all types of nominalized verbs.

Dependent Variable: Frequency of target completions (Raw scores of nominal and verbal completions in the target fragments. The range was 0-7)

The analysis did not reveal any significant main effects, but it indicated a significant interaction between “Prime Type” and “Target Type” as in the preceding study: $F(1,42) = 9.065, p < .01, \eta_p^2 = .178$. As can be seen on Figure 4.8, this interaction shows that nominal primes increase the amount of nominal target completions ($M=3.698, SE=.271$) as opposed to verbal target completions ($M=2.767, SE=.23$) and verbal primes increase the amount of verbal target completions ($M=3.465, SE=.259$) as opposed to nominal target completions ($M=3.140, SE=.253$), which indicates that there is priming. Our interpretation of this result is that despite their verbal root, deverbal nouns show noun-like behavior just like non-derived nouns in priming.

When we compare Figures 4.7 and 4.8, we can observe that intriguingly the gap between nominal and verbal completions following deverbal noun primes (see Figure 4.8) seems to be greater than that between nominal and verbal completions following simple noun primes (see Figure 4.7). This suggests the possibility that the deverbal nouns might not only demonstrate noun-like behavior, but might do so even more strongly than non-derived simple nouns. One explanation of this observation could

be that the presence of the derivational suffix might make the nominal status of the deverbal noun even more salient.

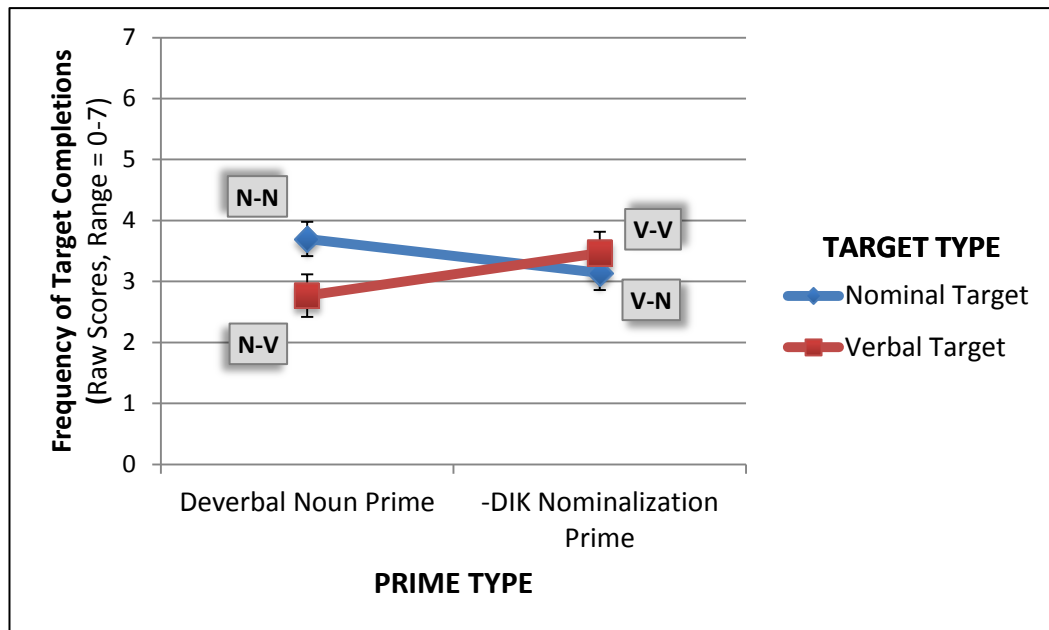


Figure 4.8: Repeated Measures ANOVA “Prime Type” x “Target Type” Interaction Plot: Comprehension-to-Production Priming Study: Deverbal Nouns vs. -DIK Nominalizations

Overall, the results indicate that it cannot be uniquely the grammatical category of the root which determines the noun-like or verb-like behavior of morphologically complex forms with respect to structural priming. Consequently, the suffixes must be crucial. These results also imply that category-changing derivational suffixes such as -I, GI, and -(A)K are also clearly distinct from the subordinating nominalization suffixes with respect to their role in priming. The derivational suffixes -I, GI, and

-(A)K seem to make the verbal properties of the root inaccessible, whereas the nominalization suffix -DIK does not have this effect.

To conclude, the results of this study provides additional evidence for the hypothesis that structural priming persists between comprehension and production and therefore supports the proposition that structural priming taps a level of linguistic representation shared between production and comprehension which is specified in terms of phrasal *vs.* clausal status. As the derivational suffixes turn the verbal roots into nominal stems, the resulting construction is an NP; whereas the nominalization suffixes (like -DIK) that attach to verbal roots do not completely lock the verbal features of the stem: although the resulting noun clause shows external noun-like behavior, it is still a verbal enough to be considered as a “clause”.

4.3.7 Deverbal Nouns *vs.* -(y)Iş Nominalizations

Aim, Research Question and Hypothesis

The specific aim of the third study was to test structural priming of deverbal nouns *vs.* -(y)Iş nominalizations from comprehension to production. The research question was whether we would get the same results as in the preceding study when we replaced -DIK nominalizations with -(y)Iş nominalizations. The hypothesis was that, if the type of the nominalizer mattered, and if -(y)Iş were not as strongly verbal as -DIK, then we should get a different result from the previous study (4.3.6) . If, on the other hand, -(y)Iş mimicked the behavior of -DIK, we would get a similar interaction showing priming effects.

Material and Methods

Participants

20 native speakers of Turkish volunteered to participate in this study.

Of those participants, 13 were female and 7 were male. All the participants were young adults and their mean age was 24.3 years.

Stimuli and Procedure

As indicated in the “Material and Method” section (4.3.3), the stimuli consisted of nominal and verbal prime sentences and empty target fragments with “balanced” matrix verbs that allow both nominal and verbal completions. The nominal primes in this specific study consisted of deverbal nouns: lexical nouns derived from verbs *via* noun-deriving suffixes (the same items as in the preceding study), whereas the verbal primes consisted of nominalized verbs with the subordination suffix *-(y)Iş*³², this time.

Again, the procedure was as explained in the “Material and Method” section (4.3.3).

Data Analysis, Results and Discussion

As in the two previous studies, the data encoded according to the criteria presented in the “Data Analysis” section (4.3.4), were subjected to a 2 x 2 within-subjects Repeated Measures ANOVA with the following variables:

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (the grammatical category of the prime sentence: nominal or verbal as manipulated by the experimenter): Nominal primes consisted of deverbal nouns, verbal primes consisted of *-(y)Iş* nominalizations.

³² As there is a derivational homophone of the nominalizer *-(y)Iş*, which is a derivational suffix that derives lexical nouns from verbs, we ensured that all the *-(y)Iş* nominalizations in the stimulus list were non-lexicalized noun clauses which would not be listed in a dictionary and which would still pertain the verbal properties of the nominalized verb (like the property of passivization). For instance, lexical nouns like “giriş” (*entrance*) were avoided.

ii. “Target Type” (the grammatical category of the target completion: nominal or verbal as provided by the participant): Nominal targets consisted of all types of nouns and verbal targets consisted of all types of nominalized verbs.

Dependent Variable: Frequency of target completions (Raw scores of nominal and verbal completions in the target fragments. The range was 0-7.)

When the deverbal nouns were paired with a different type of nominalization, namely $-(y)I\dot{s}$ nominalizations, we got some different results from the previous study (4.3.6). Instead of a significant interaction between “Prime Type” and “Target Type” reflecting priming effects as in the two previous studies, in the present study, we found a significant main effect of “Target Type”: $F(1,19) = 18.424, p < .001, \eta_p^2 = .492$. As demonstrated in Figure 4.9, regardless of the grammatical category of the prime, participants provided more nominal target completions ($M=4.7, SE=.345$) than verbal target completions ($M=1.9, SE=.317$).

This result indicates both nominal primes with deverbal nouns and verbal primes with $-(y)I\dot{s}$ nominalizations increase the amount of nominal completions. This implies that despite their verbal stems, both deverbal nouns and $-(y)I\dot{s}$ nominalizations demonstrate noun-like behavior in priming and that nominalizations with the $-(y)I\dot{s}$ suffix are different from $-DIK$ nominalizations. Although they are still clausal, $-(y)I\dot{s}$ nominalizations do not seem to be strongly verbal as $-DIK$ nominalizations, but instead they align with deverbal nouns. This finding also suggests that nominalizers may not behave uniformly in priming contexts and that $-(y)I\dot{s}$ seems more noun-like than $-DIK$. In conclusion, the following study is aimed at directly contrasting these two types of nominalizers.

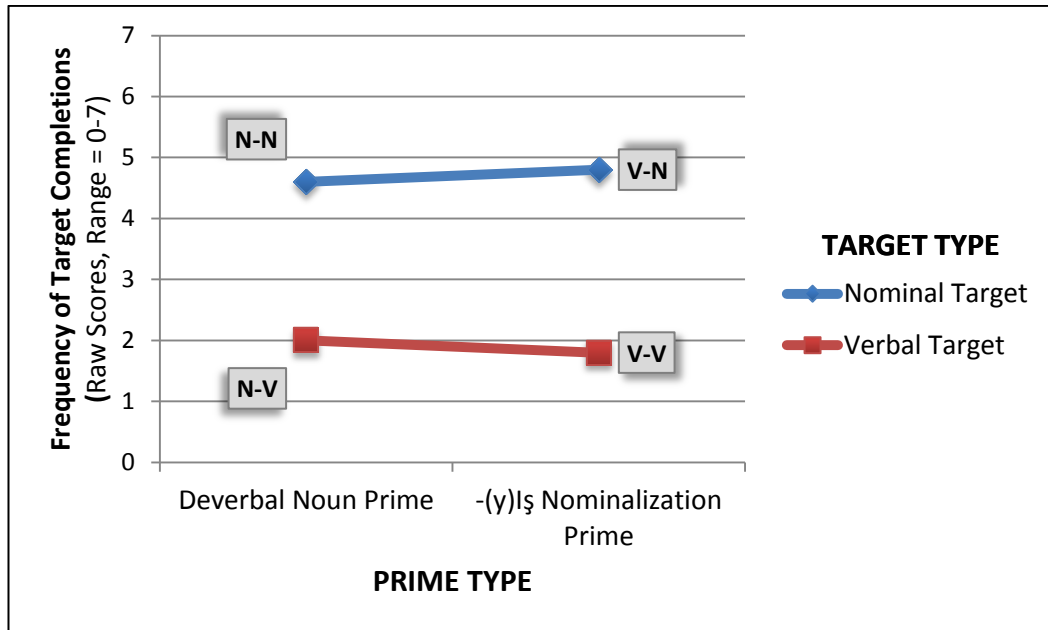


Figure 4.9: Repeated Measures ANOVA (non-significant) “Prime Type” x “Target Type” Interaction Plot: Comprehension-to-Production Priming Study: Deverbal Nouns vs. -(y)Iş Nominalizations

4.3.8 -(y)Iş Nominalizations vs. -DIK Nominalizations

Aim, Research Question and Hypothesis

The specific aim of the fourth study was to test structural priming of -(y)Iş nominalizations vs. -DIK nominalizations from comprehension to production. In other words, this study aimed to compare priming effects of noun clause primes consisting of nominalizations with two different subordinating suffixes (-DIK vs. -(y)Iş) directly. The research question was whether we would get priming effects that are comparable to those found in studies 4.3.5 and 4.3.6, if we specifically compared -(y)Iş nominalizations with -DIK nominalizations. The hypothesis was that, if -(y)Iş

were indeed more noun-like than -DIK, then we would get priming effects as in the two aforementioned studies.

Material and Methods

Participants

27 native speakers of Turkish volunteered to participate in this study. Of those participants, 13 were female and 14 were male. All of the participants were young adults and their mean age was 25.96 years.

Stimuli and Procedure

As indicated in the “Material and Method” section (4.3.3), the stimuli consisted of nominal and verbal prime sentences and empty target fragments with “balanced” matrix verbs that allow both nominal and verbal completions. The nominal primes in this specific study consisted of -(y)Iş nominalizations; whereas the verbal primes consisted of nominalized verbs with -DIK subordination suffix. It should be emphasized that, for this particular study, in which both prime types were noun clauses, we classified the presumably more noun-like (y)Iş nominalizations as nominal primes and -DIK nominalizations as verbal primes.

The procedure was again as explained in the “Material and Method” section (4.3.3), above.

Data Analysis, Results and Discussion

As in the three previous studies, the data encoded according to the criteria presented in the “Data Analysis” section (4.3.4), were subjected to a 2 x 2 within-subjects Repeated Measures ANOVA with the following variables:

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (the grammatical category of the prime sentence: nominal or verbal as manipulated by the experimenter): Nominal primes consisted of -(y)Iş nominalizations, verbal primes consisted of -DIK nominalizations.
- ii. “Target Type” (the grammatical category of the target completion: nominal or verbal as provided by the participant): Nominal targets consisted of all types of nouns and verbal targets consisted of all types of nominalized verbs.

Dependent Variable: Frequency of target completions (Raw scores of nominal and verbal completions in the target fragments. The range was 0-7.)

The analysis did not reveal any significant main effects, but it indicated a significant interaction between “Prime Type” and “Target Type” as in studies 4.3.5 and 4.3.6: $F(1, 26) = 6.009, p < .05, \eta_p^2 = .188$. This finding implies that there is priming in this construction pair. As can be seen on Figure 4.10, this interaction shows that verbal -DIK primes increase the number of verbal target completions ($M=3.963, SE=.372$) to a greater extent than nominal target completions ($M=2.444, SE=.393$) while -(y)Iş primes seem to be hybrid as they lead to an almost equal number of nominal ($M=3.259, SE=.409$) and verbal ($M=3.222, SE=.379$) target completions.

If we compare the results of the present experiment with the previous one (4.3.7), it seems that the behavior of -(y)Iş is influenced by the general context in which it is presented. -(y)Iş nominalizations seem to behave more like nominals when presented together with other nominal primes as alternatives; however, when presented together with strongly verbal -DIK nominalization primes, they prime equal amounts of nominal and verbal answers. That is, their “verbal” character is expressed more strongly as compared to when they are combined with deverbal nouns. Despite fillers and the distance between prime-target pairs, there still seems to be an effect of

“general context”, which is interesting with respect to the persistence of structural priming.

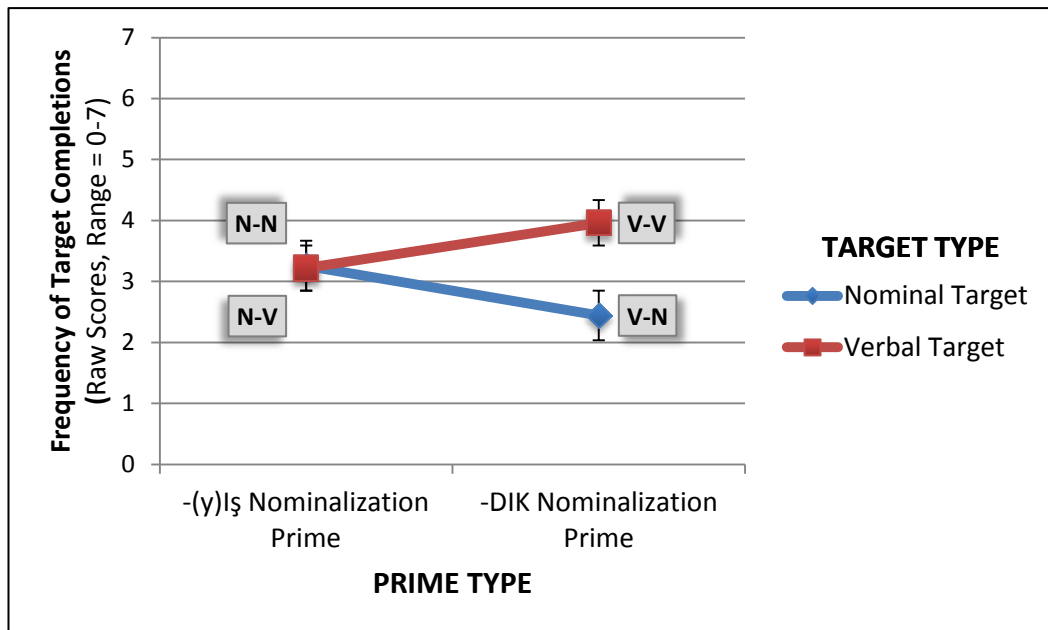


Figure 4.10: Repeated Measures ANOVA “Prime Type” x “Target Type” Interaction Plot: Comprehension-to-Production Priming Study: $-(y)Iş$ Nominalizations vs. -DIK Nominalizations

4.3.9 Results and Comparisons

In this section, we summarize the results of the four comprehension-to-production priming experiments comparatively. The first study, 4.3.5 compared simple nouns with -DIK nominalizations and showed that nominal primes increased the amount of nominal completions and verbal primes increased the amount of verbal completions, indicating priming effects. As the matrix verbs of the prime sentences and target

fragments contained different lexical items as their verbal predicate, these priming effects were independent of the lexical repetition of the matrix verb. These findings were comparable to the previous structural priming study in production.

The second study, 4.3.6 tested lexical nouns derived from verbal stems, paired with -DIK nominalizations, and revealed a similar priming effect reflected by the statistically significant interaction between prime type and completion type. When the two studies were compared, it was observed that the gap between nominal and verbal completions was larger after deverbal nouns than after simple non-derived nouns, as can be seen on Figure 4.11, which re-presents the ANOVA plots for all four experiments (see specifically the two plots in the first row). This means that the lexicalized deverbal nouns might be processed as regular nouns despite their verbal stem, and furthermore the derivational suffix might even render the nominality of the resulting lexical item stronger. Overall, this was an indication that it is not just the grammatical category of the root which determines the noun-like or verb-like behavior of morphologically complex forms with respect to structural priming.

The third experiment, 4.3.7, paired deverbal nouns with a different type of nominalization, namely -(y)Iş nominalizations, and revealed some different results. Instead of a significant interaction, this time there was a significant main effect of completion type: Regardless of the type of the prime, participants provided more nominal completions than verbal completions. This indicated that despite their verbal stems, both deverbal nouns and -(y)Iş nominalizations demonstrated noun-like behavior (c.f. Figure 4.11, bottom left-hand corner).

Finally, the results of the fourth experiment, 4.3.8, testing the two types of nominalization, i.e. -DIK vs. -(y)Iş nominalizations revealed priming effects, as well. -DIK primes increased the number of verbal completions while the completions following -(y)Iş primes seemed to be hybrid as -(y)Iş led to an almost equal number of nominal and verbal completions, as can be seen on Figure 4.11 (bottom right-hand corner).

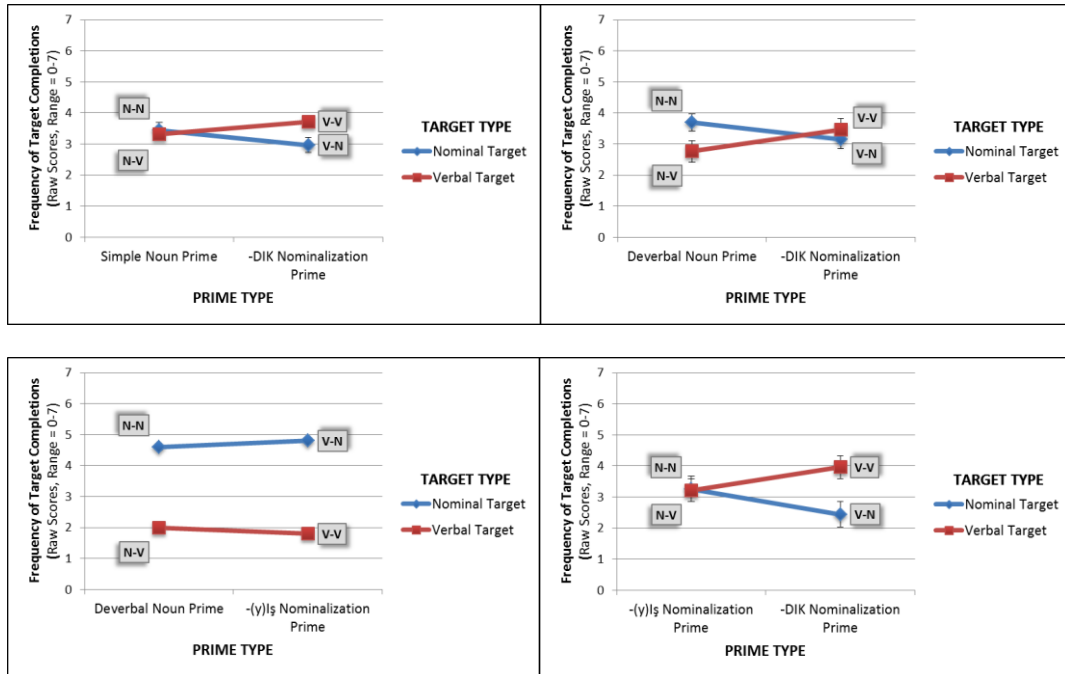


Figure 4.11 ANOVA Plots from All Four Comprehension-to-Production Priming Studies Combined

When we compared the results of this experiment with the previous one, it seemed that the behavior of -(y)Iş was influenced by the general context in which it was presented.-(y)Iş nominalizations seemed to behave like nominals when presented together with other nominal primes (4.3.7); however, when presented together with strongly verbal -DIK nominalization primes, they primed equal amounts of nominal and verbal answers (4.3.8). In other words, there was an influence of the “general context” on priming despite the existence of several fillers and the distance between prime-target pairs. Such a “context effect” had not been expected. It should be noted

that although the presence of deverbal nouns shifted the behavior of -(y)Iş nominalizations to the nominal side, it did not have the same influence on the strongly verbal -DIK nominalizations, as proven by study 4.3.6. Rather, -DIK nominalizations consistently produced verbal priming, no matter with which other prime type they were presented (4.3.5, 4.3.6, 4.3.8).

To sum up, structural priming seems to be sensitive to the phrasal *vs.* clausal distinction. This finding is comparable to the results of a research project on comprehension-to-production priming study on English “Concealed Questions”, in which priming was also found to be sensitive to the distinction between noun phrases and embedded questions and declaratives (Bahadır & Polinsky, 2010a; 2010b; 2011)³³.

Furthermore, derivational suffixes make the verbal properties of verbal roots inaccessible. Nominalization suffixes on the other hand, do not lock up the verbal root properties as derivational suffixes do. Whereas a derivational suffix creates a new word which will have a new entry in the mental lexicon, a non-derivational subordinating suffix does not create a new lexical item, but rather a new morpho-syntactic unit that remains “fluid” as opposed to becoming “solid” or “frozen” as in the case of derivation. Consequently, the nominalized verb is capable of acting as the predicate of the noun clause. The extent to which the resulting nominalized verb demonstrates nominal *vs.* verbal behavior seems to depend on the properties of the subordination suffix: -DIK being strongly verbal and -(y)Iş being relatively more noun-like or hybrid.

In the following section, we discuss the implications of these findings in the light of the research questions and hypotheses put forward in section 4.3.2.

³³ Concealed Questions shift the meaning of a functional NP argument like “The committee announced [the winner of the award.]” to a question-like meaning like “The committee announced who had won the award.”, which could also be paraphrased with an embedded declarative like “The committee announced that X had won the award.” (e.g. Heim, 1979; Nathan, 2006). Accordingly, in the above mentioned priming studies, the alternations consisted of such NPs *vs.* embedded interrogatives or declaratives.

4.3.10 Discussion

Overall, the combined results of these four experiments indicate that there is structural priming in Turkish GEN-POSS constructions from comprehension to production with nominal primes increasing the tendency to produce nominal target completions and verbal primes increasing the tendency to produce verbal target completions (verifying H4.2.1). The finding that participants' production is primed by their previous comprehension provides support to the view that the level of representation accessed by priming is shared by the comprehension and production modalities.

The experiments also revealed some characteristic patterns of structural priming in Turkish GEN-POSS constructions.

➤ Noun clauses with -DIK nominalizations most persistently prime verbal completions and behave strongly clausal in consistence with their linguistic properties. This could be related to several linguistic factors. The salience of -DIK could be due to its presumable tense, aspect or modality component (e.g. the fact that it can express present or past tense relative to the tense of the superordinate predicate). Another possible influence could be the presence of some homophones of -DIK that are also verbal³⁴ in the language: the object relativizing participle (-DIK) and the 1st person plural past tense marker (-DI-K). In addition, several adverbial clauses are also formed by combining certain subordinating conjunctions like “için” with -DIK nominalizations (e.g. Göksel & Kerslake, 2005). The presence of verbal homophones might have complex interrelations with the strongly sentential behavior of noun clauses with -DIK nominalizations. The findings of the present set of studies are consistent with the linguistic observations about -DIK, which is obviously a very salient and special morpheme.

➤ In structural priming contexts, the behavior of nominalizations with the -(y)Iş suffix is clearly distinct from that of -DIK nominalizations, as expected (H4.2.3).

³⁴ We should note that there is also a derivational (non-verbal) -DIK suffix, which is attached to verbs to make them nominals (nouns or adjectives).

Noun clauses with *-(y)Iş* nominalizations demonstrate both nominal and verbal properties depending on the other type of prime they are presented with. The comparison of Experiment 4.3.7 (deverbal nouns *vs.* *-(y)Iş* nominalizations) and Experiment 4.3.8 (*-(y)Iş* nominalizations *vs.* *-DIK* nominalizations) suggests that despite fillers and the distance between prime-target pairs, the general context in which different prime types are presented also has an influence on the behavior of *-(y)Iş*: it acts like nouns when presented together with lexical nominal primes, and more balanced with *-DIK* primes. The results are also compatible with the linguistic behavior of *-(y)Iş* as presented in Chapter 3. The fact that *-(y)Iş* has a homophone suffix that derives lexical nouns from verbal root might also be relevant to its noun-like, hybrid/balanced behavior. Moreover, although *-(y)Iş* tends to behave more noun-like when presented in the same stimulus set as deverbal noun primes; this is not the case with *-DIK* as can be seen in experiment 4.3.6 (deverbal nouns *vs.* *-DIK* nominalizations). This could again be due to the strong verbal salience of *-DIK*. To sum up, the identity of the nominalization suffix seems to be determinant in the behavior of the noun clause: *-DIK* is more verbal/sentential than *-(y)Iş*.

➤ Despite their verbal root, deverbal nouns behave like simple, non-derived nouns, suggesting that the grammatical category of the root cannot be the sole source of nominality. In fact, deverbal nouns seem to prime even more nominal completions than simple nouns do when presented together with *-DIK* primes, as implied by the comparison of Experiment 4.3.5 (regular nouns *vs.* *-DIK* nominalizations) and Experiment 4.3.6 (deverbal nouns *vs.* *-DIK* nominalizations). This could be related to the salience of the derivational suffixes on the deverbal nouns: with respect to lexical representation, the presence of these category-changing morphemes might highlight the new category status of the lexical item, which is unmarked for simple nouns.

Given that deverbal nouns and in part *-(y)Iş* nominalizations prime nominal completions, the grammatical category of the root cannot be the only source of the observed effects. The suffixes seem to play an important role during priming: the category-changing derivational morphemes enable deverbal nouns to behave strictly

noun-like. In other words, such a derivation process makes the grammatically functional features of verbal roots become inaccessible, as a result of which the deverbal noun cannot be the predicate of a subordinate clauses by itself. The subordinating nominalization suffixes, on the other hand, do not change the grammatical category of the verbal roots to which they are attached in the same sense as derivational suffixes do. As the noun clauses are still (verbal) “clauses”, the grammatical features of the verbal root may still be accessible, although the nominalizer obligatorily shifts the external morpho-syntactic template of the resulting construction to the nominal paradigm. Different nominalizers seem to differ with respect to the degree to which they cause the verbal root to act noun-like. The two types of nominalizers turn out to be distinct as -DIK is persistently more verbal than the hybrid -(y)Iş. In consequence, with respect to Q4.2.2, it seems to be the grammatical category of the whole lexical item (i.e. root/stem + suffix) that determines what kind of structures the word primes. Structural priming seems sensitive to both the phrasal *vs.* clausal distinction and to the degree that the latter show nominal *vs.* verbal behavior. It accesses morpho-syntactic information (both the type of the root/stem and the presence/absence of certain subordinating or derivational suffixes) and the resulting grammatical category of the structures.

To sum up, the experimental findings of these four studies are in coherence with linguistic analyses of the structures under scrutiny and provide theoretical and methodological contributions to the structural priming literature. Despite their verbal root, lexical deverbal nouns are almost indistinguishable from simple nouns. -(y)Iş nominalizations demonstrate both noun and verb-like behavior depending on the type of prime the alternative prime type it is presented with; which suggests a general context-persistence effect for structural priming. Finally, the strongly verbal -DIK proves to be a special morpheme, showing a very stable priming pattern in all the studies in which it was tested.

In conclusion, the results reveal structural priming from comprehension to production, supporting the view that the representations manipulated during the two

processes might be shared. The observed effects are present although the prime and target matrix verbs are different lexical items. Overall, during such comprehension-to-production priming in Turkish, participants seem to be sensitive to the morpho-syntactic information and the grammatical category information of the resulting complements, despite the identical overall GEN-POSS structure.

4.3.11 Control Experiment: Tense/Aspect Markers in Simple Nouns vs. -DIK Nominalizations

Aim, Research Question and Hypothesis

In all the previous experiments, the matrix verbs of the sentences and fragments were all inflected for 3rd person singular, simple past tense/perfective aspect with the suffix: -DI. The reason for this particular choice was that the -DI tense/aspect marker was considered to sound as natural as possible in a single sentence without further context. However, given that -DIK has a tense component (past or present) and phonologically overlaps with -DI, the persistence of -DIK in the priming studies could be due to the repetition of this tense marker in the predicates of our stimulus sentences³⁵. This tense/aspect marker control experiment was conducted in order to test whether the priming effects we found were independent of the tense and/or aspect of the matrix verb and persisted when different tense/aspect markers were attached to the matrix verbs. Thus, the specific research question was whether we would get comprehension-to-production priming effects on simple nouns and -DIK nominalizations, similar to those in Experiment 4.3.5, when the matrix verbs of the stimulus sentences and fragments were not just inflected with -DI, but with a variety of markers, instead. It was hypothesized that if the priming effects, in particular the verbal priming effect of -DIK nominalizations, were independent of the phonological overlap of the nominalizer with the matrix verb inflection -DI, then we would get similar results when the matrix verbs carried other inflectional markers, as well.

³⁵ We would like to thank Ayşe Betül Toplu for bringing this issue to our attention in a personal communication.

Material and Methods

Participants

30 native speakers of Turkish volunteered to participate in this study. Of those participants, 20 were female and 9 were male. All the participants were young adults and their mean age was 24.17 years.

Stimuli and Procedure

Just like in Experiment 4.3.5, which tested structural priming from comprehension to production on simple nouns *vs.* -DIK nominalizations, the stimuli of the present control study also consisted of nominal and verbal prime sentences and empty target fragments with “balanced” matrix verbs that allow both nominal and verbal completions. Consequently, as in 4.3.5, the nominal primes in this specific study consisted of simple nouns, whereas the verbal primes consisted of nominalized verbs with the -DIK subordination suffix.

However, unlike any of the previous studies on comprehension-to-production priming presented above, the present experiment contained stimulus sentences and fragments whose matrix verbs were inflected with a variety of tense/aspect markers: -(I)yor (imperfective), -mİş (perfective/evidential), -(y)AcAK (future), -(A/I)r (aorist) in addition to -DI (perfective). The distribution of these morphemes was as follows:

- 50% -(I)yor
- 25% mixed: -mİş, -(y)AcAK, -(A/I)r
- 25% -DI

We had -(I)yor as the most frequent marker since it does not have any homophones that are nominalizing or derivational suffixes. We still kept -DI at 25% as we assumed it to be highly natural sounding. The rest were a mixture of the remaining three markers. In other words, the inflection of 75% of the matrix verbs was modified. This distribution was followed for both Prime-Target pairs and the fillers. The prime sentence and the target fragment always shared the same tense/aspect

marker on their matrix verb and so did the complete-empty fragment filler pairs, yet in each set the latter pair contained a different marker than the former. All the matrix verbs in the overall stimulus set were inflected for 3rd person singular. Other than the specified points, the preparation, number, randomization and presentation of the stimuli were identical to those in the four previous experiments. Finally, as before, the procedure was as explained in the “Material and Method” section (4.3.3), above.

Data Analysis, Results and Discussion

As in the four previous studies, the data encoded according to the criteria presented in the “Data Analysis” section (4.3.4), were subjected to a 2 x 2 within-subjects Repeated Measures ANOVA with the following variables:

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (the grammatical category of the prime sentence: nominal or verbal as manipulated by the experimenter): Nominal primes consisted of simple nouns, verbal primes consisted of -DIK nominalizations.
- ii. “Target Type” (the grammatical category of the target completion: nominal or verbal as provided by the participant): Nominal targets consisted of all types of nouns and verbal targets consisted of all types of nominalized verbs.

Dependent Variable: Frequency of target completions (Raw scores of nominal and verbal completions in the target fragments. The range was 0-7.)

The analysis revealed a significant main effect of “Target Type”: $F(1,29) = 9.316$, $p < .01$, $\eta_p^2 = .243$, which suggests that unlike in Experiment 4.3.5, in this study the participants provided more nominal target completions ($M=3.9$, $SE=.26$) than verbal target completions overall ($M=2.467$, $SE=.22$). However, a significant interaction between “Prime Type” and “Target Type” was also observed just like in Experiment

4.3.5: $F(1, 29) = 8.956, p < .01, \eta_p^2 = .236$. Figure 4.12, shows that participants provided more nominal target completions after nominal primes ($M=4.333, SE=.293$) than after verbal primes ($M=3.467, SE=.317$), and more verbal completions after verbal primes ($M=2.9, SE=.281$) than after nominal primes ($M=2.033, SE=.242$). Although the two lines in this plot do not cross as in Figure 4.7, the interaction is statistically significant, which indicates priming. It can also be seen on Figure 4.12 that overall the amount of nominal target completions is higher than that of verbal target completions.

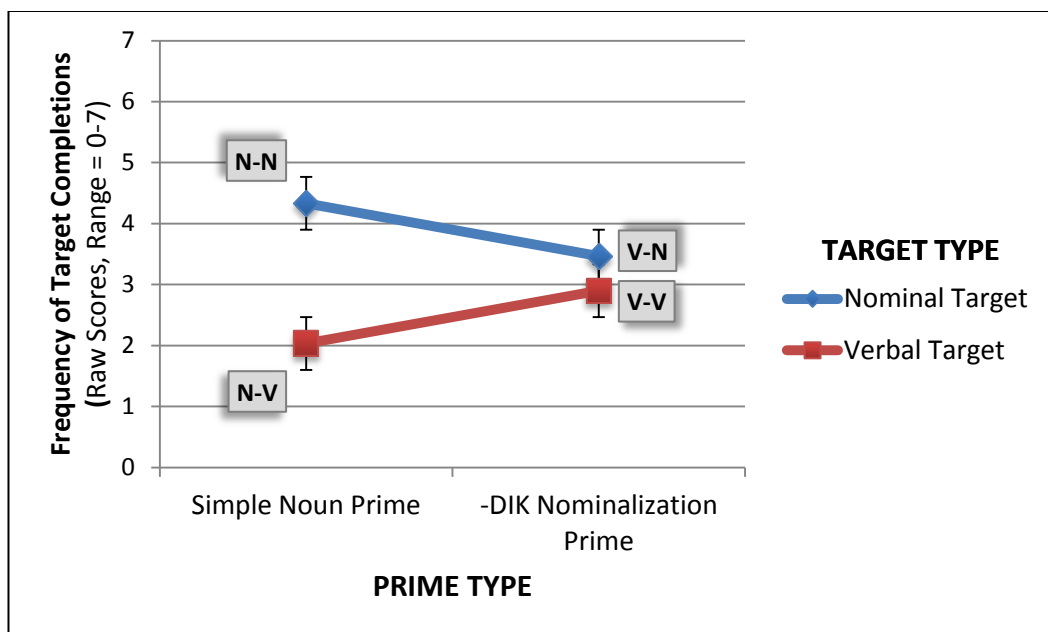


Figure 4.12: Repeated Measures ANOVA “Prime Type” x “Target Type” Interaction Plot: Comprehension-to-Production Priming Control Study: Tense/Aspect Markers in Simple Nouns vs. -DIK Nominalizations

Therefore, when we varied the tense/aspect markers (i.e. reduced the percentage of -DI's and added new markers (mostly -(I)yor), the participants tended to provide more nominal completions than verbal completions. More crucially however, when a variety of different tense markers was used on the matrix verbs of the sentences, the priming effect still persisted. In addition, it should also be noted that whereas -DIK nominalizations were always coded as verbal target completions and were abundant in number, they were not the only type of verbal completions. There were also some nominalizations with different subordinators, as well.

In consequence, the priming effect observed in the previous studies cannot be solely due to the repetition of the sentence-final tense/aspect marker -DI and its phonological resemblance to the nominalizer -DIK.

To conclude, although the use of the alternative matrix verb inflection suffixes and the concurrent decrease in the proportion of the -DI marker led to an overall increase in the number of nominal target completions, this manipulation of the tense/aspect markers on the matrix verb in this study did not inhibit the priming effect.

4.3.12 Comparative Results and Discussion

In order to get a general picture of the combined results, we merged the data from the original experiment (4.3.5) and the control experiment (4.3.11). Then the data from all 59 participants (29 participants of 4.3.5 and 30 participants of 4.3.11) were analyzed in a Mixed ANOVA. As usual, in this design, “Prime Type” and “Target Type” were the two within-subjects independent variables and the frequency of completions was the dependent variable. Additionally, there was also a between-subject independent variable in this new “mixed” design. We called this variable “SET”. We had 2 sets: Set 1 was the original stimulus set with all -DI markers in the matrix verbs, whereas Set 2 was the control stimulus set with a variety of tense/aspect markers.

The Mixed ANOVA on the combined data from both studies revealed a significant two-way interaction between “Target Type” and “SET”: $F(1, 57) = 5.703, p < .05, \eta_p^2 = .091$. As Figure 4.12 illustrates, overall in SET 1 (Experiment 4.3.5) there were more verbal target completions ($M=3.517, SE=.258$) than nominal target completions ($M=3.207, SE=.271$); while in SET 2 (Experiment 4.3.11), there were more nominal target completions ($M=3.9, SE=.266$) than verbal target completions ($M=2.467, SE=.254$). The difference between the frequencies of target completion types was greater for SET 2 than for SET 1. This is compatible with the results of the individual repeated-measures ANOVAs of Experiments 4.3.5 and 4.3.11 which had revealed a significant main effect of “Target Type” for only SET 2 (4.3.11) and not for SET 1 (4.3.5). This is why the gap between nominal and verbal target completions is larger for SET 2 than for SET 1 in Figure 4.13.

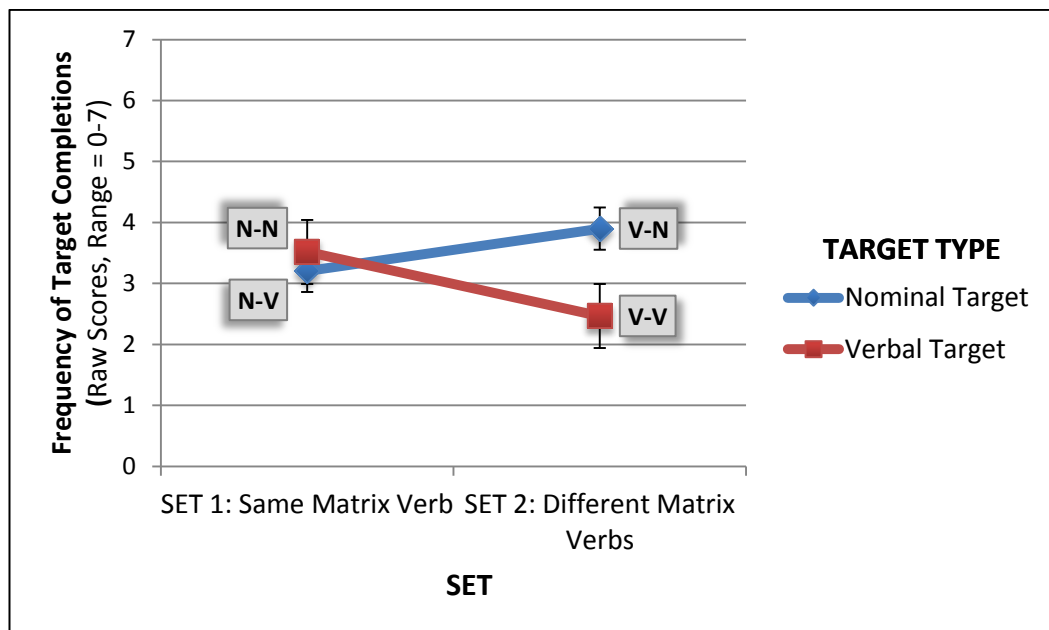


Figure 4.13: Mixed ANOVA “SET” x “Target Type” Interaction Plot: Comprehension-to-Production Priming and Tense/Aspect Markers Control Studies Combined: Simple Nouns vs. -DIK Nominalizations

The Mixed ANOVA on the combined data also revealed another significant two-way interaction between “Prime Type” and “Target Type”: $F(1, 57) = 13.316, p < .01, \eta_p^2 = .189$. As Figure 4.14 illustrates, similar structural priming effects were observed: participants provided more nominal ($M=3.891, SE=.201$) than verbal target completions ($M=2.672, SE=.193$) after nominal primes and more verbal ($M=3.312, SE=.213$) than nominal target completions ($M=3.216, SE=.225$) after verbal primes. We had found significant two-way interactions for both SETs in the relevant individual Repeated Measures ANOVAs. The present interaction, which pointed to the priming effect, was also naturally present when the two sets were combined.

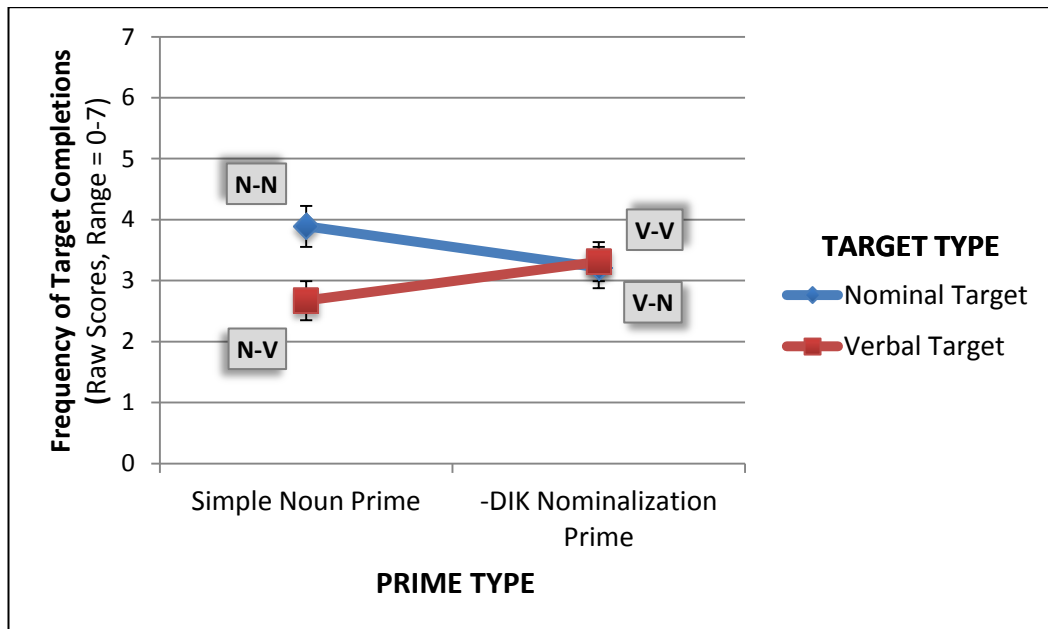


Figure 4.14: Mixed ANOVA “Prime Type” x “Target Type” Interaction Plot:
 Comprehension-to-Production Priming and Tense/Aspect Markers Control Studies
 Combined: Simple Nouns vs. -DIK Nominalizations

Apart from these two interactions, there were no other significant two-way interactions, main effects or a three-way interaction. The fact that we did not get a significant three-way interaction “Prime Type” x “Target Type” x “SET” suggests that the two SETs did not differ significantly from each other with respect to priming, although there was a significant main effect of “Target Type” in SET 2 only. The two sets differed in the amount of nominal target completions but not in terms of priming.

Consequently, it is safe to conclude that there is priming irrespective of the type of the matrix verb inflection. However, the proportion of nominal and verbal completions still varies with respect to the tense/aspect markers. This might point to a possible morpho-phonological effect of -DI on -DIK (though not to the extent of being the sole responsible of the priming effects, and only shifting it to the verbal end³⁶). Since both are verbal markers, when -DI was reduced in the stimulus set, we got fewer verbal completions (we again note that not all verbal completions were -DIK nominalizations). There seems to be a “conspiracy” between -DI and -DIK such that -DIK tends to go along more often with past-marked matrix verbs rather than with for instance: -(A)cAK or -(I)yor, due to coherence reasons at many linguistic levels. Our interpretation of this finding is that there might be an effect of morpho-phonology (on top of the priming effect of -DIK), which is a context effect of the whole clause (we had found context effects in our other data sets as well, see e.g. section 4.3.10). As long as it can be proven that the specific interaction between “Prime Type” and “Target Type” results exclusively from the use of -DIK, it is possible to argue for morpho-syntactic priming effects.

To sum up, the analysis of the combined data revealed that there was a structural priming effect of morpho-syntactic nature on simple nouns *vs.* -DIK nominalizations. There was also an additional morpho-phonological effect of the context (-DI *vs.* other

³⁶ This result is compatible with the general finding that phonological priming persists over long distances (and temporal delays) as opposed to phonological priming (Zwitserslood, Bölte, & Dohmes (2000, 2002).

tense/aspect markers on the predicate of the matrix clause). When the results of the previous comprehension-to-production experiment set are also taken into consideration, two different kinds of context effects emerge: The first is a general context effect which appeared when-(y)Iş nominalizations were influenced by the type of alternative form: if they were presented with deverbal nouns (Experiment 4.3.7), they behaved noun-like, when they were contrasted with -DIK nominalization (Experiment 4.3.8), they demonstrated hybrid behavior. A second kind of context effect is also observed here as -DIK seems to be partially influenced by the inflection of the matrix verb, i.e. whether the tense marker was -DI, -(I)yor, -(A/I)r, -(y)AcAK or -mIŞ. This effect can be related to phonological similarity, tense or aspect (as both the -DIK suffix and all these markers have some tense/aspect component). It should be noted that both of these context effects are on top of the primary priming effect that is quite resilient. An open question with respect to the latter type of context effect is: “what relation there is between -DI and -DIK”. It could be related to tense, aspect, phonological overlap, historical affinity or a combination of all these factors. This question merits further investigation.

This control experiment was the last one in the comprehension-to-production priming set. The next section will present another control study with a rather different nature which also employs the written sentence completion method.

4.4 Control Study: Natural Tense/Aspect Marker Frequencies of Matrix Verbs

4.4.1 Aim

The tense/aspect marker control experiment presented in the previous section indicated that priming effects persisted whether the -DI suffix was repeated on the matrix verbs of all the items or whether a variety of tense/aspect markers were distributed across the items. It also indicated that when the new markers were introduced, the amount of nominal target completions increased. Before starting the

experiments on structural priming in language comprehension (the self-paced reading study and the eye-tracking study), we needed to decide on which matrix verb schema to use in the stimulus sets of the new experiments. Therefore, an additional control experiment was run in order to test which tense/aspect markers participants would find the most natural.

A second and more specific objective of this experiment was to investigate the relation between the inflection marker -DI and the subordinating -DIK nominalizer more closely. Experiment 4.3.11 had indicated that when the majority of the -DI markers were replaced with other suffixes, the priming effect was not lost; however an additional main effect had emerged as an overall decrease of the verbal -DIK nominalizations. Here, we investigated this relation by leaving the tense/aspect slot of the matrix verbs empty for the participants to complete.

The final aim of the present study was to find out whether having the same or different types of critical words (i.e. nouns with POSS agreement or nominalized verbs) in the prime and the target was also related to the choice and repetition of the inflection suffixes on the matrix verbs of the prime-target pair. In a way, this control experiment would also function as a kind of second-order priming study investigating the possibility that priming at one level might promote priming at a different level³⁷ within the same sentence pair. Such a finding would also support the idea that not only the immediate morpho-syntactic structure but also larger contexts could influence priming effects to different extents.

4.4.2 Research Questions and Hypotheses

Research Question 1

Q4.3.1: In accordance with the main objective of this control study, the first question was: “Which tense/aspect markers would the participants naturally produce for

³⁷ According to a mechanistic account of language processing in dialogue, called the “Interactive Alignment Account”, alignment at one level leads to alignment at another level (Pickering & Garrod, 2004). We adopt this idea and test it with a different experimental design for the present purposes.

individual sentences?” More specifically, we were interested in understanding how the distribution of the five main markers: -(I)yor, -mİş, -DI, -(y)AcAK, -(I/A)r would turn out.

Hypothesis 1

H4.3.1: The hypothesis was that in the absence of a general context, -DI would be the most natural and appropriate tense marker. Since items with only this particular inflection were tested in the previous experiments and the participants did not report any negative feedback about the naturalness of the items, it was expected that the -DI suffix was considered natural and relatively unmarked. We did not have a directed hypothesis with respect to the distribution of the other four suffixes.

Research Question 2

Q4.2.1: Is there an interaction between the presence of the verb nominalization suffix -DIK and the inflection of the matrix verbs with the phonologically similar -DI past tense/perfective aspect marker, when the participants provide the matrix inflection rather than the nominalization?

Hypothesis 2

H4.2.1: In the light of the findings of experiment 4.3.11, we hypothesize that there would be a relation between -DI and -DIK in the context of the present study, as well. Although such a relation did not affect priming as the previous study (4.3.11) proved, the reduction of -DI's from the matrix verbs had nevertheless decreased the amount of -DIK nominalizations in target completions. Therefore, we expected a similar interaction in this study, in which the prime and target critical words were given and the participants provided the matrix verbs inflection.

Research Question 3

Q4.3.3: The last question was whether the repetition of the same tense/aspect marker (specifically -DI) on the matrix verbs of sentence pairs would tend to co-occur with priming-favoring contexts with the same types of critical words in the prime and target.

Hypothesis 3

H4.3.3: The hypothesis was that if the tendency to repeat the tense/aspect marker of the matrix verb was related to the presence of morpho-syntactic priming within the pair, then the participants would prefer to use the same marking on the matrix verbs of both sentences of the pair more often for those prime-target pairs with the same types of critical words. This would be considered as an indirect support to the possibility that priming at one level might enhance priming at another level.

4.4.3 Material and Method

The method used in this control study was also a written sentence completion task in which the sentences were presented to participants in full only without the suffixes of the matrix verbs, with the aim of determining which tense/aspect marker they would tend to produce for that slot naturally. To investigate secondary priming with respect to this choice, one group of participants always saw the same type of critical words in the prime and the target sentences and a second group always saw the opposite type of critical word of the prime in the target sentences.

Participants

17 native speakers of Turkish participated in this study. As before, participation was on a voluntary basis. Of those 17 participants, 12 were male and 5 were female. Their mean age was 27.06 years.

Stimuli

In this control study, the preferred method was again the written sentence completion task, as in the previous studies. However, in this new experimental design, participants were presented with sentences in which the matrix verbs were intentionally left uninflected. The matrix verbs were given in the infinitive form in parentheses and the participants were asked to inflect these verbs. The reason for presenting the verbs in infinitival citation form was to ensure that the participants would not get biased towards the tense that does not require changes in the vowel and that they would easily recognize the lexical item. For instance we gave the full citation form “hatırlamak” (*to remember*) instead of hatırla__ or hatırlı__, which would favor particular completions, and the form “esnemek” (*to yawn*) instead of esn__, which could be difficult to identify, despite being minimal enough to ensure impartiality to alternative completions with or without vowel changes. Consequently experimental items looked like the example in (7).

- (7) Muhasebeci, avukat-in belge -sin -i (unut -mak)
accountant lawyer-GEN document-POSS.3SG -ACC forget-INF
“The accountant (to forget) the lawyer’s document.”

As explained above, this study also functioned as a “second-order” priming study: One group of participants always read the same type of critical words in prime and target sentences (as in (8a) after a nominal prime like (7)) and a second group always read the opposite type of critical word of the prime in the target sentences (as in (8b) after a nominal prime like (7)). Participants were randomly assigned to one of these two groups.

(8) a. **Nominal Target:**

Fotoğrafçı, oyuncu-nun hile -sin -i (anla -mak)
photographer actor -GEN trick-POSS.3G-ACC understand -INF
“The photographer (to understand) the actor’s trick”

b. **Verbal Target:**

Fotoğrafçı, oyuncu-nun saklan-dığ-ın -i (anla -mak)
photographer actor -GEN hide -VN-POSS.3G-ACC understand-INF
“The photographer (to understand) that the actor (had) hidden/was hiding.”

Therefore, in Group 1, which was the “priming” group, the participants always saw the same type of critical words (nominal-nominal or verbal-verbal) in prime and target sentences. On the other hand, in Group 2, i.e. the “non-priming” group, the critical word of the target was always of the different type than that of the prime (nominal-verbal or verbal-nominal).

As such, Group 1 enabled us to test whether the participants tended to repeat the same tense suffix on the matrix verbs, when the type of the critical word was repeated. Group 2, on the other hand, would reveal the actual natural tendencies in the completion of the omitted tense suffixes, without any possible interference of priming.

During the preparation of the stimuli, we referred to the same set of sentences and fragments used in our previous studies. We completed the fragments that were previously left empty for the participant to fill in. While doing so, we took the single-word nominalized verb and noun completions of the target sentences from the actual responses of our previous participants, whenever possible. As for the empty fillers, we came up with simple single words or two-word combinations that were appropriate.

The sentences were randomized in the same fashion as in the previous control experiment (4.3.11). The number of stimuli and the overall experimental setup was also the same as before.

Procedure

The participants were handed out 19-page A5 size booklets and the informed consent form. On the first four pages of the booklets were the instructions and on the last page there was a mini-questionnaire asking for basic demographic information, the remaining 14 pages contained the stimulus items (5 items per page) (APPENDIX L).

In order to ensure that the participants did not use more complex tenses and aspects such as “gözlemle-yebil-ecek-miş” (*observe-ability-future-hearsay*, meaning: *s/he might be able to observe*), which were grammatically plausible, but beyond the scope of the present purposes, the participants were asked to choose among the 5 suffixes of interest (-(I)yor, -mIş, -DI, -(y)AcAK, -(I/A)r), presented as options. The instructions explained this clearly with a table and with two sentences as example. The two sample sentences were identical except the tense suffix of the matrix verb (we contrasted -DI with -(I)yor). The participants’ task was to inflect the verbs given in parentheses with one of the five suffixes without thinking too much, in any way they liked, as long as the resulting sentence sounded natural and was one that could be used in everyday language. The instructions also emphasized that the participant should write only one word in the blanks: the inflected matrix verb (not adding any other words like adverbials) and follow the exact order of the items without skipping any.

The aim of the study and the instructions were also presented orally by the experimenter. The participants were asked to read the instructions and informed consent form (APPENDIX M), sign the latter, inflect the verbs of the sentences on the booklet and respond to the questions at the end. When the participants finished the task, they submitted the completed booklets and the signed informed consent

form to the experimenter. Any questions they had at any point were answered by the experimenter. The whole process took approximately 15-20 minutes.

4.4.4 Data Analysis

The data obtained from the present control were subjected to three different analyses. Data encoding was straightforward, it consisted of the classification of the completions into the 5 suffix types and the grouping of them with respect to the status of the items containing them (e.g. nominal prime, verbal target, filler). If the participants used a different marker despite the instructions, or if there were technical problems like illegible responses, such completions were coded as “other” markers.

The first analysis was descriptive and provided the rankings of percentages of the use of the various tense markers in prime-target pairs and fillers. This analysis specifically addressed the first research question (Q4.3.1).

With respect to the second research question (Q4.3.2), a 2 x 2 x 2 within-subjects ANOVA was run on the frequency of inflectional markers, mainly -DI. This ANOVA enabled the examination of the relation between verbal -DIK nominalizations and -DI inflection on the matrix verb.

Independent Variables:

Within-Subjects Independent Variables:

- i. “Position in Pair” (whether the item was in the prime or the target position of the experimental pair)
- ii. “Grammatical Category” (whether the item was nominal, i.e. a noun (N); or verbal, i.e. a nominalized verb (NV))
- iii. “Priming” (whether the grammatical category of the critical word of the prime sentence was the same as the one in the target sentence, which would favor priming effects (the “priming” condition: N-N; NV-NV) or whether the

critical word in the prime and target sentences contained different types of critical words, which would disfavoring priming effects (the “non-priming condition”: N-NV; NV-N))

Dependent Variable: Frequency of tense/aspect marker completions (of -DI in particular)

Finally, the following chi-square test focused specifically on the prime and target pairs that were completed with the same tense/aspect marker by the participants. As such, it directly addresses the last research question (Q4.3.3) on the possibility of second-order priming.

4.4.5 Results

Descriptive Results: Rankings

As explained in the preceding section, we first analyzed the data descriptively and looked at the rankings of percentages of the use of the five tense/aspect markers first in prime-target (PT) pairs only, then in the PT pairs of the priming and non-priming groups separately, and then in the targets (both nominal and verbal) of the priming and non-priming group separately; next in fillers only, and finally in all the stimulus set. Table 4.3 below shows the percentages of the completions with the five markers.

Table 4.3: Distribution of Tense/Aspect Markers Across Stimulus Statuses

	-DI %	-mİŞ %	-(I)yor %	(I/A)r %	-(y)AcAK %	Others %
PT	56.35	18.65	11.90	5.56	1.59	5.95
PT (PRIMING)	48.02	20.63	13.10	9.92	2.38	5.95
PT (NON-PRIMING)	64.68	16.67	10.71	1.19	0.79	5.95
PRIMING TARGETS (N&V)	53.17	19.84	11.11	6.35	3.17	6.35
NON-PRIMING TARGETS (N&V)	65.87	15.08	10.32	0.00	0.79	7.94
FILLERS	63.36	17.99	10.05	4.37	3.57	0.66
ALL	60.56	18.25	10.79	4.84	2.78	2.78

As can be seen on this table (4.3), in all the conditions, -DI was the most frequent tense/aspect marker preferred by the participants. After -DI, came -mIŞ and then -(I)yor. In all the analysis groups, the ranking continued with (I/A)r and the least frequent tense marker that the participants produced was (y)AcAK, except the non-priming nominal and verbal targets in which we observed the reversed pattern: no (I/A)r's and 0,79% (y)AcAK's. However, it should be noted that in that group the percentage of those completions coded as "others" was quite high (7,97%).

To conclude, the proportions of the tense/aspect marker completions mostly follow this ranking: -DI > -mIŞ > -(I)yor > -(I/A)r > -(y)AcAK. This finding confirms the hypothesis that -DI would be the preferred inflection for such individual sentences in neutral contexts (H4.3.1).

ANOVA

Following the descriptive analysis, a within-subjects ANOVA on the 7 matrix verbs was run. As stated in the preceding section, the independent within-subjects variables were "Position in Pair", "Grammatical Category", and "Priming"; whereas the dependent variable was the frequency of -DI completions³⁸. The results indicated that there was a statistically significant main effect of "Priming": $F(1, 6) = 68.484$, $p < .001$, $\eta_p^2 = .919$. Overall, the priming condition led to fewer -DI completions ($M=50.893$, $SE=5.893$) than the non-priming condition ($M=68.765$, $SE=7.612$). In other words, for Group 1, in which the prime and the target sentences always contained the same type of critical word, participants were less likely to inflect the matrix verb of the sentences with -DI, than for Group 2, which included primes and targets with different types of critical word.

³⁸ The results reported here were based on the percentages of the relevant type of tense marker excluding the completions encoded as "others". When the "others" category was excluded, then the percentages and the counts represented the same frequency. The analyses based on the counts including the "others" category (which necessarily has to be reported as percentages) yielded the same significant results and therefore are not reported here.

We also ran two comparable within-subjects Repeated Measures ANOVA for the other two markers that were also frequent: -mİş and -(I)yor. Neither of these resulted in any significant main effects or interactions. For both -mİş and -(I)yor the frequency of completions was almost the same irrespective of whether we were looking at the prime or the target; whether the completion was nominal or verbal and whether the grammatical category of the critical words switched between the prime and the target or not. -DI completions, on the other hand, were higher in number when the category of the critical word switched between the prime and the target.

Chi-Square Test

To examine the data even more closely, we specifically investigated the prime-target pairs that were completed with the same tense marker. We ran separate X^2 analyses for the -mİş/-mİş; -(I)yor/-(I)yor and -DI/-DI pairs. The X^2 tests for both the -mİş/-mİş; and -(I)yor/-(I)yor prime-target pairs turned out non-significant. In fact, the frequencies of such pairs are very low. However, the X^2 results for the -DI/-DI pairs pair revealed a significant difference in the distribution of completions: $X^2(1) = 8.744, p < .01$. As illustrated in Table 4.4, this result seems to originate from the distinct behavior of the nominal prime-nominal target (N-N) pair (in which both prime and target sentences have nouns as the critical word) from the other three pairings.

Table 4.4: Completion Counts Across Conditions in the -DIK/-DIK Pairs

	Prime	
Target ↓	Nominal	Verbal
Nominal	10	27
Verbal	30	21

Based on the odds ratio it is 0.26 times less likely that a pair consisting of a prime and a target, both completed with -DI's be provided in a N-N context than in any other context. The number "10" in Table 4.4 thus represents the baseline probability of -DI completions in the absence of any -DIK's. The fact that there were so few -DI/-DI completions in the N-N pairs could also partially explain the main effect of "Priming" in the ANOVA above ($10+21=31$ vs. $30+27=57$). Of course, unlike in the ANOVA, here only the cases where -DI is both in the prime and in the target were under scrutiny.

4.4.6 Discussion

The descriptive results suggest that -DI was the most frequent tense/aspect marker in such individual sentences, as expected (H4.3.1). This tendency was evident in all conditions. It could be that in the absence of any temporal or aspectual clues and a coherent discursive context, -DI might be the unmarked default. It is also possible that emerging semantic properties of the sentences created *ad hoc* for the purpose of examining the two GEN-POSS constructions, might require this particular inflection. While the complex underlying interactions are beyond our scope, this finding points to the conclusion that the stimuli in the written-sentence completion tasks were in conformity with the inflection preferences of the participants.

In addition, the ANOVA yielded some intriguing findings regarding the interaction between the inflectional -DI and the nominalizer -DIK. It demonstrated that in the non-priming group, participants inflected the matrix verbs with more -DI's than in the priming group. Although there were the same number of -DIK nominalizations in both groups, for the non-priming group, in each pair, there was always one -DIK nominalization and no pair lacked such nominalizations; however, for the priming group -DIK was only present in the verbal pairs (with verbal primes and verbal targets) and not in the nominal pairs (with nominal primes and nominal targets). The total absence of the -DIK suffix in half of the pairs seems to have resulted in the smaller percentage of -DI completions in the priming condition. Overall, the results

point to an interaction between the two morphemes, as expected (H4.3.3). This possibly morpho-phonological interaction between the two suffixes seems to depend on the distribution pattern of -DIK in the stimulus list. In the non-priming group, whenever a prime-target pair was encountered, there was one -DIK nominalization. When -DIK is more loosely distributed like this, each instance of it seems to be activated frequently, promoting -DI.

When it is tightly distributed and locally repeated (as in the matching condition where -DIK does not appear in all the pairs, but when it does, it is doubled), its activation might be stronger, but rather infrequent, which could imply that its relation with -DI should be indeed phonological and rather short lasting. This finding also supports the conclusion of the bi-modal priming control experiment (4.3.11).

With respect to the cases of the repetition of the identical tense/aspect marker in the prime and target matrix verbs, the chi-square analysis revealed a significant result only for the pairs in which both matrix verbs were inflected with -DI. However, a closer look at the distribution of the data indicated that most of such pairs were not in the priming-favoring contexts as expected in H4.3.3. Consequently, rather than supporting a relation between two levels of priming the results strengthen our general conclusions about the relation between -DI and -DIK. The findings of the chi-square test indicated that the total absence of the -DIK nominalizer in the N-N context led to the fewest number of -DI/-DI completions. It could be argued that -DIK does not have a priming-related effect on the matrix verb tense marker *per se*; but rather an across the board, probably morpho-phonological effect. Noun phrases with simple nouns are too weak to cancel out this general effect of -DIK wherever it occurs, even once. To sum up, the findings of the chi-square test are compatible with the results of both the ANOVA presented above and the experiment 4.3.11.

In conclusion, this control experiment demonstrated that -DI was the participants' favorite tense/aspect marker for the sentences tested in the experiments within the framework of the present thesis. The findings of the present control study and the previous comprehension-to-production control experiment (4.3.11) indicate that

although the priming effects observed in the previous priming studies were proven to persist independently of the affinity between the -DIK nominalizer and the -DI marker, the two morphemes are interrelated. This relation could be related to several phonological, semantic, historical or other types of factors; what our findings currently indicate is only that it exists. Therefore, despite its advantage of being “natural”, we decided to replace past/perfective -DI with the three less frequent markers: aorist -(I/A)r, evidential past -mIŞ or present progressive -(I)yor for the two following structural priming experiments³⁹.

³⁹ The least frequent future tense marker inflectional -(y)AcAK was not included in the stimulus sets of the comprehension priming studies either, as it is also homophonous with the future alternate of the -DIK nominalizer: the subordinating -(y)AcAK.

CHAPTER 5

SELF-PACED READING STUDY⁴⁰

5.1 Aim

This self-paced reading study and the subsequent eye-tracking study investigated structural priming in the comprehension of Turkish GEN-POSS constructions. Through the use of different methodologies of presentation they complement each other and provide a complete picture of the topic under scrutiny.

The the main purpose of the present self-paced reading⁴¹ study was to investigate structural priming of possessive NPs with simple nouns and noun clauses with verbs nominalized by the -DIK suffix in online language comprehension. In other words, it tested whether reading the same kind of structure consecutively makes processing easier than reading different types of structure.

More specifically, this online comprehension task, which presented written sentences word by word (in a way similar to the unfolding of speech utterances during listening), aimed to investigate whether structural priming in the comprehension of a

⁴⁰ This study and the following eye-tracking study were supported by TÜBİTAK 1002 Research Grant awarded to the project no. 110K381. We acknowledge TÜBİTAK for this support.

⁴¹ Self-paced reading is a method that has successfully been used in structural priming experiments (e.g. Weber & Indefrey, 2009).

head-final language like Turkish is independent of the processing of the matrix predicate of the target sentence, which can come at the very end.

A secondary aim of the present study was to compare the relative processing loads of nouns and nominalized verbs of equal length in terms of syllable number, independently of any priming context, in order to obtain a baseline measure.

5.2 Research Questions and Hypotheses

5.2.1 Baseline Processing Loads of Nouns and Nominalized Verbs: (Reading Times) RTs of Critical Words in Prime Sentences

Research Question 1

Q5.1: Is there a difference in the RTs and thus presumably in the relative processing loads of simple nouns and verbs that are nominalized through the -DIK suffix that are of equal length in terms of the number of syllables, in a neutral context?

Hypothesis 1

H5.1: We hypothesize that simple nouns will be read faster than nominalized verbs of equal length due to several possible reasons like the morpho-structural complexity or higher semantic density of the latter. To put it differently, verbs nominalized with the -DIK suffix are expected to be more difficult to process (and would thus take a longer time to read) than simple nouns.

5.2.2 Structural Priming Effects: RTs of Critical Words in Target Sentences

Research Question 2

Q5.2: Is there structural priming in the comprehension of Turkish GEN-POSS constructions in an online reading task? In other words, given the SOV word-order used in the stimulus sentences, do any structural priming effects emerge, before the

matrix verb of the target sentence is encountered? Although the matrix verb of the sentence containing the Turkish GEN-POSS construction is not itself directly involved in the prime-target construction as in other alternations in other languages (e.g. in the English PO/DO alternation, where the ditransitive verb is part of the crucial structure, and can be different or the same), it could still be relevant for priming, as it is this matrix verb that embeds the critical construction.

Hypothesis 2

H5.2: The hypothesis is that if there is priming, then nouns in the target sentences should be read faster after a prime sentence with a noun rather than one with a nominalized verb and similarly, the nominalized verbs in targets should be read faster following a prime sentence with a nominalized verb rather than one with a noun. Therefore, we expect the priming effects to appear before the matrix verb of the target sentence has been read and processed. This could imply either that priming of NP *vs.* noun clause structures in a language like Turkish is independent of the processing of the matrix verb of the sentence or that there might be some kind of anticipation regarding the upcoming matrix verb.

5.3 Material and Method

5.3.1 Participants

33 people participated in this study. The data from two participants were excluded from the analysis as one was a native-bilingual and the other was way out of the general age range. Of those 31 participants whose data were analyzed, 20 were female and 11 were male. The participants were mostly university students from various departments of the Middle East Technical University. Their mean age was 22.35 years.

5.3.2 Stimuli

Sentences with Possessive NPs and noun clauses were presented to participants as prime and target sentences. The prime-target sentence pairs included both the same (noun-noun and nominalized verb-nominalized verb) and different (noun-nominalized verb and nominalized verb-noun) types of critical words. The possessive NP or the noun clause containing the critical word always played the function of direct object in both prime and target sentences; therefore, the critical words were consistently in the ACC case. The prime and target sentences that constituted a pair always contained the same matrix verb, inflected for 3rd person singular in the same tense and aspect. 7 different “balanced” verbs which are known to allow both types of critical words as argument equally frequently, were used as the superordinate predicate of the experimental sentences. These verbs are *duy-* (“hear”), *öğren-* (“learn”), *unut-* (“forget”), *hatırla-* (“remember”), *anla-* (“understand”), *anlat-* (“tell”) and *gözlemle-* (“observe”). As a result, each of these matrix verb appeared with 8 times overall: four times in prime position, twice with a noun, twice with a nominalized verb; and four times in target position, again twice with a noun and twice with a nominalized verb, in all possible combinations. The matrix verb of each sentence was inflected with either one of the three markers: aorist [-(I/A)r], evidential past (-mİŞ) or present progressive [-(I)yor].

In addition to these experimental sentences, there were three filler sentences between each prime-target sentence pair. The fillers were all structurally different from the experimental sentences.

As a result, participants read a total of 140 sentences word by word. Of those 140 sentences, 56 were experimental sentences (28 prime and target sentence pairs) and 84 were fillers (3 fillers per prime-target pair). In addition, after 1/3 of the fillers, there was a “Yes/No” question about the immediately preceding sentence to ensure that the participants kept reading the stimuli for meaning. Therefore, there were 28 comprehension questions. The correct answer for half of these questions was “yes” and that for the other half was “no”. The items were distributed into subsets consisting of 6 sentences: 1 prime sentence, 1 target sentence, 3 fillers and 1

comprehension question. The stimulus list included 7 sets, each of which consisted of 4 such subsets of 6 sentences randomized for each participant. In total, all the participants read the same 168 (140 sentences and 28 questions) items in different orders.

A pilot study with two participants (other than those whose data were analyzed) enabled us to revise the stimuli, make minor changes and finalize the design.

The sample stimulus subset in Table 5.1 illustrates what the subsets looked like (see APPENDIX N for the full stimulus sets). Each subset contained a prime-target pair with either identical types of critical words (as in Table 5.1) or with different types of critical words (as in Table 5.2). The comprehension question could come after any one of the three fillers and inquired about one of the various components of the related filler sentence.

In these sample subsets, the first prime-target sentence pair contains the same types of critical words, namely the nouns *rica* (“request”) and *ima* (“hint”). The prime and target sentences in the second pair on the other hand contain different type of critical words: whereas the prime sentence contains a nominalized verb *git-tiğ(-i)* (“that he was gone”), the target sentence contains a noun *kaygı* (“concern”). All the critical words in both primes and the targets consist of a total of four syllables including the 3rd person singular POSS agreement marker **-(s)I** and the ACC case marker **-(y)I**, so that their length is equalized. The GEN suffix on the noun that precedes the critical word and the 3rd person singular POSS agreement marker on the critical word are indicated in bold in the sample sentences. The same matrix verb “*hatırla-*” (*to remember*) is also repeated in the prime-target pairs.

Table 5.1 Sample Stimulus Subset 1

Prime1 (Nominal)	Şoför, [yolcu- nun rica- sın]-1 <i>hatırlıyor</i> . “The driver remembers the passenger’s request.”
Target1 (Nominal)	Kovboy, [şerif- in ima- sın]-1 <i>hatırlıyor</i> . “The cowboy remembers the sheriff’s hint.”
Filler1	Asker, ailesiyle son kez helalleşir. “The soldier exchanges his last goodbyes with his family”
Filler2	Baba, oğluna çok gücenmiş. “The father was very upset with his son.”
Question1	Baba, oğluna mı çok gücenmiş? “Was the father very upset with his son?” (Correct answer: “Yes”)
Filler3	Gezgin, handa üç gece konaklıyor. “The traveler lodges at the inn for three nights.”

Table 5.2 Sample Stimulus Subset 2

Prime1 (Verbal)	Teğmen, [komutan- ın git- tiğ-i]-ni <i>hatırlıyor</i> . “The lieutenant remembers that the commander was gone.”
Target1 (Nominal)	Kaymakam, [müteahhid- in kaygı- sın]-1 <i>hatırlıyor</i> . “The governor remembers the contractor’s concern.”
Fillers + Question[...]	

5.3.3 Procedure

The study was conducted at a meeting room in the Social Sciences Building of Middle East Technical University. The participants were welcomed in this room one by one by the experimenter. They were first asked to fill in a small survey containing a few demographic questions and to read and sign the informed consent form (APPENDIX O). The participants sat in front of the computer screen and the experimenter sat next to them, not having a direct view of the screen. Experimental instructions were presented both in writing on the computer screen and orally by the experimenter. If the participants had any questions about the procedure, the experimenter replied.

At the beginning of the experiment, the experimenter started a short trial round. Then, the experimental sets were presented in 4 sub-sessions. Between these sub-sessions, a short break was taken and during these breaks, the experimenter opened the following sub-session on the computer for the participant to read. The items in sub-groups of stimuli within each sub-session were presented in random order.

In this self-paced reading design, the stimulus sentences were presented word by word on a 15.6" notebook screen through the software E-Prime 2.0. The words appeared in the middle of the screen, on a black background with white bold letters (font Arial, size 22). Before each sentence started a “+” appeared in the center as a fixation mark. As soon as the participant pressed the space bar, the fixation cross disappeared, and the first word of the sentence appeared instead. When the participant read this word, s/he pressed the space bar again to replace it with the following word as in the example in Figure 5.1. The presentation of words was therefore non-cumulative, mimicking the actual online language processing during listening, but in written modality.

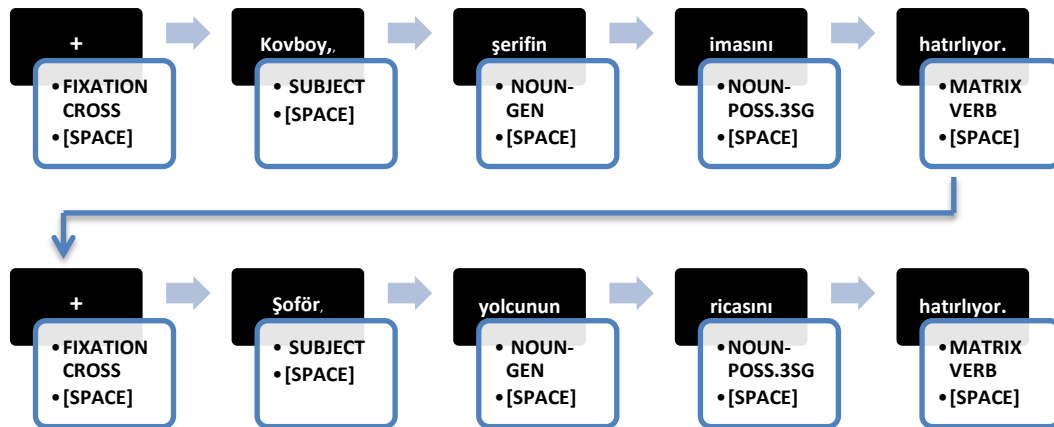


Figure 5.1: Flowchart Illustrating the “Self-Paced Reading Task”

For each word, the system automatically recorded the time that the participants took to press the key to call for the next word. This duration is considered as the reading time in our analysis.

In addition to the experimental prime and target sentences, there were also filler sentences dispersed between these experimental pairs. After some of the fillers, there was a comprehension question that immediately appeared after that sentence in order to ensure that the participants keep concentrating. These *Yes/No* questions were not presented word-by-word, but appeared on the screen as a whole sentence. In order to answer these questions, the participant was required to press one of the “N” and “V” keys just above the space bar. The “N” key which is on the right was marked with a little yellow piece of paper that had the letter “E” on it, which is the initial letter of the Turkish word “Evet” meaning “Yes”; and the “V” key on the left was marked with a dark pink paper with the letter “H”, representing “Hayır”, the Turkish word for “No”. The correct answer for each question was previously specified to the software, which enabled the system to provide a feedback display after the

participant answers the question. This feedback displayed specified whether the given answer was correct or incorrect and stayed on the screen for 1500 milliseconds. Then it was replaced with the following fixation cross.

To sum up, the participants were asked to read each sentence word by word, silently with their natural reading speed, by pressing the space bar to call for the following word or the “N” or “V” keys to answer the questions.

At the end of the study, any questions that the participants had were answered and they were given more detailed information about the study. The participants who were interested in receiving an e-mail on the results were invited to write down their contact information on a post-experiment information list. Overall, a complete session for one participant took about 20-30 minutes.

5.4 Data Analysis

E-Prime 2.0 software creates an output file for each participant. This output file with .Edat extension is a long and comprehensive file containing the participants' reading times (the duration between the presentation of a word and the pressing of the key) of each word in great detail with time stamps. Each participant's output file was manually scanned, the words belonging to the prime and target sentences were selected and recorded in an Excel spreadsheet. Consequently, for each participant a file with the reading times of the 4 words in 28 experimental sentences was provided. Then, all participants' reading times of the critical (i.e. the 3rd) words of the prime and target sentences were put into two larger spreadsheets, which were later transferred to SPSS (Statistical Package for Social Sciences, version 13.0 for Windows).

In the light of the research questions introduced above, two statistical analyses were run on the reading times of the critical words of prime and target sentences. The first analysis was aimed at comparing the baseline reading times of the nouns and nominalized verbs in prime sentences independent of any priming effect. The second

analysis was the main analysis and investigated whether the critical words of the target sentences were read faster when the preceding prime sentence contained the same type of critical word [N-N; NV-NV] than when it contained a different type of critical word [N-NV; NV-N]. Accordingly, two analyses were designed with the relevant variables.

Design 1: RTs of Critical Words in Prime Sentences

Independent Variables:

Within-Subjects Independent Variables:

- i. “Grammatical Category” (Noun or Nominalized Verb) of the critical word in the *Prime* sentence
- ii. “Order of Presentation” (Each nominal or verbal prime matrix verb was presented twice throughout the experiment. For instance the matrix verb “hatırla-” appeared twice in (two different) nominal primes (once before a nominal target and once before a verbal target). Similarly it also appeared twice in (two different) verbal primes (again once before a nominal target and once before a verbal target). This variable indicates whether the prime sentence containing the critical word (either nominal or verbal) constituted the first or the second instance of the presentation of the matrix verb.)

Dependent Variable: “Reading Time” (in milliseconds)

Design 2: RTs of Critical Words in Target Sentences

Independent Variables:

Within-Subjects Independent Variables:

- i. “Grammatical Category” (noun or nominalized verb) of the critical word in the *Target* sentence

ii. “Priming” (whether the grammatical category of the critical word of the target sentence is the same as the one in the prime sentence, which would favor priming effects (the “priming” condition: N-N; NV-NV) or whether the critical word in the prime and target sentences contain different types of critical words, which would inhibit priming effects (the “non-priming condition”: N-NV; NV-N))

Dependent Variable: “Reading Time” (in milliseconds)

For both designs, before running the analysis, outliers were removed *via* a z-value correction. This is a common statistical procedure in reading time studies, which was applied to the raw data in order to eliminate those values that are extremely out of the norms (2.58 standard deviations shorter or longer RTs than the mean of the z-distribution).

5.5 Results

In this section, first the analysis of the RTs of the critical words in prime sentences will be presented to evaluate whether there is a difference in the baseline processing loads of nouns and nominalized verbs irrespective of priming.

ANOVA 1: RTs of Critical Words in Prime Sentences

➤ A 2X2 repeated-measures ANOVA revealed a statistically significant main effect of “Grammatical Category” of the critical word in the prime sentences: $F(1, 30) = 5.517, p < .05, \eta_p^2 = .155$. The reading time of the critical words that were nouns ($M=642.655$ ms, $SE=46.573$) was significantly shorter than the reading time of the critical words that were nominalized verbs ($M=680.462$ ms, $SE=49.064$). In other words, the nominalized verbs of verbal primes took a longer time to read than the nouns of the nominal primes, thereby verifying our hypothesis (H5.1). This result is consistent with our expectation that verbs nominalized by the suffix -DIK would bring a higher processing load to the cognitive system than the structurally and

semantically less complex regular nouns, as expected. Since the critical words were matched in syllable number this difference cannot be due to differences in length and must indeed stem from differences in processing load.

➤ The ANOVA also revealed a second significant main effect of the “Order of Presentation” of the matrix verbs of the prime sentences with nominal and verbal critical words as stimuli: $F(1, 30) = 29.779, p < .01, \eta_p^2 = .498$. The reading time of the critical words in prime sentences in which the matrix verb in question appears for the first time ($M=702.86$ ms, $SE=48.455$) is significantly higher than that of the critical words in those prime sentences which instantiate the second appearance of that same matrix verb ($M=620.257$ ms, $SE=47.048$). This indicates that reading times of the participants decrease from the first to the second appearance of matrix verb. That participants get faster in time as they get habituated to the nature of the task is not an unexpected result. The observed main effect simply indicates that participants get to read the critical words in the sentences faster at the temporally more advanced phases of the study.

ANOVA 2: RTs of Critical Words in Target Sentences

➤ The second ANOVA on the reading times of the critical words of the target sentences revealed a significant main effect of “Grammatical Category” as before: $F(1, 30) = 4.409, p < .05, \eta_p^2 = .128$. Parallel to the previous hypothesis (H5.1) and ANOVA (1) results, this analysis also indicates that nominal critical words are read faster ($M=643.928$ ms, $SE=43.544$) than those critical words that are nominalized verbs ($M=677.964$ ms, $SE=48.453$) also in the target sentences.

➤ In addition, there was also a significant two-way interaction between “Grammatical Category” and “Priming”: $F(1, 30) = 4.852, p < .05, \eta_p^2 = .139$. A closer look at this interaction leads to the following observations: For nominal critical words in target sentences, if the target sentence contains the “same” type of critical words as the prime sentence (i.e. the priming condition), the critical word of the target sentence is read faster ($M=639.22$ ms, $SE=44.724$) than the condition in

which the type of the critical word of the prime sentence switches to its alternative in the target sentence ($M=648.636$ ms, $SE=44.299$) (i.e. the non-priming condition). This is in line with the relevant hypothesis (H5.2) and indicates that structural priming effects indeed make reading times faster for nouns. On the other hand, for the critical words in the target sentences that are nominalized verbs, reading times are faster when there is a switch in the type between prime and the target sentences (i.e. when the sentences contain “different” types of critical words: the non-priming condition) ($M=657.046$ ms, $SE=48.453$) than when there is no such switch (i.e. when they contain the “same” types of critical words: the priming condition) ($M=698.882$ ms, $SE=50.239$). This interaction is illustrated in the below interaction plot (Figure 5.2).

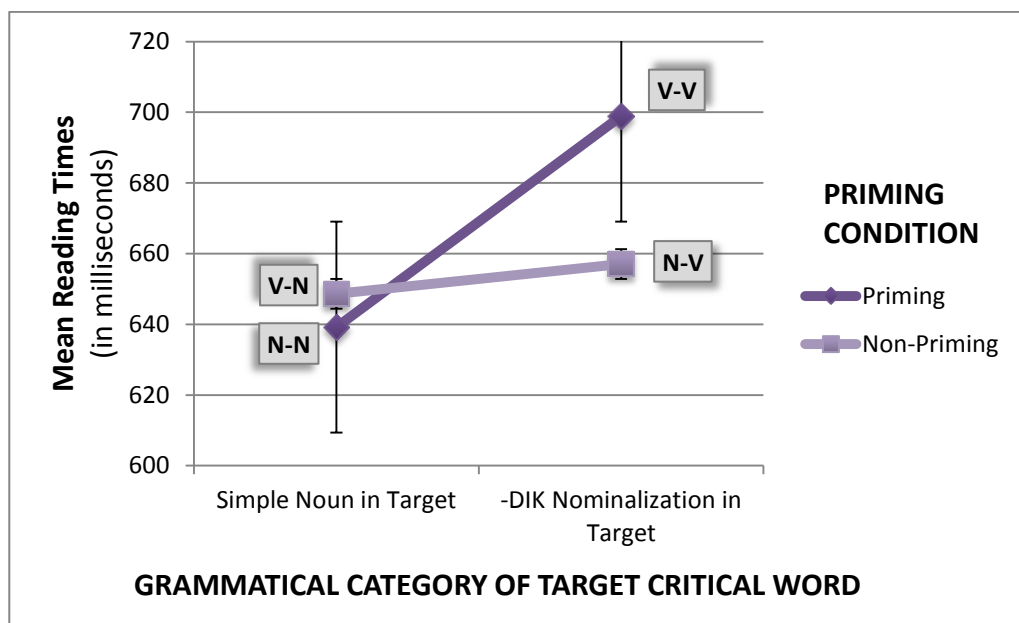


Figure 5.2: Repeated Measures ANOVA “Grammatical Category” x “Priming” Interaction Plot: Reading Times of Critical Words in Target Sentences

This interaction is of great theoretical interest. The expected facilitating effect of structural priming is evident for nouns which bring the least amount of cognitive load to the language processor; whereas the augmented processing load of nominalized verbs seems to override this effect for the prime-target pairs which include two morphologically loaded nominalized verbs consecutively. The possible reasons and implications of this finding will be discussed in more detail in the following “Discussion” section (5.6).

5.6 Discussion

The results of the present self-paced reading study first shed light on the theoretical question of the relative processing loads of nouns and verbs that are nominalized by the -DIK suffix. Although nominalized verbs behave like nouns in their external morpho-syntax, they bring a higher load to the language processing system than regular nouns do. As the nominalized verbs in the prime sentences take a longer time to read than the nouns of the same length, the hypothesis that the former brings more processing load to the system is verified. This could be due to a basic difference of semantic content between nominal and verbal roots or to the internal morphological complexity of nominalized verbs. The process of nominalization through the -DIK marker might require additional computational resources not employed during the processing of simple nouns. It is also possible that a combination of all these and possibly other factors might contribute to this result. Further research is required to tease apart the influence of these plausible contributing factors.

The first analysis also indicates that the readings times of the critical words are faster when the same matrix verb appears for the second time in this stimulus list. This result suggests that the participants seem to get faster as the task progresses. In other words, they might be getting habituated or familiarized with the nature of the task and thus read the words more rapidly in general.

The main finding of the present study is the one revealed by the second analysis. On top of the main effect of “Grammatical Category”, which reflects the previously mentioned processing load difference between nouns and nominalized verbs, there is also a significant interaction between “Grammatical Category” and “Priming”. This interaction reveals that having read the same type of critical word in the preceding prime sentence facilitates the processing of the critical word in the target sentence if the critical word is a noun. Processing a noun after a prime sentence with another noun takes a shorter time than after a prime sentence with a nominalized verb. Intriguingly, this expected facilitating priming effect is present only for those critical words that are nouns, in other words, for the critical words that are nominalized verbs, the reverse seems to be the case. If the participant has already read a nominalized verb in the prime sentence, s/he gets slower while reading the second nominalized verb in the following target sentence. When the participants read a noun in the prime sentence, the reading time for the nominalized verb in the consecutive target sentence is considerably lower than in the condition where the critical words are of the same type, i.e. both are nominalized verbs. The facilitating effect of structural priming is evident for the nouns in possessive NPs. However, in the prime-target pairs which contain noun clauses with morphologically loaded nominalized verbs consecutively, the priming effect seems to be overridden by the increased processing load. This could be due to the extra time required for the decomposition of the nominalized verbs. Since no such decomposition is needed for regular nouns, the structural priming effect is clearly visible for them. In other words, this effect might be camouflaged for noun clauses with nominalized verbs. The explanation must therefore lie at the morphology-syntax interface. The present finding also points to the possibility that the prime and the target sentences might be in interaction with respect to their critical words. The processing load brought by the morphologically complex nominalized verb in the first (prime) sentence might spill over to the following target sentence and the presence of another complex nominalized verb in this sentence might cause extra processing load. In this regard, there seems to be a “reverse priming” effect for nominalized verbs.

To sum up, the first hypothesis (H.5.1) is completely verified as nouns are read faster than the morphologically complex nominalized verbs in prime sentences, and the second hypothesis (H5.2) is partially verified as the facilitating effect of structural priming was found uniquely for the nominal critical words of the target sentences. When the critical words in the target sentences were nominalized verbs, a novel “reverse priming” effect was observed, most probably due to the compositional structure of the nominalized verbs that increases their complexity.

Overall, these results contribute to the understanding of structural priming in the Turkish constructions under scrutiny and their relative processing loads. This study investigated structural priming in the online comprehension of written language. The critical words appeared at the third position in the experimental sentences, therefore the observed priming effects emerged before the matrix verb of the sentence was encountered. This could imply either that structural priming is independent of the matrix verb in Turkish (and therefore the readers do not engage in any processing related to the matrix verb until it is actually encountered) or that the readers could be assigning a dummy/virtual matrix verb (which could in turn be either a full matrix verb with its lexical semantics or a semantically empty bundle of abstract features specified for argument structure). In order to further investigate structural priming in the comprehension of the same construction pair, we ran a complementary experiment (Chapter 6) in which we presented sentences not word by word but as complete sentence pairs and recorded the participants’ eye-movements as they read the sentences. This eye-tracking study aimed at clarifying the role of the matrix verb in priming in the comprehension of Turkish GEN-POSS constructions, by comparing the effects of having the same or different matrix verbs in prime and target sentences.

CHAPTER 6

EYE-TRACKING READING STUDY

6.1 Aim

Just like the previous self-paced reading study, this eye-tracking study was also designed to investigate structural priming in the comprehension of Turkish possessive NPs with simple nouns and noun clauses with -DIK nominalizations, but with a different method of presentation and data collection. Unlike the self-paced reading paradigm, the eye-tracking task enabled us to present the two complete sentences in pairs rather than word-by word, as they would naturally appear in a written text. Therefore, this methodology enabled us not only to measure the reading times of parts of the sentence as the readers' eyes focus on the words, but also to observe any backtrackings where the readers' gaze turned back to previous parts of the stimuli⁴². Structural priming was again investigated through the examination of reading times, this time measured as eye-fixation duration on words.

⁴² Eye-tracking is a well-established quantitative measure of attention which is particularly suitable for reading studies (e.g. Duchowski, 2002; 2006). It has been used in structural priming studies with various reading (e.g. Traxler, 2008) and visual world tasks (e.g. Arai *et al.*, 2007) as explained in Chapter 2.

To address the more specific question of the influence of the lexical repetition of the matrix verb, which was now simultaneously in the visual field of the reader, the stimuli were organized such that in one group, the matrix verbs of the prime and the target sentences would be identical, and in the other they would be different.

Another objective of the eye-tracking study was to observe the patterns of backtrackings among different parts of the sentence stimuli, which are assumed to represent a rather offline analysis process. Backtracking may inform us about the priming process insofar as patterns of backtracking may differ between primed and unprimed structures and may reflect re-checking due to difficulty in processing.

Finally, as in the self-paced reading study, a secondary aim was to compare the relative processing loads of nouns and verbs this time with the eye-tracking methodology in which reading times are measured in terms of fixation durations.

6.2 Research Questions and Hypotheses

6.2.1 Baseline Processing Loads of Nouns and Nominalized Verbs: Reading Times (RTs) of Critical Words in Prime Sentences

Research Question 1

Q6.1: Is there a difference in the reading times (now measured as the total fixation duration) and thus presumably in the relative processing loads of simple nouns and verbs that are nominalized through the -DIK suffix that are of equal length in terms of the number of syllables, in a neutral context as in the self-paced reading study?

Hypothesis 1

H6.1: Irrespective of the possible priming effects, we expect the simple nouns in the GEN-POSS construction to be read faster (indicated by shorter total fixation durations) than the corresponding nominalized verbs, just like in the self-paced reading task. Since verbal stems are semantically denser and the nominalized verbs

are morphologically more complex (given the nominalization suffix), the nominalized verbs should bring more processing load to the system than the nouns. Therefore, they are expected to be read more slowly, indicated by longer fixation durations.

6.2.2 Structural Priming Effects: RTs of Critical Words in Target Sentences with the Same and Different Matrix Verbs

Research Questions 2 and 3

Q6.2: Is there structural priming in the comprehension of Turkish GEN-POSS constructions (again in the sense that the target critical words are read faster when they follow a prime containing the same type of critical word: a noun or a nominalized verb), in this design where both the prime and the target sentences are simultaneously presented in pairs? In other words, do structural priming effects emerge when the matrix verbs of both sentences are readily visible on the computer screen?

Q6.3: A second relevant question that follows is whether the possible structural priming effects are influenced by (dependent on or boosted by) the lexical repetition of the matrix verbs of the prime sentence in the final position of the target sentence.

Hypotheses 2 and 3

H6.2: If there is priming in the comprehension of Turkish GEN-POSS constructions and if the total fixation durations as measured by eye-tracking are sensitive to priming effects, then the participants are expected to read the target constituents that are of the same grammatical category as the prime more quickly. In other words, a target with a nominalized verb following a prime with another nominalized verb [NV-NV] should be read faster than one following a prime with a noun [N-NV] and a target with a noun should be read faster after a prime with another noun [N-N] than after a prime with a nominalized verb [NV-N].

H6.3: Moreover, if priming in Turkish is completely independent of the lexical repetition of the matrix verb as its speakers are accustomed to hearing or reading the matrix verb at the very end of the sentence, then the reading times of the critical words in the target sentences of the two groups should not be significantly different. Or there might also be a boosting effect of lexical repetition, which would lead to stronger priming effects in the same matrix verb group. Finally, if priming in this methodological paradigm is sensitive to the lexical repetition of the matrix verb even in a head-final language like Turkish, then the priming effects should be visible in the same matrix verb group only or should be stronger there.

6.2.3 RTs of the Matrix Verbs

Research Question 4

Q6.4: Is there a difference in the reading times (again measured as the total fixation duration) and thus presumably in the relative processing loads of the matrix verbs of the prime and the target sentences in the same- and different-matrix verb groups? To put it differently, is there a different type of facilitating effect in the repetition of the same matrix verb in the prime-target pair, which we can call “lexical identity priming” for the matrix verbs?

Hypothesis 4

H6.4: We hypothesize that the target matrix verbs in the different matrix verbs group should be read more slowly (i.e. should be fixated upon for a longer duration) than those in the same matrix verb group, because they constitute new lexical items. When the matrix verb is repeated in the sentence pair, the one in the target sentence should be read faster due to a different kind of priming effect based on the lexical identity of the prime and target predicates.

6.2.4 Backtrackings from the Target Sentence to the Prime Sentence

Research Questions 5 and 6

Q6.5: Do the readers go back to the prime sentence after reading the target sentence? If they do, in which condition does this happen the most frequently?

Q6.6: Which region of the target sentence do the backtrackings originate from and to which region do they go and which regions do they target in the prime sentence? In other words, what are the starting and ending points of the backtrackings?

Hypotheses 5 and 6

H6.5: If there is priming in the comprehension of Turkish GEN-POSS constructions and if backtracking reflects such priming effects, then the participants are expected to backtrack more between prime-target pairs with different types of critical words.

H6.6: If backtrackings are indicators of immediate processing load, then we could expect them to start off at the critical word of the target sentence and go to the critical word of the prime sentence. The number of such backtrackings would thus be greater for the instances where the critical words are of different types.

In addition, there might also be different numbers of backtrackings between the matrix verbs of the target and prime sentences in the two groups. One can expect that more backtrackings would occur between the matrix verbs when the two are different lexical items. Lastly, the number of backtrackings might be different for nouns (Ns) and for nominalized verbs (NVs), given their different processing loads.

6.3 Material and Method

6.3.1 Participants

A total of 61 volunteers with normal or corrected vision participated in this study. Data from some of the participants were not included in the analysis due to several

reasons. The main reasons for exclusion were 5 or more incorrect answers given to the comprehension questions, calibration problems, and the misunderstanding of the task. Overall, data from 50 participants were analyzed. Of those participants 28 were female and 22 were male. Their mean age was 25.46 years.

These participants were randomly assigned to one of the two groups: the same matrix verb group and different matrix verbs group. As a result, 26 participants (15 female, 11 male, mean age: 26.27 years) were assigned to the same matrix verb group, and 24 participants (13 female, 11 male, mean age: 24.58 years) were assigned to the different matrix verbs group.

6.3.2 Stimuli

Just like in the previous self-paced reading study, sentences with possessive NPs and noun clauses were presented to participants as prime and target sentences. The prime-target sentence pairs included both the same (N-N and NV-NV) and different (N-NV and NV-N) types of critical words. The possessive NP or the noun clause containing the critical word always played the function of the direct object in both prime and target sentences; therefore, the critical words were consistently in the ACC case.

With respect to the matrix verb of the prime and the target sentences that constituted a pair, the participants were randomly assigned to one of the two groups: In the same matrix verb condition, the two sentences always contained the same matrix verb, inflected for 3rd person singular in the same tense and aspect. In the different-matrix verbs condition, the prime and the target sentences contained two different matrix verbs both of which were also inflected for 3rd person singular in the same tense and aspect.

The 7 matrix verbs used in these two combinations were again the “balanced” ones that are already known to allow both types of critical words (nouns and nominalized verbs) as arguments equally frequently: *duy-* (“hear”), *öğren-* (“learn”), *unut-*

(“forget”), *hatırla-* (“remember”), *anla-* (“understand”), *anlat-* (“tell”) and *gözlemle-* (“observe”).

In addition to these experimental sentences, there were 3 filler sentences between each prime-target pair. The fillers were all structurally different from the experimental sentences.

The stimuli used in this study were identical in content to those in the self-paced reading study. However, unlike in the self-paced reading study where the sentence unfolded word-by-word, in this eye-tracking task the stimuli were presented as complete sentences and in pairs (one under the other) on the computer screen. Therefore, the prime and the target sentences were displayed simultaneously. We adopted this specific presentation design in order to ensure that both matrix verbs would be in the readers’ visual field, which would in turn allow us to investigate backtrackings from targets to primes. In order to ensure that the participants did not distinguish the prime-target pairs from the fillers, we presented the fillers in pairs as well. As a result, unlike in the self-paced reading study, in the eye-tracking design, there were four fillers (2 filler pairs) between each prime-target pair. This required us to prepare 28 new fillers that were similar to the previous ones and to add them in the stimulus set. There were also relevant “Yes/No” questions to ensure that the participants kept reading the stimuli for meaning. These comprehension questions followed one of the filler pairs (i.e. there was a question on $\frac{1}{4}$ of the fillers) and could be related to either the first or the second filler sentence on the immediately preceding display. The correct answer for half of these questions was “yes” and that for the other half was “no”. The items were distributed into subsets consisting of 7 sentences (1 prime-target pair, 2 filler pairs and 1 question) as illustrated in Table 6.1, presented across 4 displays: 1 prime sentence, 1 target sentence (Display I), 4 fillers (Displays II and III) and 1 comprehension question (Display IV). The stimuli list included 7 sets, each of which consisted of 4 such subsets of 7 sentences, randomized for each participant. In total, all the participants read the same 196 (168 sentences and 28 questions) items in different orders. The matrix verbs of all these

196 sentences were inflected with either one of the three markers: aorist [-(I/A)r], evidential past (-mIŞ) or present progressive [-(I)yor]. The matrix verb tense/aspect markers were identical for all those sentences that constituted a prime-target pair and for half of the filler pairs; and the tense/aspect marker of the question always matched that of the related filler sentence.

Again, a pilot study with two participants (other than those whose data were analyzed) enabled us to revise the stimuli, make minor changes and finalize the design. The sample stimulus subset in Table 6.1 illustrates what the subsets looked like (for the full stimulus sets which covers the items tested in both the present study and the preceding self-paced reading experiment presented in Chapter 5, see APPENDIX N).

Table 6.1 gives a full sample subset with the fillers and the comprehension question, as well as the nominal prime-nominal target pair (N-N) in the same matrix verb (“unut-”: *to forget*) condition. Table 6.2 shows the three remaining prime-target pairings (N-N, NV-N, NV-NV) in the same matrix verb condition. Table 6.3 on the other hand, demonstrates all four prime-target conditions in the different matrix verb condition. In each of these pairs, the matrix verb of the target is different from that of the prime.

As before, all the critical words in both primes and the targets consist of a total of four syllables including the 3rd person singular POSS agreement marker -(s)I(n) and the ACC case marker -(y)I, so that their length is equalized. The GEN suffix on the noun that precedes the critical word and the 3rd person singular possessive agreement marker on the critical word are indicated in bold in the sample sentences in Tables 6.1, 6.2 and 6.3.

Table 6.1: The Same Matrix Verb Group Nominal Prime-Nominal Target Sample Stimulus Subset with Fillers and Comprehension Question

Filler1	Şarkıcı besteciyle nihayet anlaşmış. "The singer finally came to an agreement with the composer."
Filler2	Şövalye zindandan zar zor kurtulur. "The knight escapes from the dungeon with difficulty."
Question1	Şövalye zindandan mı zar zor kurtulur? "Does the knight escape from the dungeon with difficulty?" (Correct answer: "Yes")
Filler3	Oyuncakçı palyaçolara ilgiyle bakıyor. "The toy-seller is looking at the clowns with interest."
Filler4	Postacı kapıcıyla her gün tartışıyor. "The postman argues with the doorkeeper every day."
Prime1 (Nominal)	İtfaiyeci, [jandarma-nın cevab-ı]-nı unutmuş. "The firefighter forgot the gendarme's answer."
Target1 (Nominal)	Kral, [karısı-nın surat-ı]-nı <i>unutmuş</i> . "The king forgot his wife's face."

Table 6.2: The Same Matrix Verb Group Nominal Prime-Verbal Target, Verbal Prime-Nominal Target and Verbal Prime-Verbal Target Pairs: Sample Stimuli

Prime2 (Nominal)	Assolist, [yardımcısı- nın veda- sın]-1 <i>hatırlıyor</i> . “The lead singer remembers her/his assistant’s farewell.”
Target2 (Verbal)	Muavin, [hemşehrisi- nin kız-dı ^ğ - ın]-1 <i>hatırlıyor</i> . “The driver attendant remembers that her/his fellow citizen got angry.”
Prime3 (Verbal)	Muhasebeci, [avukat- ın sus- tuğ-ün]-u <i>gözlemliyor</i> . “The accountant observes that the lawyer remains silent.”
Target3 (Nominal)	Cerrah, [araştırmacı- nın çaba- sın]-1 <i>gözlemliyor</i> . “The surgeon observes the researcher’s effort.”
Prime4 (Verbal)	Damat, [akrabası- nın kaç- tuğ-ın]-1 <i>anlatır</i> . “The bridegroom tells that his relative ran away.”
Target4 (Verbal)	Çiçekçi, [berber- in bat- tuğ-ın]-1 <i>anlatır</i> . “The florist tells that the barber went bankrupt.”

Table 6.3: Different Matrix Verbs Group Nominal Prime-Nominal Target, Nominal Prime-Verbal Target, Verbal Prime-Nominal Target and Verbal Prime-Verbal-Target Pairs: Sample Stimuli

Prime1 (Nominal)	İtfaiyeci, [jandarma- nın cevab- ı]-nı <u>unutmuş</u> . “The firefighter forgot the gendarme’s answer.”
Target1 (Nominal)	Dolandırıcı, [polis- in yanıt- ı]-nı <u>duymuş</u> . “The impostor heard the police officer’s answer.”
Prime2 (Nominal)	Assolist, [yardımcısı- nın veda- sın]-ı <u>hatırlıyor</u> . “The lead singer remembers her/his assistant’s farewell.”
Target2 (Verbal)	Teyze, [misafir- in doy- duğ - un]-u <u>gözlemliyor</u> . “The lady observes that the guest is full.”
Prime3 (Verbal)	Muhasebeci, [avukat- ın sus- tuğ - un]-u gözlemliyor. “The accountant observes that the lawyer remains silent.”
Target3 (Nominal)	Kondüktör [makinist- in düdüğ- ün]-ü duyuyor. “The conductor hears the engineer’s whistle.”
Prime4 (Verbal)	Damat, [akrabası- nın kaç- tiğ - ın]-ı <u>anlatır</u> . “The bridegroom tells that his relative ran away.”
Target4 (Verbal)	Yeniçeri, [sadrazam- ın var- dığ - ın]-ı <u>öğrenir</u> . “The janissary learns that the grand vizier has arrived.”

6.3.3 Procedure

The study was conducted at the Human-Computer Interaction Lab of Middle East Technical University, located at the Computer Center. The participants were welcomed in the experimental room one by one by the experimenter. They were first asked to fill in a small survey containing a few demographic questions and to read and sign the informed consent form (APPENDIX P). Then, the participants sat (at an approximate distance of 60-70 cm) in front of the screen of a desktop computer that had an integrated Tobii T120 eye-tracker device⁴³, equipped with E-Prime software and E-Prime extensions for Tobii.

Before the experiment started, there was a (5-point) calibration phase so that the participants' eye-gaze could be recorded. This was provided automatically by Tobii. The participant was asked to fixate on and follow a red dot which moves to 5 different parts of the screen. The experiment was started only after successful calibration had been obtained. Experimental instructions were presented both in writing on the computer screen and orally by the experimenter. If the participants had any questions about the procedure, the experimenter replied. When the experiment started, the experimenter left the participant at the experimental room and went in the adjacent observation room. The experimenter could observe the participant through the one-way mirror that separates the two rooms. The experimenter and the participant could also hear and talk to each other if necessary *via* the loudspeakers and the microphones located in the rooms. The participants were given this information in advance. In the observation room, there was a control unit connected to the participant's computer, which allows the experimenter to observe the same scene that the participant sees and to control which experimental files are opened and/or closed. At the beginning of the experiment, the experimenter started a short trial round. Then, the experimental sets were presented in 3 sub-sessions. Between

⁴³ This binocular tracker has a typical accuracy of 0.5 degrees and spatial resolution of 0.2 degrees. Its data rate is 120 Hz, i.e. it collects 120 samples per second (Product Description for Tobii T and X Series Eye Trackers, 2010).

these sub-sessions, a short break was taken and during these breaks, the experimenter opened the following sub-session on the computer for the participant to read.

The sentences were presented in pairs. In each display, two sentences (either two fillers or a prime-target pair) were presented, one underneath the other, in bold black Arial 22 letters on a white background, with left alignment.

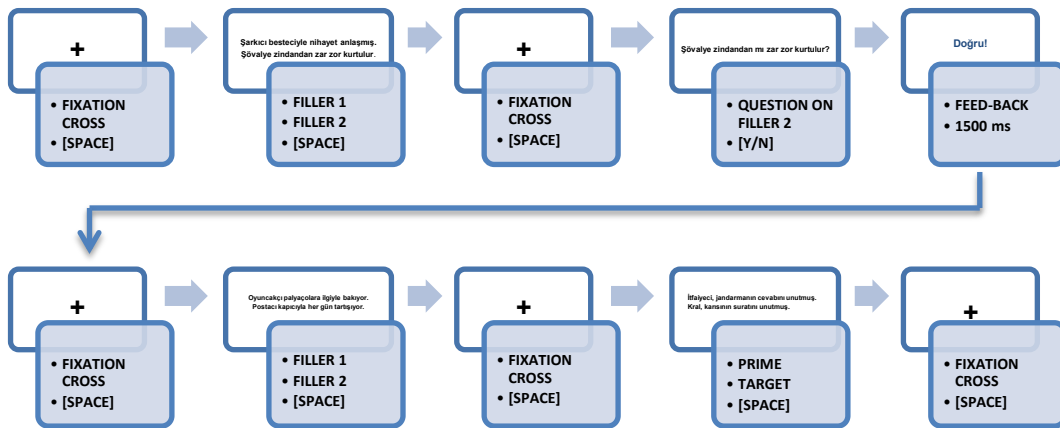


Figure 6.1: Flowchart Illustrating the “Eye-Tracking Experiment”

After having read the sentences silently, the participants pressed the space bar to call for the next display. Before each sentence pair, there was a fixation cross (“+”) at the middle of the screen. The participants needed to press the space bar to move to the next display after the fixation cross, as well. When there was a comprehension question (with the aim of ensuring that the participants keep concentrating), they responded by pressing either the “Ö” key, which was covered with a little yellow square piece of paper marked with the letter “E” (initial of “Evet”, meaning “Yes” in Turkish) or the X key, covered with a dark pink piece of paper marked with an “H”

(initial of “Hayır”, meaning “No” in Turkish). They immediately got feedback about whether their response was correct or not. This feedback display stayed on the screen for 1500 milliseconds until it was automatically replaced with the following fixation cross (see Figure 6.1). To sum up, the participants were asked to read each sentence silently with their natural reading speed, following the given order and press the space bar to move to the following display or the “X” or “Ö” keys to answer the questions.

At the end of the study, any questions that the participants had were answered and they were given more detailed information about the study. The participants who were interested in receiving an e-mail on the results were invited to write down their contact information on a post-experiment information list. Overall, a complete session for one participant took about 20 minutes.

6.4 Data Analyses, Specific Results and Discussions

In accordance with the objectives of the study, two types of analyses were run. The first group of analysis was on reading times as in the self-paced reading study; but this time reading times were measured by the participants’ fixation durations and the second group of analysis was on the counts of backtrackings, i.e. those instances in which the readers’ eye gaze turned back from any part of the target sentence to any part of the prime sentence.

6.4.1 Reading Times (Data Analysis, Results, Discussion)

Data Analysis

In order to measure how long the participants looked at certain parts of the stimulus sentences, first the “Areas of Interest” (AOIs) were specified. The AOIs for this study were the critical words (either a noun or a nominalized verb) of the GEN-POSS constructions in both prime and target sentences. In addition, the matrix verbs of the sentences were also considered as AOIs. Therefore, for each prime-target

sentence pair, there were 4 AOIs as can be seen on Figure 6.2: critical words (which were always the third word of the sentence) in both the prime and the target and matrix verbs (which were always the fourth and the last word of the sentence). The AOIs were rectangular areas around the words (somewhat extended downwards to capture the general reading pattern) and were specified for each prime-target pair in both the same matrix verb and the different matrix verbs groups. The AOIs did not overlap with each other and were identical for participants who read the same stimuli.

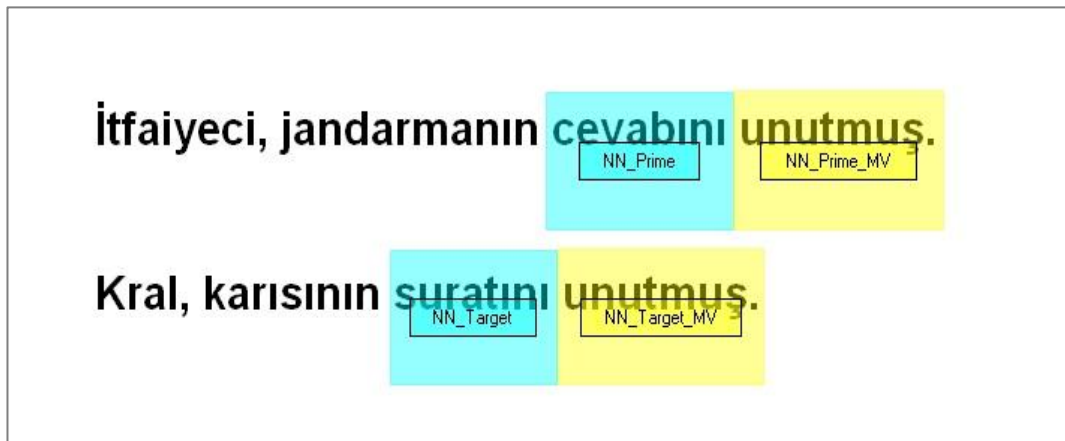


Figure 6.2: Sample AOIs in Prime and Target Sentences. Turquoise: Critical Words; Yellow: Matrix Verbs (“Same Matrix Verb Condition”, Nominal Prime and Nominal Target)

Then, the reading time measured by fixation durations were calculated with three different metrics: “Total Fixation Duration”, “(Mean) Fixation Duration” and “First Fixation Duration”⁴⁴. Of these, total fixation duration⁴⁵, the sum of the durations for

⁴⁴ Total fixation duration is the sum of the durations for all the fixations within an AOI. Fixation duration is the duration of each individual fixation in an AOI. Since it is the mean duration of all the

all the fixations that are within an AOI, is the most comprehensive metric and constitutes the richest source of information for the purposes of this study. It is on this metric that we based our hypotheses. Therefore, in the Results section below, we will only report the reading times measured as total fixation duration.

We created 3 Mixed ANOVA designs to investigate reading times (RTs) of (1) critical words in prime sentences, (2) critical words in target sentences and (3) matrix verbs in prime and target sentences. The variables of each design are as follows:

Design 1: RTs of Critical Words in Prime Sentences

Independent Variables:

Within-Subjects Independent Variables:

- i. “Grammatical Category” (noun (N) or nominalized verb (NV)) of the critical word in the *Prime*
- ii. “Priming” (whether the grammatical category of the critical word of the target sentence is the same as the one in the prime sentence, which would favor priming effects (the “priming” condition: N-N; NV-NV) or whether the critical word in the prime and target sentences contains different types of critical words, which would inhibit priming effects (the “non-priming condition”: N-NV; NV-N))

Between-Subjects Independent Variable: “Group” (The same matrix verb or different matrix verbs in prime-target pairs)

fixations within an AOI, we can also call this metric “Mean Fixation Duration” to avoid confusion with total fixation duration. Finally, first fixation duration is the duration of the first fixation within an AOI. (Tobii Studio User Manual, 2010). These three metrics provide us with the measures of the durations of the initial fixations in an AOI, and if there are further fixations in the same AOI, the total and mean durations of all the fixations. All these metrics measure durations in seconds. First fixation durations might represent the recognition of the words and mean fixation durations provide an approximation on average duration length. Evidently, the total fixation duration metric is the most inclusive one.

⁴⁵ We used the metric called “Total Fixation Duration (Include Zeros)” which also takes into account those instances where there were no fixations at all on the AOI and includes them in the statistics.

Dependent Variable: Reading Time (in seconds, measured by the total fixation duration metric)

Design 2: RTs of Critical Words in Target Sentences

Independent Variables:

Within-Subjects Independent Variables:

- i. “Grammatical Category” (noun or nominalized verb) of the critical word in the *Target*
- ii. “Priming” (whether the grammatical category of the critical word of the prime sentence is the same as the one in the target sentence, which would favor priming effects (the “priming” condition: N-N; NV-NV) or whether the prime and target sentences contain different types of critical words, which would inhibit priming effects (the “non-priming condition”: N-NV; NV-N))

Between-Subjects Independent Variable: “Group” (Same matrix verb or different matrix verbs in prime-target pairs)

Dependent Variable: Reading Time (in seconds, measured by the total fixation duration metric)

Design 3: RTs of Matrix Verbs in Prime and Target Sentences

Independent Variables:

Within-Subjects Independent Variable: The “Position” in which the sentence containing the matrix verb appeared in the pair (in other words whether the sentence containing the matrix verb was the *Prime*, which is the first sentence or the *Target*, which is the second)

Between-Subjects Independent Variable: “Group” (Same matrix verb or different matrix verb in prime-target pairs)

Dependent Variable: Reading Time (in seconds, measured by the total fixation duration metric)

Results

As stated before, the reading time results are reported in terms of total fixation duration. All the results are derived from the output of the Mixed ANOVAs with the variables defined in the previous section.

ANOVA 1: RTs of Critical Words in Prime Sentences

➤ There is a statistically significant main effect of the “Grammatical Category” of the prime on the total fixation durations of the critical words of the prime sentences: $F(1, 48) = 25.604, p = .000, \eta_p^2 = .348$. As expected in H6.1, and just like in the self-paced reading study, the prime critical words that were complex nominalized verbs ($M = .774$ sec, $SE = .052$) were read more slowly (i.e. had a greater total fixation duration) than those that were simple nouns ($M = .686$ sec, $SE = .042$).

➤ In addition, there was also a significant two-way interaction between “Priming” and “Group”: $F(1, 48) = 6.330, p = .015, \eta_p^2 = .117$. For the same matrix verb group, the total fixation duration of the critical prime word was greater in the priming condition (in which the critical words of the prime and target sentences were of the same grammatical category) ($M = .813$ sec, $SE = .070$) than in the non-priming condition (in which the critical words of the prime and target sentences belonged to different grammatical categories) ($M = .761$ sec, $SE = .057$). For the different matrix verbs group, it was the other way round: the total fixation duration of the critical prime word was greater in the non-priming condition ($M = .691$ sec, $SE = .060$) than in the priming condition ($M = .655$ sec, $SE = .073$).

ANOVA 2: RTs of Critical Words in Target Sentences

➤ There was a statistically significant main effect of the “Grammatical Category” of the critical word in the target sentences: $F(1, 48) = 28.134, p = .000, \eta_p^2 = .370$. Just like in the prime critical words, the total fixation duration of the verbal target critical words ($M = .691$ sec, $SE = .035$) was higher than that of the nominal target critical words ($M = .613$ sec, $SE = .029$), which was again an expected result.

➤ There was also a significant two-way interaction between the “Grammatical Category” of the critical word in the target sentences and “Priming”: $F(1, 48) = 6.396, p = .015, \eta_p^2 = .118$. The total fixation duration for nominal critical target words was higher in the non-priming condition (in which the critical words of the prime and target sentences belonged to different grammatical categories) ($M = .627$ sec, $SE = .032$) than in the priming condition (in which the critical words of the prime and target sentences were of the same grammatical category) ($M = .599$ sec, $SE = .030$). This indicated that there was a facilitating priming effect for nouns. The total fixation duration for verbal critical target words, on the other hand, was higher in the priming condition ($M = .707$ sec, $SE = .039$) than in the non-priming condition ($M = .675$ sec, $SE = .033$), which indicated reverse priming for nominalized verbs.

➤ Finally, there was also a significant three-way interaction between the “Grammatical Category” of the critical word in the target sentences, “Priming” and “Group”: $F(1, 48) = 4.596, p = .037, \eta_p^2 = .087$. In the same matrix verb group, the total fixation duration for nominal critical target words was higher in the non-priming condition ($M = .626$ sec, $SE = .044$) than in the priming condition ($M = .585$ sec, $SE = .041$) (which, again, is evidence for facilitating priming), whereas the total fixation duration for verbal critical target words of this group was higher in the priming condition ($M = .744$ sec, $SE = .054$) than in the non-priming condition ($M = .674$ sec, $SE = .046$) (which, again, is evidence for “reverse priming”) as can be seen on Figure 6.3. In the different matrix verbs group, the total fixation duration for nominal critical target words was again higher in the non-priming condition ($M = .628$ sec, $SE = .046$) than in the priming condition ($M = .614$ sec, $SE = .043$) (which,

again, is evidence for facilitating priming effects), but this time, the total fixation duration for verbal critical target words of this group was also numerically (albeit insignificantly) higher in the non-priming condition ($M = .675$ sec, $SE = .048$) than in the priming condition ($M = .670$ sec, $SE = .057$), as illustrated in Figure 6.4.

It seems that the two-way interaction between the “Grammatical Category” of the critical word in the target sentences and “Transition Condition” resulted mainly from the first part of this three-way interaction, namely by the behavior of the same matrix verb group. The lack of the reverse priming for NV-NV prime-target pairs in the different matrix verbs group may then be due to the lack of time to proceed to the more deeply embedded priming level of the critical words, as the participants might be spending more time on the processing of the different matrix verbs.

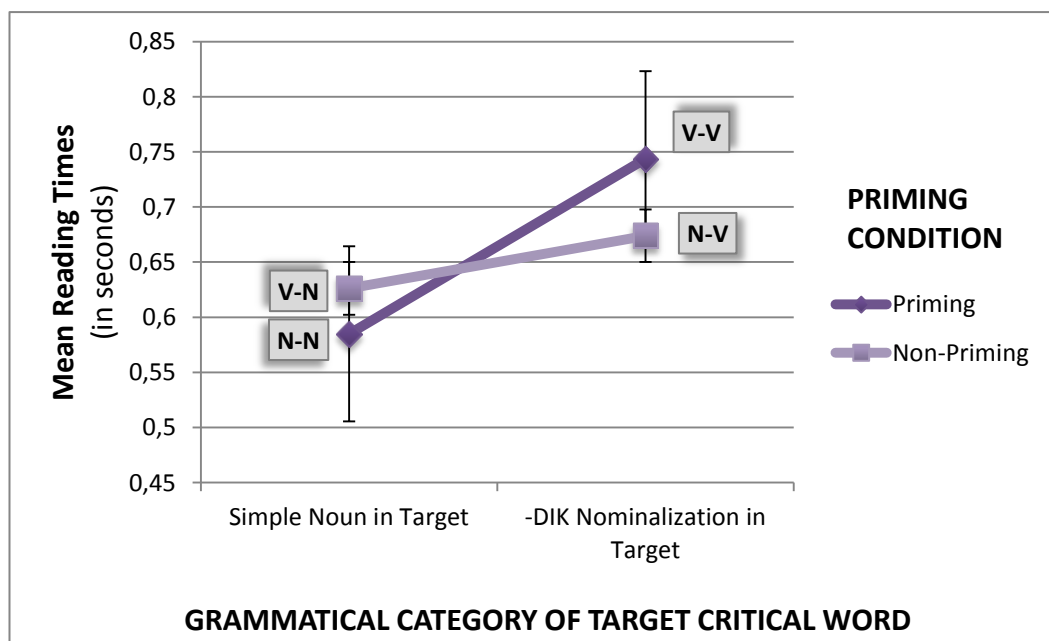


Figure 6.3: Reading Times of Critical Words in Target Sentences: “Priming” and “Non-Priming” Conditions for the “Same Matrix Verb Group”

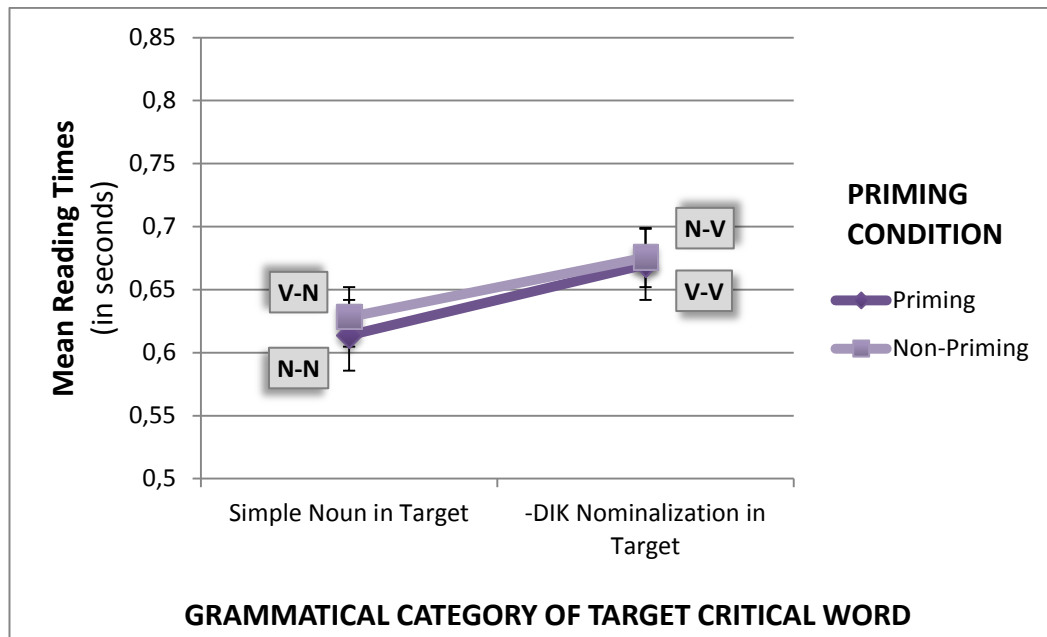


Figure 6.4: Reading Times of Critical Words in Target Sentences: “Priming” and “Non-Priming” Conditions for the “Different Matrix Verbs Group”

ANOVA 3: RTs of Matrix Verbs in Prime and Target Sentences

➤ The main effect of the “Position” in which the sentence containing the matrix verb appeared in the prime-target pair (whether the sentence containing the matrix verb was the *Prime*, which was the first sentence or the *Target*, which was the second) was not significant: $F(1, 48) = 3.548, p = .066, \eta_p^2 = .069$. The total fixation duration of the matrix verbs in the prime sentence, which was the first sentence in the pair, ($M = .493$ sec, $SE = .028$) was higher than that of the matrix verbs in the target sentence, which was the second sentence in the pair, ($M = .466$ sec, $SE = .028$) even though the statistics do not reach significance.

➤ There was a significant two-way interaction between “Group” (same or different matrix verbs) and the “Position” in which the sentence containing the matrix verb appeared in the prime-target pair (whether the sentence containing the matrix verb was the *Prime*, which was the first sentence or the *Target*, which was the second): $F(1, 48) = 51.595, p = .000, \eta_p^2 = .518$. For the same matrix verb group, the total

fixation duration on the prime matrix verb ($M = .509$ sec, $SE = .039$) was higher than that on the target matrix verb ($M = .378$ sec, $SE = .038$); whereas for the different matrix verbs group, the total fixation duration on the target matrix verb ($M = .554$ sec, $SE = .040$) was higher than that on the prime matrix verb ($M = .477$ sec, $SE = .041$), as expected (H6.4).

Discussion

1. RTs of Critical Words in Prime Sentences

The finding that the reading time of the verbal critical prime words was higher than that of the nominal critical prime words verifies our hypothesis that the nouns in the GEN-POSS construction are read faster than the nominalized verbs in the same structure, irrespective of any priming effects (H6.1). This difference in the reading times cannot be due to the length of the words, as the nouns and the nominalized verbs in the study were of equal syllable numbers. The increased processing load of the nominalized verb could be due to its morphological complexity given the nominalization suffix -DIK, to the semantic density of the verbal root, to possible differences in frequency or to a combination of all of these factors. Further research is required to tease these factors apart. Another intriguing finding was that in the same matrix verb group, the reading times for the critical prime word were longer for the priming condition (i.e. when the following target sentence contained the same type of critical word as the prime sentence) and in the different matrix verbs group, the reading times for the critical prime word was longer for the non-priming condition (i.e. when the following target sentence contained a different type of critical word). This first suggests that although we are only looking at the primes here, the targets also have an influence on the primes. We propose that this could be due to the backtrackings, as discussed in the following sections. Overall, the participants seem to distinguish primes and targets, and the transition condition seems to have an influence on the reading time of the prime critical words (in retrospect). It is possible that if the matrix verbs are the same in both sentences, the

participant gets into the priming level, i.e. the priming effect kicks in (this interpretation will be explained in more detailed in the Backtrackings section (6.4.2)), and they go back to investigate the prime critical word more closely which takes some more time. Reversely, when the matrix verbs of the two sentences are different, the priming effect may not be initiated at all, and the participant may go back to the previous critical word, this time just to see why it is different from the one in the target sentence and they may not go back for such a comparison when the types of the critical words are not switched. This interpretation is supported by the results of the analysis of the reading times of the critical words in targets as discussed below. In this respect, the eye-tracking methodology turns out to be a very suitable one that is capable of detecting such backtrackings between the simultaneously presented prime and target sentences.

2. RTs of Critical Words in Target Sentences

The reading time analysis of the critical target words is the most crucial measure for the purposes of the present study as it is on these critical words that the possible structural priming effects present themselves.

The first result was that verbal target critical words were read more slowly than nominal target critical words. This is the same effect found for the critical words of the prime sentences discussed in the previous section. The plausible explanations are again the morphological or semantic complexity differences, frequency differences or a different combination of these factors.

More intriguing was the significant two-way interaction between the “Grammatical Category” of the target critical word and “Priming”. For nominal critical words, the reading times were greater in the non-priming condition than in the priming condition, indicating the facilitating priming effect, as expected. For verbal critical words on the other hand, it was the other way around, i.e. there was a reversed effect. Therefore, our hypothesis that “*the participants would read the critical words in the*

target sentences that are of the same grammatical category as the prime more quickly” (H6.2) was partially confirmed. Processing a nominal critical target word after a prime sentence with another noun takes a shorter time than after a prime sentence with a nominalized verb. If, however, the participant has already read a nominalized verb in the prime sentence, s/he gets slower while reading the second nominalized verb in the following target sentence. The facilitating effect of structural priming is thus evident for the nouns in possessive NPs. However, in the prime-target pairs which consecutively contain noun clauses with morphologically loaded nominalized verbs, the facilitating priming effect seems to be overridden by the increased processing load. This could be due to the extra time required for the decomposition of the nominalized verbs. Since no such decomposition is needed for regular nouns, the structural priming effect is clearly visible for them. It might be that this effect is camouflaged for nominalized clauses. The present finding also points to the possibility that the prime and the target sentences might be in interaction with respect to their critical words. The processing load brought by the morphologically complex nominalized verb in the first (prime) sentence might spill over to the following target sentence and the presence of another complex nominalized verb in this sentence might cause extra processing load. In this regard, there seems to be a “reverse priming” effect for nominalized verbs. This situation is comparable to the results of the previous self-paced reading task.

Finally, there was also a significant three-way interaction, which showed that the two groups (same or different matrix verbs) differed: the observed effects were clearer in the same matrix verb group. Therefore, the matrix verb seems to have an effect on priming in this design. It is only in those cases where the matrix verbs are identical, that we see the priming and the reverse priming effects. Therefore, the matrix verb appears to act as a “filter” or “gate” for priming effects to appear. When the matrix verbs are different, the readers do not go into the analysis of the internal structure of the critical words; however, when the matrix verbs are identical, they seem to initiate a secondary processing in this more embedded level. In the same matrix verb group, if the critical word at this level is a noun, the participants read it faster. If it is a

nominalized verb, they decompose it, which causes the increased reading times. Having even one verbal item in the pair already slows down the process. When the two consecutive critical words are both verbal, it takes naturally the longest time to process them. This suggests that the results of the same matrix verb group of the eye-tracking study are identical to those of the self-paced reading study (which will be discussed in more detail in section 6.6). On the other hand, when the matrix verbs of the prime and the target sentences are different, the participants do not even get into this finer level of priming, as priming (in reading) seems to be time-sensitive, we only get the effect if the processing of the matrix verb does not already take a lot of time. All these findings imply that priming effects are time-sensitive and subject to spillover influences, and that reading for processing of lexical categories, namely the matrix verbs, may override priming. There seems to be a hierarchical processing, the deeper embedded level (at which the decomposition of nominal verbs and facilitating priming on the nouns take place) may only become accessible if the matrix verbs are identical, and therefore some processing time and resources are spared for this second-level processing. Overall, this suggests that in the present reading task, priming seems sensitive to the lexical repetition of the verb even in Turkish which is a verb-final language, such that lexical repetition is a prerequisite for deeper and finer-level processing where priming effects become visible. The possible reasons why we get the same effects in the self-paced reading study and the same matrix verb condition of this eye-tracking study will be discussed in more detail in section 6.6.

3. RTs of Matrix Verbs in Prime and Target Sentences

The ANOVA results on the reading times reveal that the matrix verbs of the prime sentences take a longer time to read than the matrix verbs of the target sentences, indicating that overall people tend to get faster at reading the matrix verbs as they go from the prime sentence to the target sentence (although the main effect does not reach significance).

Even more crucially, for the same matrix verb group, the total fixation duration on the prime matrix verb was higher than that on the target matrix verb; whereas for the different matrix verbs group, the total fixation duration of the target matrix verb was higher than that on the prime matrix verb, verifying our hypothesis (H6.4) that “*the target matrix verbs in the different matrix verbs group will be read more slowly than those in the same matrix verb group, because they are new lexical items. When the matrix verb is repeated in the sentence pair, the one in the target sentence should be read faster due to a different kind of lexical priming effect*”. This is indeed a different and more robust form of priming which stems from the repetition of the same lexical item. This effect can also be called “lexical identity priming” because in the case of the same matrix verb, the same exact verb is repeated. We can thus talk about a priming chain with the first member being the matrix verb of the embedding sentence and the second member being the critical word of the embedded construction.

6.4.2 Backtrackings (Data Analysis, Results, Discussion)

Data Analysis

As participants leave and come back to certain AOIs once or several times while reading the sentence pairs, the analysis of their backtracking is required to complement the reading time measures. To this end, two separate analyses were run. The first one investigates backtracking rates according to condition and the second one aims to locate the source and goal points of backtrackings.

Design 1: Backtracking Rates:

First, we counted the number of backtrackings for each subject categorizing them into four groups that represent the conditions of the experiment: nominal prime-nominal target (N-N); nominal prime-verbal (i.e. “nominalized verb”) target (N-V), verbal prime-nominal target (V-N) and verbal prime-verbal target (V-V). The number of backtrackings for this analysis is the total number of saccades from the second sentence (i.e. the target) back to the first sentence (i.e. the prime).

Backtrackings to previous words within prime or target sentences were not included into the analysis, as we were mainly interested in the interaction between the prime and the target. For instance, in the prime-target sentence pair in Figure 6.5, which is a sample nominal prime-verbal target pair in the same matrix verb group, there were two backtrackings, one from fixation 8 to fixation 9 and one from fixation 18 to 19. The other two saccades between the two sentences were not considered as backtracking since they originated at the prime sentence and went to the target sentence. The saccades between the words of the same sentence were not counted, either. In addition, for the present analysis, we did not distinguish which target word the backtracking starts at or which prime word it ends at, either. This was the aim of the second analysis. Here, we only grouped the backtracking counts into the four conditions for both the same matrix verb and the different matrix verbs groups. Then we took the percentages of these counts for each subject and analyzed these rates in a Mixed ANOVA.

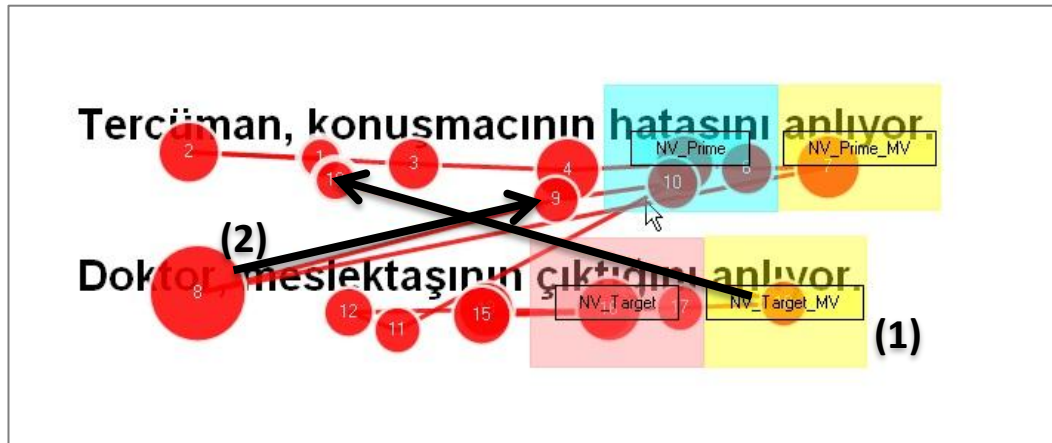


Figure 6.5: Sample Backtrackings from the Target Sentence to the Prime Sentence:

(1) 8-to-9, (2) 18-to-19

Independent Variables:

Within-Subjects Independent Variables:

- i. “Prime Type” (whether the *prime* sentence contains a *nominal* critical word, i.e. a simple noun, or a *verbal* critical word, i.e. a nominalized verb)
- ii. “Target Type” (whether the *target* sentence contains a *nominal* critical word, i.e. a simple noun, or a *verbal* critical word, i.e. a nominalized verb)

Between-Subjects Independent Variable: “Group” (Same matrix verb or different matrix verb in prime-target pairs)

Dependent Variable: Percentages of backtracking counts for each participant

Design 2. Locating Backtracking

In this second analysis, we aimed to locate where the backtrackings started and where they ended most frequently. All the prime and target sentences contained four words (see Figures 6.2 and 6.5). The first word was the NOM subject, the second word was a noun marked with the GEN suffix, the third word, which is the critical word, can be either a possessive-marked noun or a possessive-marked nominalized verb (therefore words 2 and 3 constituted the GEN-POSS structure together, which could be either a possessive noun phrase or a noun clause) and the fourth word was the matrix verb of the sentence. The last word could be the same or different in the prime and the target sentence depending on the group. The backtrackings started at one of the four words of the target sentence and ended in one of the four words of the prime sentence by definition. Accordingly, we prepared a contingency table for each subject in both groups. In these tables, there were four rows and four columns. The rows represented the four words that could be the *source* of the backtracking, i.e. the four words of the target sentence, whereas the columns represented the four words that could be the *goal* of the backtracking, i.e. the four words of the prime sentence.

The cell at the intersection of a certain row and a certain column was where the count of backtrackings starting from that word in the row to that word in the column was recorded. For example, the two backtrackings in Figure 6.5 were (1) from word 1 in the target to word 2 in the prime and (2) from word 4 in the target to word 2 in the prime, as can be seen on Table 6.4. Therefore, we had one backtracking in the cell at the intersection of the source row that represents word 1 and the goal column representing word 2 and one other at the intersection of the source row representing word 4 of the target and the goal column representing the second word in the prime, as before.

Table 6.4: Sample Contingency Table Representing the Backtrackings in Figure 6.5.

Source/Goal	1	2	3	4
1		1		
2				
3				
4		1		

After preparing the contingency tables for each subject in both the same matrix verb and different matrix verbs groups, we also created two comprehensive contingency tables containing the counts of backtrackings from all the subjects in the two groups (APPENDIX Q). Then, we ran two separate X^2 analyses on these data for each group⁴⁶ with the same variables.

⁴⁶ Unfortunately, the X^2 analysis does not provide a statistical comparison of the two groups, therefore, we will report the results for each group separately in the Results section.

Independent Variables:

Within-Subjects Independent Variables:

- i. “Source” word (one of the 4 words of the target sentences indicated in the 4 rows of the two general contingency tables)
- ii. “Goal” word (one of the 4 words of the prime sentences indicated in the 4 columns of the two general contingency tables)

Dependent Variable: Backtracking counts extracted from the two general contingency tables (raw numbers)

Results

As indicated above, two separate analyses were run in order to investigate the instances in which the participants went back to certain regions on the prime sentence after reading the words in the target sentence. In this section, we report the results of these two analyses on the rates and location of backtrackings.

1. Backtracking Rates:

i. Descriptive Statistics:

➤ The average percentages of backtracking counts from target sentence words to prime sentence words in the four experimental conditions (NN: nominal prime-nominal target, NV: nominal prime-verbal target, VN: verbal prime-nominal target, and VV: verbal prime-verbal target) for the two groups and the overall percentages are given in Figure 6.6. Although the overall distribution over the four conditions is almost equal when the two groups are combined, there are slightly more backtrackings in the VN condition (26.59%). This is also true and even more pronounced when the different matrix verbs group is examined in isolation (VN:

29.75%). In the latter group, the VV ratio (21.95%) is slightly decreased. Finally, in the same matrix verb group, the greatest percentage of the backtrackings is in the VV condition (26.88%). It should again be noted that the backtrackings reported here are not marked for the exact source and goal words.

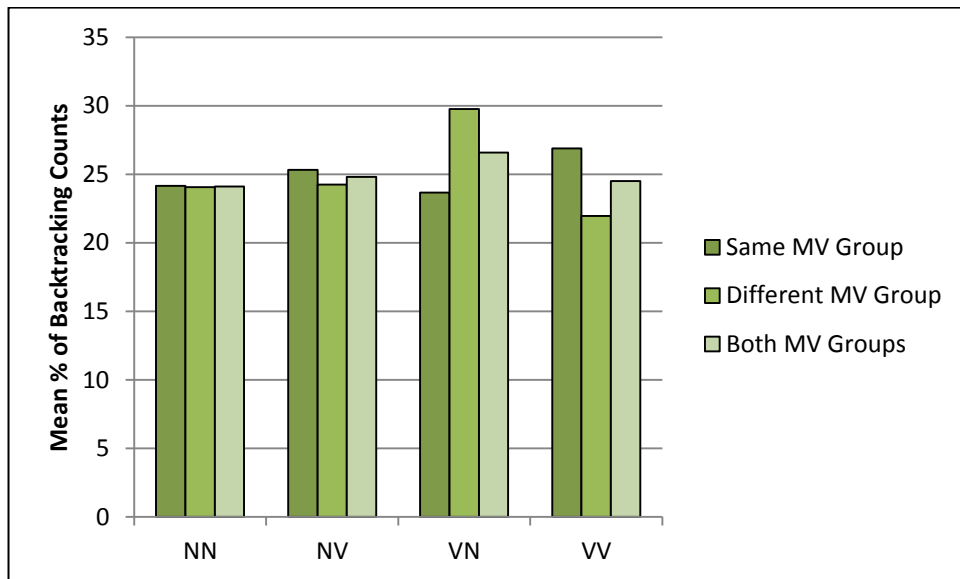


Figure 6.6: The Average Percentages of Backtracking Counts for the Four Prime-Target Combinations in the Same and Different Matrix Verb Groups and the Combination of Both

ii. Mixed ANOVA Results:

➤ There is a significant two-way interaction between “Group” (same or different matrix verbs groups) and “Target Type” (the grammatical type of the critical word of the target sentence): $F(1, 48) = 7.909, p = .007, \eta_p^2 = .141$. For the same matrix verb group, the average percentage of backtracking counts originating from verbal targets (i.e. target sentences containing a nominalized verb as critical word) ($M = 26.097, SE$

= .739) was higher than those originating from nominal targets (i.e. target sentences containing a possessive noun as critical word) ($M = 23.903$, $SE = .739$); whereas for the different matrix verbs group, the average percentage of backtracking counts originating from nominal targets ($M = 26.901$, $SE = .769$) was higher than those originating from verbal targets ($M = 23.099$, $SE = .769$).

b. Locating Backtracking:

i. Descriptive Statistics:

➤ Overall, there were 1109 backtrackings from the target sentence to the prime sentence. 637 of these were observed in the same matrix verb group and 472 of them were observed in the different matrix verbs group. Figure 6.7 demonstrates the general distribution of backtrackings between the words in prime and target sentences. In the 16 chart labels, there are always two numbers. The first number in the labels indicates the source word number (which word of the target sentence the backtracking started) and the second one indicates the goal word number (which word of the prime sentence the backtracking ended).

As shown on Figure 6.7, the greatest proportion of the backtrackings is that represented by the label: 4_2. This indicates that most of the backtrackings were those that started from the 4th word of the target sentence (i.e. the matrix verb of the target sentence) and that ended at the 2nd word of the prime sentence (i.e. always a noun marked with the GEN suffix, preceding the critical word). An example for these backtrackings can be seen in backtracking number 2 (that goes from fixation 18 to fixation 19) in Figure 6.5. There was also quite a large proportion of backtrackings going from the 2nd word of the target sentence to again the 2nd word of the prime sentence.

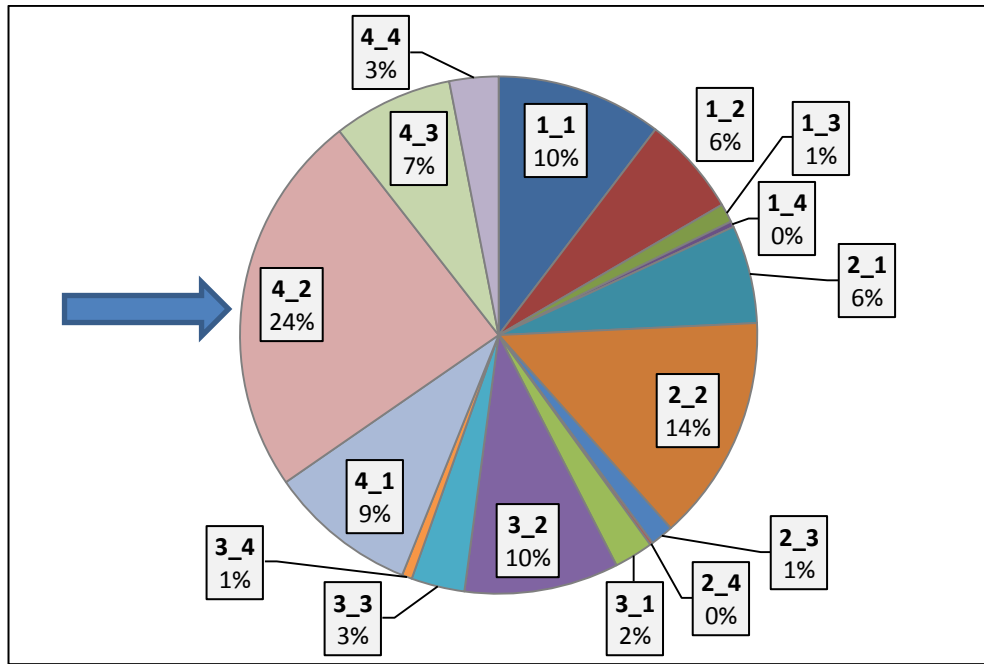


Figure 6.7: Percentages of Overall Backtrackings from Target Words to Prime Words

➤ For both the same and different matrix verbs groups, most of the backtrackings were those that originated at the 4th and last word of the target sentence, which was the matrix verb, and ended at the 2nd word of the prime sentence. The 2nd word, the GEN-marked noun indicates the beginning of the GEN-POSS construction. The critical word, either a noun or a nominalized verb, always has possessive agreement with this 2nd word. The second most frequent backtracking path was from the 2nd word of the target sentence to the 2nd word of the prime sentence for both groups. However, as can be seen on Figure 6.8, which gives the raw backtracking counts, the frequency of backtrackings in this latter path (2nd word to 2nd word) was greater for the same matrix verb group than for the different matrix verbs group.

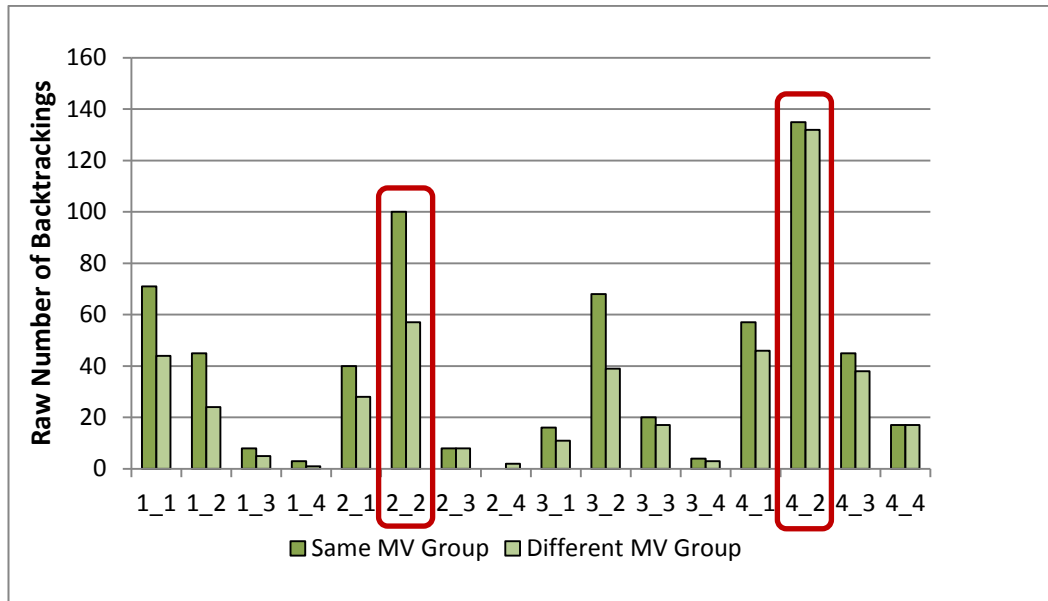


Figure 6.8: Raw Numbers of Backtrackings from Target Words to Prime Words for Both the Same and the Different Matrix Verb (MV) Groups

ii. Chi-square Results:

➤ A chi-square test was performed to determine whether the backtrackings of the same matrix verb group were equally distributed across the different locations with 4 source and 4 goal points. The results indicated that backtrackings were not equally distributed across these paths: $X^2(9) = 88.106, p = .000$. This was a global measure of uniformity of backtracking, pertaining to the entire contingency table (APPENDIX R). The most frequent path was from the 4th word of the target to the 2nd word of the prime (21.19%), whereas there were no backtrackings from the 2nd word of the target to the 4th word of the prime.

➤ A second similar chi-square test was performed to determine whether the backtrackings of the different matrix verbs group were equally distributed across the different locations with 4 source and 4 goal points. Again, backtrackings were not

equally distributed across these paths: $\chi^2(9) = 60.804, p = .000$. As in the previous group, the most frequent path in this group was also from the 4th word of the target to the 2nd word of the prime (27.97%). The least frequent path, on the other hand, was from the 1st word (which is the NOM subject nominal) of the target to the 4th word (i.e. the matrix verb) of the prime (0.21%).

Discussion

In this section, we interpret the analyses of the distribution of the backtrackings across the four prime-target conditions and across all possible locations (source-goal words at the beginning and the end of the backtrackings).

1. Backtracking Rates:

The descriptive statistics and the Mixed ANOVA results on the percentages of backtracking counts on the four different prime-target combinations suggest that the rate of backtracking does not seem to depend on whether the condition is priming-favoring or not, contrary to our hypothesis (H6.5). We see that backtracking does happen across the board. In the same matrix verb group, most of the backtrackings from the target to the prime take place on the VV condition (prime and target both with nominalized verbs as the critical word), which is compatible with the priming results of the reading time analyses presented in the reading times analyses. In the different matrix verbs group, on the other hand, most of the backtrackings are in the VN condition (prime has a nominalized verb and target has a noun as the critical word). This is not incompatible with the previous reading time findings, either: when the matrix verbs are different, priming is not instantiated; however, the initial recognition of the (alternate) grammatical category of the target words still motivates backtracking.

The significant interaction revealed by the Mixed ANOVA also indicated that for the same matrix verb group, the average percentage of backtracking counts originating from verbal targets (i.e. target sentences containing a nominalized verb as critical

word) was higher than those originating from nominal targets (i.e. target sentences containing a POSS noun as critical word); whereas for the different matrix verbs group, the average percentage of backtracking counts originating from nominal targets was higher than those originating from verbal targets. This is also compatible with the reading time results: when the matrix verbs are identical, priming pops in and for verbal critical words, decomposition takes place; as a result, most of the backtrackings start at the verbal target and go to the verbal prime for this group. When the matrix verbs are different, there may be no time left for the decompositional analysis of the embedded nominalized words, leading to the decrease in the rate of the backtrackings that originate from the targets with verbal critical words. This suggests that there might be a limit to the depth of analysis one can afford and an allocation of resources is required. It is also noteworthy that the backtrackings reported in this analysis could start at any of the four words of the target and go to any of the four words of the prime. There was not any distinction with respect to the exact source and goal of the backtrackings. For this reason, we also ran the chi-square analysis to locate the backtrackings.

2. Locating Backtracking:

We had hypothesized (in H6.6) that “*backtrackings would start off at the critical word of the target sentence and go to the critical word of the prime sentence*” (This would be the cases labeled with “3_3” in Figures 6.5 and 6.6). However, it turned out that this was not the case (overall only 3% of the backtrackings was between the critical words). Instead, the observation of the backtracking patterns revealed the most frequent trajectory for both the same and the different matrix verbs was the one between the matrix verb of the target and ended at the second word of the prime sentence, which was the GEN-marked noun. The second most frequent path for the backtrackings was between the second words of the target and the prime sentences. The chi-square analysis for each group also statistically verified that the backtracking counts were not equally distributed across the possible paths. The ones indicated

above were the most frequent paths. Even though the analysis does not provide a statistical comparison of the two groups due to the nature of the data, the prominence of the backtrackings from the target matrix verb to the second word of the prime seems greater for the different matrix verbs group than the same matrix verb group (the raw numbers seem to indicate the reverse; however, given the differences in the overall counts, percentages prove more suitable for this comparison). In addition, with respect to our secondary hypothesis concerning the backtrackings between matrix verbs in the two different groups, we can say that overall there are very few backtrackings between the two matrix verbs (3%) and the raw numbers are exactly equal for the two groups (17 such backtrackings) although the different matrix verbs group (which has a smaller overall backtracking count) has a greater percentage (3.60%) of such backtrackings than the same matrix verb group (2.67%).

The very interesting finding that the backtrackings go to the GEN-marked nouns in the prime instead of the expected POSS-marked critical words suggests a crucial and exciting conclusion. As the GEN-marked noun always represents the beginning of the GEN-POSS construction, it is the starting point of the critical phrase, irrespective of whether a POSS noun or a nominalized verb will follow it. As the backtrackings mostly concentrate on this word, it is possible to assume that processing in this context might be in line with the linguistic structure. Therefore, processing and backtracking in this task might be sensitive to linguistic structure and hierarchy.

6.5 General Discussion

In conclusion, this eye-tracking study on structural priming in the comprehension of Turkish GEN-POSS constructions with POSS nouns and nominalized verbs revealed interesting novel results. The results of the reading time analyses indicated that even though the matrix verb is often at the final position in the sentence, during an offline reading task, the lexical repetition of this matrix verb in prime-target pairs acts as an essential “filter” or “gate” to allow for the priming effects to surface. In those cases where the matrix verbs are not identical, the lexical recognition of those predicates

seems to take up all of the limited time and available cognitive resources and thus override priming effects. When the matrix verbs are the same and the more embedded GEN-POSS constructions become accessible, the priming effects show up. For the simple nouns, priming-favoring contexts make it easier to process the target critical noun, which is the expected facilitating influence of priming. For the morphologically complex nominalized verbs on the other hand, the access to this finer level of structural hierarchy leads to a decompositional analysis, which takes more time and resources and hence brings about reverse priming effects.

The analyses of the backtrackings on the other hand, provide additional support to the results that the reading time analyses revealed. The rates of backtrackings in the four prime-target contexts complement the same picture as the reading time results. The analysis of the source and goal points of the backtrackings implies that readers revisit the (entire) construction that embeds the critical word, once they are finished with the target sentence or the target construction. The observation that the locus of backtracking is the beginning of the GEN-POSS construction also raises the possibility that processing follows the linguistic structure of the constructions under scrutiny.

To sum up, the findings of the study coming from both the reading times and the analysis of the backtrackings of the participants' eye-gaze are consistent and informative for the structural priming in Turkish GEN-POSS constructions with possessive NPs and nominalized verbs.

6.6 Combined Discussion of the Self-Paced Reading and the Eye-Tracking Studies

The observation that similar facilitating and reversed priming effects are found in the self-paced reading task and the same matrix verb condition of the eye-tracking study has some implications for the processing of a head-final language like Turkish.

The self-paced reading study shows that priming effects appear before the actual matrix verb is read. The eye-tracking study, which presents complete prime and target sentences in pairs, demonstrates these same (facilitating and reverse) effects only when the same matrix verb is used in the prime and the target sentences, and not when the matrix verbs are different. There are two possible explanations to this parallelism.

- i. It could be that during online processing, a virtual/dummy verb with abstract morpho-syntactic features is projected, which does not interfere with processing and therefore does not bring any additional processing costs. The processing cost would come only after the semantic material relating the matrix verb comes in, after the actual verb is lexically accessed. Thus, in the self-paced reading study, the virtual verb does not bring any extra cost to the processor; therefore, the deeper embedded level is also processed, leading to facilitation for nouns and difficulty for nominalized verbs due to the initialization of the decomposition. In the same matrix verb condition of the eye-tracking study, the insertion of the semantic content does not cost too much, either. Therefore, the more embedded-level processing, where the priming effects come to surface, is also initiated. The reason why the processing of the identical matrix verb is not that costly can either be the residual activation of its lexical-semantic content or the possibility that the virtual verb carrying the abstract morpho-syntactic features be also lexically specified to some extent. In the different-matrix verbs condition of the eye-tracking study; on the other hand, the load of processing of the new matrix verb with new semantics takes up the cognitive resources and the reader does not get to the deeper level where priming effects would emerge. This remarkable finding could be due to a kind of intrinsic allocation of limited cognitive resources, because in the task, there was not any time limitations imposed on the readers. It could be possible that there are limited resources for the processing of a single sentence independent of the actual time it would take to parse it fully. Alternatively, there may be a characteristic speed of reading and parsing which cannot be extended beyond a certain range.

- ii. A second possibility is that during the online processing going on in the self-paced reading task, not only the abstract morpho-syntactic features of the matrix verbs are projected; but instead the same exact verb might be expected in the same position. This would directly correspond to the same matrix verb condition of the eye-tracking task. Again, it does not necessarily have to be an expectation in the strict sense of the word and it could also be residual activation that spreads from the last processed matrix verb. But crucially, this expected or residually activated verb would be completely lexically specified. If the expected or residually activated features include not only the morpho-syntactic features and but also the lexical semantics, then the difficulty of processing that results from having a new verb could also stem from the need to revise the initial lexical item.

To sum up, the analysis of the reading times of the matrix verbs in the eye-tracking study showed that overall the matrix verbs in target sentences are read more slowly than those in prime sentences, but that this is due to the behavior of the different-matrix verb group; for the same matrix verb group, the target matrix verbs are read faster. At this moment, we cannot decide among these two alternative explanations, i.e. whether the added processing cost of encountering a new matrix verb stems just from the insertion of new semantic material into a lexically underspecified abstract verb (i) or from the need to need to revise an unexpected form which does not match the anticipated one (ii). Future research with a baseline measure of the reading times of new matrix verbs without priming contexts is required to factor out these explanations and tease them apart. A self-paced reading study in which the matrix verb is left open for the participants to complete would also be helpful in finding the answer. This distinction would be crucial for the debate on the extent to which syntactic knowledge is lexicalized.

Taken together, the results of the two reading studies provide information about general processing strategies used in Turkish. The results of the self-paced reading study indicate that, in a head-final language like Turkish, processing begins immediately, as soon as some morpho-syntactic information comes in, and that the

readers do not wait until the end of the sentence to start processing the available information. The finding that priming effects can occur before the matrix verb has been encountered shows that processing in Turkish is indeed incremental.

Another important finding, revealed by the backtracking analysis is that processing also seems to follow the hierarchical linguistic structure such that phrase and clause boundaries are respected for units undergoing processing.

To conclude, the results of the two structural priming studies in Turkish GEN-POSS constructions also suggest that there is great potential for future research in psycholinguistic experimentation in Turkish language comprehension, which is yet a young field of study.

CHAPTER 7

GENERAL DISCUSSION

7.1 Summary and Discussion of Findings

In this chapter, we discuss the findings of the experiments presented in the previous chapters. To this end, we first summarize and discuss the results of each experiment individually in the present section. Then, in section 7.2, a general review of the three experimental chapters is provided. This review relates the findings of the studies using the three different methods to investigate structural priming in Turkish GEN-POSS constructions.

7.1.1 Preliminary Study

The preliminary study (4.1) had the objective of determining the frequency of co-occurrence of nouns and nominalized verbs with a set of matrix verbs that grammatically allow both types of complements, in natural written language production. Accordingly, participants were asked to fill in sentence fragments that contained a NOM subject, a noun in GEN case, the blanks and the matrix verb.

The result was that participants completed the fragments containing some matrix verbs more often with nominal complements, the fragments containing some other matrix verbs more often with verbal complements. Above all, it turned out that fragments with a set of “balanced” matrix verbs were almost equally frequently completed with both complement types. These “balanced” matrix verbs were: “anlat-” (*to tell*), “duy-” (*to hear*), “gözlemle-” (*to observe*), “unut-” (*to forget*), “hatırla-” (*to remember*), “anla-” (*to understand*) and “öğren-” (*to learn*). As these matrix verbs were not naturally biased towards either nouns or nominalized verbs, they were used in the stimuli of the structural priming studies that followed.

7.1.2 Structural Priming in Production

The purpose of study 4.2 was to investigate structural priming in the production of Turkish GEN-POSS constructions. In order to investigate whether there is priming with respect to the choice of noun- and nominalized verb-complements in GEN-POSS constructions, in a written sentence completion task, participants were presented with prime fragments with a matrix verb allowing only a nominal or only a verbal complement and target fragments with a balanced matrix verb, allowing both.

The result was that participants filled in the target fragments with more nominal completions than verbal completions after nominal primes, and with more verbal completions than nominal completions after verbal primes. This finding indicated that there was a facilitating effect of structural priming in the written production of Turkish GEN-POSS constructions. Moreover, the overall number of nominal and verbal target completions were almost the same, showing that the preliminary study was successful in determining the matrix verbs that were indeed “balanced”.

The results also suggested that although the nouns and nominalized verbs were within the same morpho-syntactic template, participants seemed to be sensitive to the constituents of the template, which suggested that during priming grammatical information regarding the category of the root and/or information regarding the -DIK morpheme might be accessible. In other words, the representations accessed by

priming seemed to be specified with respect to the availability of “propositional information”, i.e. whether the structure in question was phrasal or clausal. The implication of this finding with respect to the processing of Turkish noun clauses with nominalized verbs was that despite their outer nominal morphology, they retained some sentential properties and were still “clausal”.

As the external GEN-POSS plus ACC morphemes attached to nouns and nominalized verbs were indistinguishable, the observed priming effects could not be due to the morpho-syntactic template⁴⁷. Therefore, the source of the priming of nominalized verbs might be their verbal root, the nominalization morpheme they take or both. The following set of comprehension-to-production experiments addressed this question of the locus of priming.

7.1.3 Structural Priming from Comprehension to Production

A set of five experiments investigated structural priming from written language comprehension to production. The first four experiments were the main priming studies and the fifth one was a control. All the experiments were aimed at testing whether structural priming persists between comprehension and production, which would imply that the level of representation it accesses is shared by the two modalities. In particular, the first four experiments investigated different pairings of simple nouns, deverbal nouns and nominalizations with two different suffixes, namely -DIK and -(y)Iş; in order to find out whether priming effects were due to the root, the suffix or the overall grammatical category of the lexical items.

⁴⁷ It should be noted that although the morpho-syntactic GEN-POSS template cannot be the source of the priming effects as it was identical on both alternates as a result of the specific design of the present study, it is perfectly possible that this template can also be primed at a higher level. To test this higher level-priming, the GEN-POSS morpho-syntax can be contrasted with other morpho-syntactic relations. For instance possessive NPs can be contrasted with LOC-marked “NPs+ki” construction: “Öğretmen, [öğrenci-**nin** azm-**in**]-i gözlemledi.” (teacher [student-GEN perseverance-POSS.3SG]-ACC observed: *The teacher observed the student’s perseverance*) vs. (“Öğretmen, [öğrenci-de-ki azm]i gözlemledi.” (teacher [student-LOC-ADJ perseverance]-ACC observed: *The teacher observed the perseverance in the student*).

Another specific and related purpose of these four experiments was to determine the extent of nominal/verbal behavior of Turkish simple and deverbal nouns and nominalizations with different suffixes during processing. Whether this behavior was consistent with the general linguistic descriptions of the forms was also a question of interest, although a thorough comparison of the competing formal analyses in the light of the experimental data was beyond the scope of this study.

The four experiments in this set contrasted the following constructions: Simple Nouns *vs.* -DIK Nominalizations (4.3.5), Deverbal Nouns *vs.* -DIK Nominalizations (4.3.6), Deverbal Nouns *vs.* -(y)İş Nominalizations (4.3.7) and -(y)İş Nominalizations *vs.* -DIK Nominalizations (4.3.8).

The fifth experiment was also a comprehension-to-production priming study and tested the phenomenon in the Simple Nouns *vs.* -DIK Nominalizations pair just like experiment 4.3.5. However, unlike the rest of the experiments in this set in which all the matrix verbs were inflected with the past tense/perfective aspect marker -DI, the matrix verbs of the stimulus sentences in this study carried a variety of tense/aspect markers in order to ensure that the priming effects observed especially for -DIK nominalizations were not due to the phonological similarity of this nominalizer to the inflectional -DI marker.

The methodology used in all five experiments was again a written sentence completion task. Nevertheless, this time all the experimental items contained different pairings of “balanced” matrix verbs. Crucially, the prime sentences were already completed by the experimenters either with a noun or a nominalized verb, and only the targets were left empty for the participants to fill in. The participants read the primes and completed only the target fragments.

1. Simple Nouns vs. -DIK Nominalizations (Experiment 4.3.5)

The first study comparing simple nouns with -DIK nominalizations revealed that nominal primes increased the amount of nominal target completions and verbal

primes increased the amount of verbal target completions, indicating priming effects. This finding was comparable to the previous structural priming study in production. The result of this study also proved that structural priming of the Turkish GEN-POSS constructions persists between comprehension and production (independently of the lexical repetition of the matrix verb); thereby supporting the proposition that structural priming taps a level of linguistic representation shared between production and comprehension.

2. Deverbal Nouns (with -I, GI, and -(A)K) vs. -DIK Nominalizations (Experiment 4.3.6)

The second study tested lexicalized nouns derived from verbs, i.e. deverbal nouns and -DIK nominalizations. It also revealed a similar priming effect: nominal primes led to a greater number of nominal target completions while verbal primes led to a greater number of verbal target completions. When the results of this study were compared with those of the previous study in terms of the responses to nominal primes, it was observed that the gap between the number of nominal and verbal completions was even numerically larger after primes that were deverbal nouns (4.3.6) than after primes that were simple non-derived nouns (4.3.5). This suggests that despite their verbal root the lexicalized deverbal nouns might be processed like nouns. Furthermore, the presence of the derivational suffix might even make the “nounhood” of the resulting lexical item marked, reflected by the larger gap between nominal and verbal completions following nominal primes than that of the previous study. Overall, the present results indicate that it cannot simply be only the grammatical category of the root which determines the noun-like or verb-like behavior of morphologically complex forms with respect to structural priming but that (after completion of a derivational process) the grammatical category of the resulting entity - here a deverbal noun - is relevant. This implies that the verbal features of the root of the lexicalized deverbal noun must have been erased, so that they are inaccessible.

3. Deverbal Nouns (with -I, GI, and -(A)K) vs. -(y)Iş Nominalizations (Experiment 4.3.7)

The third experiment investigating deverbal nouns and -(y)Iş nominalizations (4.3.7) revealed some different results than the other experiments in this set. Instead of getting more nominal target completions following nominal primes, (i.e. deverbal nouns) and more verbal target completions following verbal primes, (i.e. -(y)Iş nominalizations) as before, the result here was an increased amount of “nominal” completions across the board, irrespective of whether the prime sentence contained a deverbal noun or a -(y)Iş nominalization. This showed that although their roots were verbal, not only deverbal nouns but also -(y)Iş nominalizations behaved like nouns in this context and primed nominal completions.

4. -(y)Iş Nominalizations vs. -DIK Nominalizations (Experiment 4.3.8)

The fourth experiment (4.3.8) tested nominalizations with two different subordination markers: -(y)Iş and -DIK. This time, -(y)Iş nominalizations were considered as nominal as opposed to the strongly verbal -DIK nominalizations in this study. The results demonstrated priming effects: -DIK primes increased the number of verbal target completions; whereas -(y)Iş primes led to an almost equal amount of nominal and verbal target completions.

When this hybrid behavior of -(y)Iş was compared to its noun-like behavior in the previous study (4.3.7), it became evident that the priming behavior of -(y)Iş was influenced by the overall context in which it is presented. When presented along with nominal prime alternatives (i.e. deverbal nouns in study 4.3.7), -(y)Iş nominalizations seemed to behave more like nouns; when presented with other strongly verbal -DIK nominalization primes, however, they primed equal amounts of nominal and verbal answers. Although there were three fillers between each prime target pair and the types of nominal and verbal pairs alternated, there still seemed to be an effect of the “general context” on -(y)Iş nominalizations. On the other hand, although the presence of deverbal noun primes in the same stimulus set shifted the hybrid

behavior of -(y)Iş to the nominal side (as in 4.3.7), it did not have the same power on the consistently verbal -DIK nominalizations (as in 4.3.6). Another interpretation could be that it was the presence of the strongly verbal -DIK alternatives that promoted the verbal behavior of the regularly noun-like -(y)Iş nominalizations and that brought it to a balanced (hybrid) level (in 4.3.8). However, the persistently verbal -DIK did not have such an influence on either simple nouns (4.3.5) or deverbal nouns (4.3.6). Either way, the degree of nominal/verbal behavior of -(y)Iş seemed to be sensitive to such contextual effects; whereas the nominality of simple nouns and deverbal nouns and the verbality of -DIK nominalizations were not prone to such contextual influences. Simple nouns and deverbal nouns always primed nominal target completions and -DIK nominalizations always primed verbal completions. The volatile behavior of -(y)Iş indicated that although it was not consistently “noun-like” in the sense of actual lexicalized nouns, it is nevertheless less “verb-like” than the strictly verbal -DIK. Overall, these findings are compatible with the general linguistic descriptions of each of the forms inquired here.

The combined findings from these four experiments brought about the following implications:

- There was priming from comprehension to production, which supported the view that the representations manipulated during the two processes might be shared. The particular aspects of linguistic knowledge that were activated during reading were readily available and thus more frequently used in consequent production.
- With respect to the type of target completions they primed, deverbal nouns behaved like simple, non-derived nouns. This was in spite of the fact that the root of the deverbal noun was verbal. In consequence, the grammatical category of the root cannot be the sole source of priming: the suffixes that attach to it and which change its grammatical category must be crucial.
- Noun clauses with -DIK nominalizations most persistently primed verbal completions and behaved strongly clausal, in consistence with their linguistic

properties. This could be related to several linguistic factors such as the tense/aspect/modality property of -DIK, its verbal homophone morphemes and its prominence as the main means of subordination in Turkish. -DIK proved to be a ubiquitously salient morpheme in these studies.

➤ The priming behavior of noun clauses with -(y)Iş nominalizations, on the other hand, was shaped by the type of the alternative prime, which pointed to general contextual effects on priming. -(y)Iş nominalizations demonstrated both nominal and verbal properties: when paired with deverbal nouns they were rather noun-like and when paired with -DIK nominalizations they primed an almost equal amount of nominal and verbal target completions. This was again consistent with the linguistic descriptions of the suffix which is considered to be less clausal than -DIK. To sum up, the nominalization suffix was determinant in the behavior of the noun clause: -DIK was more verbal/sentential than -(y)Iş.

➤ With respect to the investigation of structural priming as a methodological paradigm, a crucial observation was the overall context-sensitive effects on the hybrid priming behavior of the -(y)Iş morpheme.

➤ In conclusion, the combined results of these four experiments revealed that structural priming was sensitive to morpho-syntactic information in terms of the presence or absence of certain subordinating and derivational suffixes, and more specifically to the resulting grammatical category of the lexical items.

5. Control Experiment: Tense/Aspect Markers in Simple Nouns vs. -DIK Nominalizations (Experiment 4.3.11)

To ensure that the priming effects found in the four previous bi-modal priming studies, in particular those related to -DIK nominalizations, were not due to the phonological affinity of the -DIK subordinator to the -DI past tense/perfective aspect suffix -DI (which was attached to the matrix verbs of every single sentence and fragment), a control study was conducted. The design of this control study was

identical to that of experiment (4.3.5) except the fact that the majority of the -DI inflectional markers were replaced with other tense/aspect markers: 50% of all matrix verbs were now inflected by the imperfective progressive -(I)yor, 25% of them were kept inflected with -DI and the remaining 25% were inflected with either the perfective/evidential past marker -mİş, the future marker -(y)AcAK, or the aorist -(A/I)r.

The results of this control study showed that when new tense/aspect markers were introduced, the participants tended to provide more nominal completions than verbal completions in the target fragments overall. To put it differently, the reduction of the proportion of the -DI's on the matrix verbs was associated with a decrease in the overall amount of verbal target completions. This implies that there might be an interaction between -DI and -DIK. On the other hand, the finding that was most closely relevant for the present purposes was that the priming effect persisted even when the proportion of -DI inflections were reduced to a great extent. Hence, the priming effect observed in the previous studies cannot be solely due to the repetition of the sentence-final tense/aspect marker -DI and its phonological resemblance to the nominalizer -DIK. The interaction between the two morphemes seemed to be limited to the (morpho-)phonological level and did not influence the priming effects that arise at the morpho-syntactic level.

7.1.4 Control Study: Natural Tense/Aspect Marker Frequencies of Matrix Verbs

This second control study, also employing the written sentence completion task, was conducted in order to provide a better understanding of the relation between the priming effects and the tense/aspect marker on the matrix verb of the sentence. Unlike the studies in sections 4.2 and 4.3, this control experiment was not a structural priming study *per se*. It was designed specifically to examine the natural frequencies of the five tense/aspect markers that could be attached to the matrix verbs; which would facilitate the choice of the inflectional markers to be used in the following

structural priming studies in comprehension. Participants were presented with sentences and asked to inflect the verbs given in parenthesis in citation form. The sentences also contained possessive NPs or noun clauses with -DIK nominalizations and were designed as pairs that included the same or different type of complements. The reason for this priming-inspired design was that the control experiment also had two secondary aims: to closely investigate (i) the specific relation between -DI and -DIK, and (ii) the priming and grammatical category related condition patterns in which the same matrix verb tense/aspect marker was repeated subsequently.

The results suggested that participants preferred to inflect most of the matrix verbs with the -DI marker. This was also our initial intuition which had motivated us to adopt -DI in the stimuli of all the preceding studies. In the absence of temporal or aspectual clues and a discursive context, -DI might be used as an unmarked default tense/aspect marker.

In addition, the participants provided more -DI inflections when the two experimental sentences contained the same type of complement (noun-noun or nominalized verb-nominalized verb) than when they contained opposite types of complements (noun-nominalized verb or nominalized verb-noun). This implied that temporally frequent encounters of -DIK nominalizations and not intensive but infrequent encounters with it (once in each pair rather than twice in every other pair) was related to the increase in the tendency to inflect the matrix verb with -DI. This provided further support to the view that the relation between the two morphemes was versatile, short-lived and possibly (morpho-)phonological.

When the sentence pairs both of which were completed with -DI were investigated, it was found that such repetition was not distributed evenly across the four priming combinations (Same-Different x Nominal-Verbal). The repetition of the -DI inflection on the two matrix verbs, was least often observed when both the prime and the target contained nominal complements (and hence no -DIK nominalizations). This finding also strengthens the suggestion that -DIK and -DI are (morpho-)phonologically related.

Although the previous control experiment (4.3.11) firmly proved that priming effects were independent of the matrix verbs' tense/aspect markers, given the relation between -DI and -DIK (and despite the evident naturalness of -DI) it was decided not to use -DI on the matrix verbs in the following comprehension priming studies. This precaution was taken to ensure that the results would be freed of possible phonological confounds.

7.1.5 Structural Priming in Comprehension: Self-Paced Reading

The main objective of the self-paced reading study was to investigate structural priming of Turkish GEN-POSS constructions in an online written language comprehension task. This online comprehension task enabled us to study whether structural priming in the comprehension of a head-final language like Turkish was independent of the processing of the matrix predicate of the target sentence. A secondary aim was to compare the relative processing loads of nouns and nominalized verbs of equal length in terms of syllable number.

Participants were presented with prime and target sentences word by word in the middle of a computer screen. When they finished reading one word, they pressed a keyboard button to replace that word with the subsequent one. Their reading time of each word was thus recorded.

Prime and target sentences were manipulated such that they contained either the same type of grammatical critical words (noun in prime-noun in target or nominalized verb in prime-nominalized verb in target) or different types (noun in prime-nominalized verb in target or nominalized verb in prime-noun in target). If there was a facilitating effect of priming, the critical words in the targets that follow a prime sentence with the same type of critical word should be read faster. Crucially, at the moment in which the critical word in the target was read, the matrix verb of the target sentence would not have been encountered yet.

The analysis of the reading times of prime critical words provided the baseline processing loads of nouns and nominalized verbs: In primes nouns were read faster than nominalized verbs. Verbs nominalized by the suffix -DIK brought a higher processing load to the cognitive system than simple nouns. This could be related to the differences in the structural complexity, semantic density and frequency of the two types of lexical expressions. Moreover, the analysis of the critical words in primes also revealed that the order of occurrence also mattered: the participants got faster as they progressed in the task.

The more relevant analysis was the one on the reading times of the target critical words. In addition to confirming the general difference in the processing loads (higher for nominalized verbs than simple nouns), this analysis also revealed that target nouns were read faster when the prime also contained a noun than when the prime contained a nominalized verb. For target nominalized verbs, it was the other way around: they were read faster when the prime contained a noun than when the prime contained another nominalized verb. This showed that there was a facilitating priming effect for nominal targets following nominal primes and there was a “reverse priming” effect for verbal targets following verbal primes. To put it differently, the priming effect manifested itself as facilitation for simple nouns, as expected and as increased processing time for the complex nominalized verbs.

To sum up, although nominalized verbs (in -DIK nominalizations) carried the same exact nominal external morphology as the simple nouns in possessive NPs, they brought a higher load to the language processing system than simple nouns did possible due to a combination of morpho-syntactic and semantic factors. The repetition of the same type of complement had a facilitating priming effect for nominal target verbs, as expected. However, for verbal targets the facilitating effect seemed to be overridden by the increased processing load due to the extra time required for the decomposition of the nominalized verbs and spillover from the preceding verbal prime. In other words, the priming effect manifested itself in the

form of increased processing load due to the instantiation of the decomposition. The explanation must therefore lie at the morphology-syntax interface.

In conclusion, this study revealed some structural priming effects in the comprehension of Turkish GEN-POSS constructions. As the critical words had appeared before the matrix verb of the target sentence was read, the observed effects could not have resulted from the actual processing of this superordinate predicate. This first suggested that in Turkish, processing was indeed incremental in that the participants did not wait until the end of the sentence (i.e. the matrix verb) to initiate processing. Moreover, it implied that either priming was independent of the matrix verb in Turkish and that readers did not engage in any processing related to the matrix verb until it was actually encountered; or that the readers assigned a “virtual” matrix verb which could be a full matrix verb with complete lexical semantics or a semantically empty (or underspecified) bundle of abstract features.

7.1.6 Structural Priming in Comprehension: Eye-Tracking

The eye-tracking experiment complemented the previous self-paced reading study to further investigate structural priming in the comprehension of the same pair. In this new design, sentences were not presented word by word, but rather as pairs of complete sentences. The eye-tracking device recorded the participants’ eye-movements as they read the sentences.

This study not only investigated structural priming in the comprehension of Turkish GEN-POSS constructions (with a different method), but also aimed to clarify the role of the lexical repetition of the matrix verb in prime and target sentences on structural priming in comprehension. Accordingly prime and target sentences with either the same or different types of complements (nouns or nominalized verbs) were presented in pairs. In one group, the matrix verbs of the primes and the targets were identical; whereas in the second group, the matrix verb of the target was different from that of the prime.

As before, another aim was to compare the processing loads of nouns and nominalized verbs. Furthermore, a different secondary aim was to investigate a separate kind of “lexical identity” priming on the matrix verbs by testing whether the matrix verbs in the targets would be read faster in the same matrix verb group than in the different matrix verbs group. In addition, exploiting the technical advantages of the eye-tracking methodology, we measured not only the reading times but also the backtrackings, i.e. the instances in which the readers’ eye-gazes moved back from the target to the prime. The final aim was therefore to examine the rates and distribution of such backtrackings.

The results first confirmed the now established difference in the processing loads of nouns and nominalized verbs in both prime and target sentences. Moreover, the analyses also revealed that the reading times of the target nouns were greater when the prime contained a nominalized verb than when it contained another noun; and similarly, the reading times of the target nominalized verbs were greater following a prime with another nominalized verb than after a nominal prime. This result, which is identical to that revealed by the self-paced reading study resulted from the behavior of the same matrix group. In other words, the same matrix verb condition of the eye-tracking study and the self-paced reading study led to the same results.

Our interpretation to the finding that the facilitating priming effects on nouns and the reverse priming effects on nominalized verbs were only observed in the same matrix verb group of the eye-tracking study was as follows: the lexical repetition of the matrix verb might be an essential “filter” or “gate” to allow priming effects to surface. When the matrix verbs were the same in the prime and the target, this would not cost any additional processing load. The cognitive resource and time savings would make the more deeply embedded GEN-POSS construction accessible and the priming effect would emerge. For simple nouns this effect demonstrated itself as increased ease of processing whereas for nominalized verbs it led to processing difficulty, due to the decomposition of the complex forms. In the different matrix verbs group, the recognition and processing of the new lexical item used up a

substantial amount of the resources as a result of which the level where priming effects would surface was never accessed.

Another finding was that the target matrix verb was read faster in the same matrix verb group than in the different matrix verbs group. This “lexical identity priming” was a different type of priming, taking place at a different level. This finding implied that priming effects could be observed concurrently at different levels.

To conclude, the analysis of backtrackings showed that for the same matrix verbs group there were more backtrackings originating from verbal targets than from nominal targets; whereas for the different matrix verbs group, it was the other way around. This pattern was consistent with the reading time results with respect to the view that the presence of identical matrix verbs in the prime and the target, acted as a “filter/gate” and “reverse priming” effects were observed for nominalized verbs. Finally, the localization of backtracking raised the interesting possibility that processing might follow linguistic structure: Most of the backtrackings landed on the second word of the prime sentence, which was the GEN-marked noun marking the beginning of the phrase; rather than going directly to the critical POSS-marked noun or nominalized verb.

7.2 General Review of Experimental Chapters

In this section, we zoom out and discuss the general findings of the experimental chapters. We first review the overall results of the written sentence completion studies and then we evaluate the combined findings of the two studies on structural priming in comprehension. Thus, this general review helps to connect the sentence completion tasks to the reading time tasks.

7.2.1 Written Sentence Completion Studies (Chapter 4)

The experiments using the written sentence completion method revealed that there were structural priming effects in Turkish GEN-POSS constructions, both in language production and from comprehension to production. The existence of bi-modal priming provided support for the possibility that the representations activated during reading and writing might be shared. The priming effects observed in both the production study and the bi-modal studies occurred independently of the lexical repetition of the matrix verb. In addition, the effects were persistent for both nominal and verbal complements.

These priming studies further indicated that the level of representation that structural priming accesses should be specified with respect to the linguistic information as to whether the forms in question were phrasal *vs.* clausal. This finding is compatible with a series of study specifically investigating whether priming is sensitive to the phrasal-clausal distinction in English concealed questions (Bahadır & Polinsky, 2010a, 2010b and 2011). These studies demonstrated that structural priming from written language comprehension to production is sensitive to whether a construction is a noun phrase as in “The committee announced [the winner of the award]” or a corresponding complementizer phrase (either an embedded interrogative like “The committee announced [who had won the award]” or an embedded declarative “The committee announced [that X had won the award]). Consequently, the results from this alternation in which the same truth-conditional meaning is expressed in two different forms, support the present finding with respect to the sensitivity of structural priming to the distinction between phrases and clauses.

In addition, the observed effects in different types of nouns and nominalizations in Turkish also suggested that the locus of priming in the present context was not just the grammatical category information of the root of the lexical items; but rather the suffix and the resulting overall grammatical type of the expressions. Therefore, it can be concluded that the priming effects revealed in these studies were of morpho-syntactic nature.

The investigation of a variety of nouns and nominalized verbs, namely of simple nouns, deverbal nouns, -DIK nominalizations and -(y)Iş nominalizations also confirmed that the processing evidence regarding these lexical expressions was in consistence with their general linguistic description.

The specific priming behavior of -(y)Iş nominalizations further uncovered a “general context effect” acting upon structural priming, which was a remarkable methodological finding.

Finally, the preliminary study and the two control studies also shed light on a variety of intriguing questions regarding the identity of the “balanced verbs” that take both nominal and verbal complements equally frequently, native Turkish speakers’ preferences for the inflection of matrix verbs of individual sentences in neutral contexts and the possibly (morpho-)phonological relation between the tense/aspect marker -DI and the subordinating nominalizer -DIK.

7.2.2 Self-Paced Reading Study and Eye-Tracking Study (Chapters 5 and 6)

These two studies employing the self-paced reading and eye-tracking methodologies uncovered structural priming effects in the comprehension of Turkish GEN-POSS constructions. The effects found in the self-paced reading task occurred before the matrix verb of the target sentence was encountered. The same priming effects were observed in only the same matrix verb condition of the eye-tracking experiment, which presented complete sentences in pairs. The observation that the different matrix verb condition of the eye-tracking experiment did not reveal the same priming effects suggested that the identity of the matrix verb could be related to the priming of comprehension in a different way than it is to priming in production and from comprehension to production where the effects persisted without the repetition of the matrix verb (e.g. Pickering & Ferreira, 2008).

Although the results of the self-paced reading study seemed to imply that priming was completely independent of the processing of the matrix verb at first, the subsequent eye-tracking experiment showed that the relation was not that

straightforward. If the readers did not engage in any anticipatory processing regarding the upcoming matrix verb at all, then we should have found the same effects in the different matrix verbs group of the eye-tracking experiment. This observation eliminated the first possibility that no matrix verb-related processing whatsoever would be carried out in online processing⁴⁸. This leaves us with two possible explanations:

(i) During online processing readers might be assigning a virtual or dummy matrix verb (with abstract structural features that could be lexically empty or underspecified). This would imply that processing could be syntactically driven in the sense that a dummy matrix verb is first projected and this projection is then filled with the real lexical item when the reader reads it, regardless of whether it is the same verb as in the previous sentence or a different one. This view is in line with a more syntactically driven approach like that of Friederici (2002) or of Pulvermüller, Shtyrov, Hasting, and Carlyon (2008) who have shown that the earliest EEG signals of sentence processing (ELAN) are syntactic reflexes.

(ii) Alternatively, readers might be expecting the same exact lexical item to be iterated. This view could be considered to support the idea that processing is rather lexically driven. Accordingly, the reader could be anticipating the same lexical verb as s/he had encountered before and then needs to or does not need to revise this guess when s/he reads the real word.

The cost of processing a different matrix verb in the target could have occurred either as a result of the insertion of new semantic material or of the replacement due to a mismatch with preexisting expectation. Either way, this added processing load overrode the priming effects and inhibited the initiation of the decompositional analysis at the deeper level where such effects were expected to occur. If further research supports the former explanation then it could imply that “syntactic

⁴⁸ However, in order to ensure that the absence of priming effects did not originate as a result of backtracking processes, it is important to run a new self-paced reading with different matrix verbs as a control. This idea will be further elaborated in the following chapter.

knowledge is representationally independent of lexical knowledge, yet it can be influenced by ongoing lexical processing” (Pickering & Ferreira, 2008; p. 440). If the latter explanation is verified by future studies, on the other hand, this would suggest that processing could be lexically motivated: in the online self-paced reading task, the readers must therefore have expected the same matrix verb. The question of how this interpretation which is plausible in priming contexts would apply to sentence processing in general in a head-final language would constitute an interesting research topic. The present results only revealed the existing effect and any attempts to explain the reasons would be mere speculation at this point. Only further research specifically designed for the relevant purpose could disentangle these plausible explanations. Such an endeavor would be relevant for the discussion on the extent to which grammatical information is lexically specified.

Another way in which structural priming in the comprehension of Turkish GEN-POSS constructions differed from the corresponding studies in production and from comprehension to production was that, in comprehension, the effects manifested themselves differently for nouns and nominalized verbs. In the production and comprehension-to-production studies, priming effects were demonstrated by an increase in the amount of target completions for both nouns and nominalized verbs. In the comprehension studies; however, while priming facilitated the processing of (i.e. decreased the reading time of) nouns it demonstrated its effect in a reverse way on nominalized verbs due to the decomposition of the complex nominalization, which increased reading times. The observation that when the matrix verbs of the prime and the target differed lexically (as in the different matrix verb condition of the eye-tracking experiment), the available resources were not adequate to get into the level where priming would occur. To put it differently, the decomposition of nominalized verbs was only activated when the resources allowed it. This can be due to the allocation patterns of limited cognitive resources or due to temporal limitations. Since the time given to the participants in the tasks were not limited by the experimenter there could be certain “intrinsic” limitations on the amount of time

and resources, which can either be self-imposed by the participant or required by the language comprehension system.

Finally, the presence of a different sort of priming, namely the “lexical identity priming” effect on the matrix verbs, was observed when the same predicate was repeated in the prime and target sentences of the eye-tracking study. This provided support to the proposition that in principle, priming effects could be observed at all linguistic levels (Pickering & Ferreira, 2008).

Apart from these structural priming-related findings, the self-paced reading and eye-tracking studies also revealed some more general results. One such robust finding was that simple nouns were read faster and thus brought less processing load to the system than nominalized verbs of equal length in terms of syllable numbers. This was considered to be due to several factors such as the differences in the morphological complexity, semantic density or overall frequency of nouns and nominalized verbs. Moreover, the self-paced reading study suggested that as soon as some morpho-syntactic information was provided, online comprehension started off. This was evident as the priming effects emerged before the matrix verb of the targets had been perceived. This was considered as evidence for the incrementality of sentence processing in Turkish.

In conclusion, the written sentence completion tasks and the comprehension priming studies indicated that there was structural priming for Turkish GEN-POSS constructions in written language production and comprehension, and also between the two: from comprehension to production. This multi-method approach had the advantage of allowing us to investigate the priming of a specific target pair systematically. As explained above, the patterns in which the effects manifested themselves in different modalities and tasks were different in certain respects. This implied that although the representations might be shared, the architectures and mechanisms of the two modalities could be different. Given the differences in the nature of the input and the output as well as those in the specific requirements of the two systems this was not an unexpected proposal. Furthermore, the nature of the tasks in these studies was also strictly intertwined with the properties of the

modalities. Whereas priming was measured by the counts of completions types in offline production, it was evaluated in terms of reading times in the comprehension studies. Overall, priming effects seemed to be more robust in production and somewhat more volatile in comprehension; which was in line with the observation that: “different tasks yield different magnitudes of effect as does the particular structure under scrutiny” (Branigan, 2007; p. 5). To conclude, the noted distinctions between the priming effects in production and comprehension were probably due to the differences in the nature of the task which in turn reflected the different requirements of the modalities.

CHAPTER 8

CONCLUSIONS

In the final chapter of this thesis, we first revisit the general research questions and present the answers that the results of the experiments provided to them. Then, we present the implications of the findings of this thesis. We conclude this chapter and the thesis by stating the limitations of the study and by suggesting some directions for future research.

8.1 Revisiting the General Research Questions

8.1.1 Exploratory Conclusions

The basic exploratory research question addressed in this thesis was “*whether there was structural priming in the possessive nouns and nominalized verbs of Turkish GEN-POSS constructions*”. To put it differently, the study had a *descriptive dimension in exploring structural priming in a new alternation from a language which is typologically different from those widely examined in the structural priming literature*. The overall results indicate that the answer to this main question was affirmative. The experiments indicated that there was structural priming for nouns and nominalized verbs in Turkish GEN-POSS constructions.

Specifically, experiment 4.2 revealed structural priming of these constructions in written language production. The series of experiments presented in section 4.3 tested a variety of nouns and nominalized verbs and found structural priming effects from comprehension to production. Finally, the self-paced reading and eye-tracking studies presented in chapters V and VI also showed that there was structural priming in the comprehension of Turkish nouns and nominalized verbs in online task, although this effect manifested itself in rather different ways for the two forms and seemed to be somewhat more volatile than the effects in production.

8.1.2 Theoretical Conclusions

There were two veins of theoretical questions that the thesis addressed: questions on representation and processing. We take the exact questions from the introductory chapter, give them in italic letters and then present the conclusions related to each specific question.

A. Questions on Representations

A.1 Nature of Representations Structural Priming Accesses:

“What is the level and nature of the mental linguistic representations that structural priming accesses?”

- *Is the level of representation accessed by priming purely syntactic, purely morphological or morpho-syntactic for Turkish (in the context of GEN-POSS constructions)?*

➤ The series of experiments in 4.3 identified the overall grammatical category of the lexical expressions including nominalization suffixes as the locus of priming effects observed in the present context. The finding that morphologically distinct simple and deverbal nouns both primed nominal target completions implied that the level of representation identified by priming could not be purely morphological. Moreover, -DIK and -(y)Iş nominalizations both of which syntactically act as the noun clause

predicates did not behave uniformly with respect to priming. This suggested that the representations priming accessed could not be uniquely syntactic either. Moreover, the control study 4.3.11 further implied that the observed priming effect on -DIK nominalizations could not only result from the phonological overlap between the matrix verb tense/aspect marker -DI and the nominalizer -DIK. Taken together, the findings of all these studies pointed to the conclusion that in the present context and experimental design, structural priming had access to representations at the morpho-syntactic level⁴⁹. More specifically, the derivational suffix (e.g. -I, GI, or -(A)K) which is attached to the verbal root changes its grammatical category, which makes the verbal features of the root inaccessible. This is why the GEN-POSS construction containing the deverbal noun is an NP. Therefore, for such derived forms, structural priming seems to access the properties of the resulting structure. For noun clauses with nominalized verbs on the other hand, the locus of priming could still be the verbal root (which is also the stem in the stimulus items in this study), the subordination suffix (-DIK or -(y)Iş) or the resulting construction. It seems that for nominalized verbs priming could access the grammatical category information of the root/stem as they retain some of their verbal grammatical properties such as being passivized and assigning ACC case to its arguments, unlike the deverbal nouns. It is only verbal roots or stems that can take the nominalization morphemes and function as the verbal predicate of subordinated noun clauses, anyway. Therefore overall the grammatical category information of the stem after all the morphological derivations seems to matter. Furthermore, the finding that two different types of nominalizers

⁴⁹ CAVEAT: Since the alternative forms constituting the construction pair under scrutiny here do not carry the same truth conditional meaning as in the traditional active/passive and PO/DO alternations, it could be possible to argue that the present effects could also be due to semantic factors. However, in principle verbal completions can mostly be paraphrased as nouns with the insertion of an auxiliary word (e.g. “gül-düğ-ün-ü”: *laugh-VN-POSS.3SG-ACC* meaning *that s/he laughed* “can be paraphrased as “gül-düğ-ü gerçeğ-in-i”: *laugh-VN-POSS.3SG fact-POSS.3SG-ACC* meaning *the fact that s/he laughed*) and nominal completions can be paraphrased as nominalizations with the addition of a *wh*-word and the light verb “ol-“ (*to be*) (e.g. “sorun-un-u: *problem-POSS.3SG-ACC* meaning *her/his problem* can be paraphrased as “sorun-un-un ne ol-duğ-un-u”: *problem-POSS.3SG-GEN what be-VN-POSS.3SG* meaning *what her/his problem was*). In any case, the present account suggests that the effects are not purely phonological, morphological or syntactic; but are rather morpho-syntactic. It does not eliminate the possibility of interaction with semantics. It is also possible that semantics might influence priming effects at its interface with morpho-syntax. This possibility would not contradict the present account..

(-y)Iş and -DIK) show nominal properties to different extents implies that priming might also be sensitive to the functional information brought by the nominalizer.

There were various levels in Turkish GEN-POSS constructions. At the outmost layer, there was the ACC-marked syntactic object, which the whole GEN-POSS construction constituted (level 1). We were not interested in this outmost layer. There was also the level with the noun phrase or noun clause constituents of this construction (level 2). Then, for the noun clauses there was also the level at which the nominalizer was specified (level 3). That level was not relevant for deverbal nouns, therefore it is left empty (\emptyset) in (2) below. The other level (level 4) represented the stem which carries the grammatical category information of the lexical item as a result of the inner morphological derivation process. This level was not relevant for the nominalized verbs in this study as the roots of the nominalized verbs used as stimuli were all non-derived verbs, therefore it is left empty (\emptyset) in (1) below. Finally the last and innermost level (level 5) represented the root of lexical items. Again, as the nominalized verbs in our stimuli did not undergo any derivation, levels 4 and 5 were conflated for them (i.e. the root and the stem were the same). For deverbal nouns it is relevant as at level 5 they have the grammatical information of a verbal root; whereas by the insertion of the derivational suffix, this information becomes inaccessible and at level 4 it is a lexicalized noun with nominal grammatical properties. The brackets in sentences (1) and (2) illustrate these five levels.

(1) Korsan [[[prens-es -in [gül]₅- \emptyset]₄ -düğ]₃-ün]₂ -ü]₁ duy -du
 pirate princess-GEN laugh -VN -POSS.3SG -ACC hear-PF.3SG
 “The pirate heard that the princess (had) laughed/was laughing.”

(2) Korsan [[[prens-es -in [sor]₅-u]₄- \emptyset]₃ -sun]₂ -u]₁ duy -du
 pirate princess-GEN quest -ion -POSS.3SG -ACC hear-PF.3SG
 “The pirate heard the princess’s question.”

The morpho-syntactic representations that structural priming accessed in the experiments in study 4.3 were located on levels 3 and 4 (and, in the case of nominalized verb in this example also on level 5 as 4 and 5 are conflated due to the absence of any derivational morphemes) which determined whether the construction would be an NP or a noun clause.

- *Are the representations structural priming taps specified as phrasal versus clausal?*

➤ Study 4.2 investigating the priming of possessive noun phrases and noun clauses in production suggested that phrasal *vs.* clausal properties of the constructions were accessible to priming. Experiments in study 4.3 which examined structural priming of the same constructions from comprehension to production also indicated that the representations activated during such priming were specified with respect to this distinction. Finally, the self-paced reading (Chapter 5) and eye-tracking (Chapter 6) studies investigating priming of GEN-POSS constructions in comprehension also pointed to the same observation. Despite their external noun-like properties, the representation of nominalized verbs did not specify them as noun phrases; they were still “clauses” with some of their inner verbal properties preserved.

- *For the morphologically complex forms, what level of representation does priming access? The root information, the suffix information or both?*

➤ The results of experiments 4.3.6 and 4.3.7 which tested deverbal nouns with -DIK and -(y)Iş nominalizations, implied that it could not be uniquely the root information that priming accessed. Despite their verbal root, deverbal nouns primed nominal target completions. Therefore it rather seems to be the grammatical category of the “stem” that is accessed⁵⁰. For deverbal nouns this category is nominal, for the non-derived nominalized verbs, it is verbal. The other studies in this series further showed that the choice of the suffix (derivational *vs.* subordinating, and for the latter -DIK *vs.*

⁵⁰ As the present stimuli included nominalizations with non-derived verbal roots, the root and stem were conflated. Consequently, for the nominalized verbs in this study, the root/stem information was accessed. If the nominalized verbs had contained stems that were verbs derived from nouns, then, we would again have expected the stem (rather than the root) information to be accessed during priming.

-(y)Iş) was also crucial. Thus, for the complex forms, it must have been the overall grammatical category information obtained after the insertion of the derivational and subordinating suffixes that was accessed by priming. It seemed that what determined the behavior of the overall form was the specific combination of morpho-syntactic information encoded on the stem and the subordinating morphemes, if there were any.

A.2 Shared Representations in Production and Comprehension:

“Are the representations accessed by priming shared between the language production and comprehension systems?”

- *Is there priming in a comprehension-to-production task?*

➤ The bi-modal priming experiments presented in section 4.3 indicated that there was structural priming from comprehension to production. This finding supports the idea that the representations on which the comprehension and production systems operate might be shared. The persistence of priming effects across modalities suggested that at a certain level, the same representations might have been activated. The representations activated when the participants read a certain type of prime must have also been accessed in their subsequent writing, as the participants tended to repeat the prime forms in their own production. To sum up, although the general architectures and mechanisms of language comprehension and production might be distinct, the representations on which the two systems operate could be shared⁵¹.

⁵¹ Although we use the term “shared” in a non-specific way here, it could in principle refer to two different properties: (1) The representation in production can be translated into a representation for comprehension or else be made available for comprehension. This would not require a common code between production and comprehension. (2) At some point there might be a common code that is truly shared between comprehension and production, in the sense of “ideo-motor theories” of perception and action (Prinz 1997; Hommel *et al.* 2001) or simulation theories (Pickering & Garrod 2007). Given the time-sensitivity of priming (which may not leave enough time for a clumsy translation process) and the ubiquity of such common coding, it is more likely that the “sharing” is of type (2). However,

A.3 Representations in Formal Linguistic Theories:

“Are the representations accessed by priming parallel to the formal representations assumed by linguistic theories?”

- *Are the properties of the representations of GEN-POSS constructions compatible with the relevant linguistics literature?*

➤ The experiments of study 4.3 showed that the representations accessed by priming indeed showed some parallelism with the corresponding linguistic representations. Overall, the strictly nominal behavior of deverbal nouns in priming, the verbal salience of -DIK nominalizations and the intermediate status of -(y)Iş nominalizations (as well as the differences in the accessibility of the grammatical category information of the root in deverbal nouns and nominalized verbs) were compatible with the general linguistic descriptions of these forms⁵².

B. Questions on Processing

B.1 Processing of Turkish GEN-POSS Constructions:

“How are Turkish GEN-POSS constructions processed?”

- *Are the GEN-POSS constructions processed as a single syntactic unit or are they decomposed into their constituents?*

➤ The presence of structural priming effects in the two types of GEN-POSS constructions in production (study 4.2), from comprehension to production

as the present experiments do not provide concluding evidence in this respect, we do not make the distinction and use the term “shared” non-specifically.

⁵² The present thesis did not aim to distinguish among the specific competing linguistic analyses of Turkish nominalizations. Accordingly, its experimental findings were only compared to and found to be in harmony with the characteristic and mostly agreed upon linguistic properties of noun clauses.

(experiments in study 4.3) and in comprehension (in the online self-paced reading study in Chapter 5 and in the same matrix verb condition of the eye-tracking study in Chapter 6) suggested that GEN-POSS constructions were not just superficially processed as a single unit; they were rather decomposed into their inner constituents, i.e. noun phrases and noun clauses. The only exception to this decomposition was the different matrix verbs condition of the eye-tracking experiment (Chapter 6). In that particular condition, all the available resources were devoted to the processing of the lexically distinct new matrix verb that appeared in the target sentence. This increased processing cost did not leave any resources for the decomposition of the constructions into their constituents. Therefore, we concluded that the GEN-POSS constructions were mostly decomposed into their inner components, when there were adequate processing resources; and were only processed as a single unit when costly competing operations took up all the available resources. It was for reasons of resources only, when decomposition was not achieved. The experiments showed under which circumstances such decomposition was achieved.

- *Is there a difference in the processing loads of simple nouns and complex nominalized verbs in GEN-POSS constructions that are of the same length in terms of syllable number?*

➤ A robust finding was that nominalized verbs brought higher processing load to the system than simple nouns of equal length (i.e. containing the same number of syllables). The reading time measures of the critical words in not only the primes but also the targets of both the self-paced reading and the eye-tracking studies confirmed this result. The reason why nominalized verbs brought more processing load than simple nouns could be that the former are morpho-syntactically more complex, semantically denser and possibly less frequent than the latter.

- *Are the complex nominalized verbs further decomposed into their morphemes? If they are, is this decomposition subject to any constraints?*

➤ Study 4.3.8 which contrasted -DIK and -(y)Iş nominalizations revealed that the processing-related behavior of the two nominalizers was distinct. This finding implied that nominalizations could undergo decomposition. More direct evidence came from the self-paced reading task and the eye-tracking study. The increased processing time of the complex nominalized verbs in both the primes and the targets suggested that nominalized verbs are further decomposed. However, the instantiation of this decompositional analysis seemed to be subject to some constraints. As explained above, nominalized verbs were decomposed most of the time; only when the available resources needed to be used economically due to some additional processing cost, as in the different matrix verbs condition of the eye-tracking study, such a decompositional analysis was not initiated.

B.2 Different Mechanisms in Production and Comprehension:

“Are the processing mechanisms the same or different in language production and comprehension?”

- *Are the same structural priming effects observed in the production tasks and in the comprehension tasks?*

➤ Although we found structural priming from comprehension to production in study 4.3 and interpreted this as an argument for shared representations, when we looked at the uni-modal production (4.2) and comprehension studies (self-paced reading in Chapter 5 and eye-tracking in Chapter 6) separately, we saw different patterns of priming. In production-to-production priming strong facilitating priming effects were observed for both nouns and nominalized verbs. Furthermore, these effects were found when the prime and the target sentences contained different matrix verbs. On the other hand, the comprehension studies with two different methodologies indicated that although the priming effects were again present, their manifestation was different for nouns and nominalized verbs. For simple nouns, priming decreased reading times; for nominalized verbs priming was in the form of an increase in processing time due to the decompositional analysis. In addition, in the

eye-tracking experiment, priming effects only got visible when there were not any additional processing requirements such as a new lexical item as the matrix predicate of the superordinate clause in the target. The differences in the priming patterns and in the nature of the linguistic input and the output of the comprehension and production modalities point to the possibility that the architectural structure and operational mechanisms of the two modalities might be different. In fact, the properties of the tasks that were used for investigating the priming effects in production and comprehension already reflected the distinct requirements of the two systems. The consistent differences in priming patterns provided further evidence to the idea of different processing mechanisms for language comprehension and production.

The reason why priming effects were most robustly observed in production-to-production task could be that as the primes were already produced by the participants themselves and thus were already present in the system, when it came to the target sentence, they did not have to enter into the system from the outside anymore, as in comprehension-to-production priming. It seems that what the participants have done themselves (generating a noun or a nominalized verb) has a greater impact than the information they receive from the outside. This could imply that the source of information (whether it is the self or not) might make a difference in terms of the strength of the representations.

In addition, the processing speed in production priming might be slower as the participants need time to write down the words. Hence, there might be more time for the priming effects to unfold or alternatively it could also be more economical to insert the construction that has already been activated because writing might be more demanding in terms of processing cost than reading comprehension. As a result, the processor might commit to its own previous production for the sake of consistency or in order to avoid “switch costs”.

B.3 Processing of Turkish in General:

“What does the study of structural priming reveal about the general processing strategies in Turkish?”

- *Does sentence processing in Turkish reflect incrementality, especially with respect to the Subject-Object-Verb (SOV) word order?*

➤ The self-paced reading study (Chapter 5) which presented the stimulus words one by one, indicated that structural priming effects occurred before the matrix verb of the target sentence was encountered. In other words, processing started as soon as the initial linguistic information was available: the readers did not wait until the end of the sentence where the matrix verb would have been revealed to start processing. This supports the view that sentence processing in Turkish is incremental.

➤ In addition to incrementality, the present studies provided information about other aspects of sentence processing in Turkish, as well. First, the emerging possibility that a virtual matrix verb could be projected during online processing or that the most recently processed matrix verb be expected to be repeated suggests that sentence processing in Turkish might be not only incremental, but also anticipatory (in the sense that production mechanisms could be used during comprehension processes (Pickering & Garrod, 2007)). If further research confirmed sentence processing in Turkish to be anticipatory, this would contribute to explaining how speakers of SOV languages deal with the unknown identity of the matrix verb during incremental processing. Such expectancy driven-processing might actually be what enables the presence of SOV languages in the first place. This vein of research would prove fascinating with respect to the interaction of cognitive resources like memory with language processing and also to the relation between processing and linguistic typology.

➤ Another conclusion with respect to sentence processing in Turkish was that overall it showed parallelism with the theoretical linguistic descriptions of various forms and sentence structure. For instance, the priming behavior of -DIK and -(y)Iş

nominalizations as well as that of deverbal nouns was consistent with the general linguistic properties of these forms. Furthermore, the analysis of backtrackings strongly suggested that processing followed the linguistic structure by respecting phrase boundaries. Overall, experimental results and theoretical descriptions were compatible.

➤ Finally, the preliminary study and the tense/aspect marker control studies also revealed some specific results with respect to the grammatical preferences during processing. Among several grammatically acceptable forms, native speakers constantly make choices during production. The preliminary study identified the seven “balanced” matrix verbs that were equally frequently used with nominal and verbal complement; whereas the naturalness control study on matrix verb inflections showed that in neutral contexts speakers of Turkish opted for the -DI marker.

8.1.3 Methodological Conclusions

The results of the experiments also brought about some methodological conclusions about structural priming. As the experiments tested structural priming of Turkish GEN-POSS constructions systematically through a variety of different methods, they contributed to the understanding of priming as a methodological paradigm.

- *Is structural priming in production and especially comprehension dependent on the lexical repetition of the matrix verb, even in a head-final language like Turkish?*

➤ The primes and the targets in studies 4.2 and 4.3 contained different matrix verbs. This suggested that structural priming in production and from production to comprehension was independent of the lexical repetition of matrix verbs. This observation was consistent with the general literature on priming. With respect to structural priming in comprehension, first the online self-paced reading study indicated that the effect occurred before the matrix verb of the target sentence was encountered. This seemed to suggest that priming in comprehension might be independent of the processing of the matrix verb of the target. On the other hand, in

the eye-tracking study, structural priming effects appeared only when the prime and the target contained the same matrix verb and not when the target introduced a new matrix verb. The deeper level where such effects occurred would be accessed only when the matrix verb was repeated. As reflected by the lively debate on the role of the lexical repetition of verbs in priming of comprehension, this question was challenging. However, as noted before, in the traditional alternations testing structural priming, the verb which was repeated (or not repeated) in the prime and the target was already a part of the construction under scrutiny, whereas in the present study the matrix verb which was repeated (or not only) embedded the actual prime-target constructions (which in turn could contain a noun or a nominalized verb). Overall, comprehension priming as revealed by the eye-tracking experiment appeared to be more influenced by the repetition of the matrix verbs than production priming; although in the self-paced reading experiment the effect had appeared before the matrix verb. The comparison of the results from the two comprehension studies demonstrated that the nature of the task and its specific requirements might lead to different processing strategies, particularly in comprehension priming contexts.

- *Are there differences in the robustness of different online and offline tasks in revealing structural priming effects?*

➤ The systematic investigation of the same constructs with different methodologies enabled us to evaluate the robustness of online and offline tasks in revealing structural priming effects. The more traditional, pen-and-paper based offline written sentence completion tasks proved to be powerful in reflecting structural priming effects on both nouns and nominalized verbs, irrespective of whether the matrix verb was repeated or not. The online self-paced reading and the eye-tracking tasks, on the other hand, revealed the priming effects as facilitation for nouns and as increased processing load for nominalized verbs. Particularly, the latter task seemed to depend on the lexical repetition of the matrix verb to uncover priming effects. The sensitivity and volatility of this task is in contrast to the robustness of the sentence completion

technique. The simpler and less sophisticated task turned out to be strong in capturing specific effects. This could again be related to the possibility that the timing required for writing might be different than that for reading.

In conclusion, this general methodological observation was also inevitably in close relation with the natural characteristics of the language production and comprehension mechanisms. The tasks aimed to examine reading comprehension *vs.* written production necessarily reflected the particularities of the two modalities. To sum up, the observed differences in the robustness of different tasks was intertwined with the specific requirements of the systems under scrutiny.

➤ An additional methodological finding which was not envisaged in methodological research questions but was revealed by the results of the experiments was the observation that *the overall context could have an influence on the priming effects*. The volatility of the priming effects found for -(y)Iş nominalizations (experiments 4.3.7 and 4.3.8) pointed out that the overall context in which structures were presented could have a cumulative influence on priming. Such global context effects occurred in the priming of forms like -(y)Iş nominalizations which tend to act transiently unlike persistently verbal -DIK nominalizations, for instance. Nevertheless, it should be noted that since this particular “context effect” has been found for the first time here it should be replicated in the future before it can be considered as an established fact. In addition to the influence of the general context which was related to the grammatical category of the alternative structure, there were also more local pair-specific contextual effects. In the eye-tracking study, the analysis of the reading times of the critical words in prime sentences (6.4.1) revealed that the targets had an influence on the primes *via* the backtrackings. Similarly, the increased reading times of verbal targets after verbal primes in the same matrix verb condition of the same study suggest that there could be spillover effects from the target, as well. Finally, the observation that priming in the eye-tracking experiment was limited to the same matrix verb condition implied that sentence-level context also affects priming at the micro-level.

8.2 Implications

As explained in the Introduction to this thesis, the present experiments had the potential and ambition to make a number of contributions (section 1.3) to various related areas of research. In the light of the findings, in this section, we discuss the implications of our results for these fields. The implications are related to the study of structural priming specifically in Turkish, to sentence processing in general and of Turkish in particular, to theoretical linguistics, to the general structural priming literature, to experimental methodology and finally to the wider field of cognitive science.

8.2.1 Implications for the Study of Structural Priming in Turkish

To the best of our knowledge, this study constituted the first attempt to investigate structural priming in Turkish, an agglutinative language, which is typologically distinct in several aspects from the more widely studied languages in the priming literature. Focusing on GEN-POSS constructions with possessive NPs and noun clauses with nominalized verbs, the experiments scrutinized pairs with identical external morpho-syntactic templates and different internal (nominal or verbal) grammatical category information. These experiments found structural priming effects in not only comprehension and production but also from the former to the latter through a variety of experimental methods. The findings of the present study raised certain intriguing questions that call for further investigation. As such, this thesis opens way to future structural priming studies in Turkish.

8.2.2 Implications for the Sentence Processing Literature

By virtue of examining structural priming in a typologically distinct, head-final language like Turkish, this study provided a cross-linguistic contribution to the general sentence processing literature, in particular to the literature on SOV

languages. Specifically, it has implications to the rather young literature on the structural priming of Turkish. The present findings did not only shed some light on the processing of Turkish possessive NPs and noun clauses, but also raised intriguing questions about the incremental and anticipatory nature of sentence processing, especially with respect to the verb-final word order and about the role of morpho-syntax in online language processing.

8.2.3 Implications for Theoretical Linguistics

The results of the experiments in this study provided an empirical support to the general description of deverbal nouns and nominalizations with the -DIK and -(y)Iş morphemes. The strongly nominal and verbal priming behavior of deverbal nouns and -DIK nominalizations respectively and the hybrid status of -(y)Iş nominalizations are in line with the linguistic properties of these forms. These preliminary findings are promising and future research based on these results could help the evaluation of competing linguistic analyses of Turkish nominalizations and other structures. Overall, structural priming would prove to be a significant experiment-based source of information for cognitivist linguist approaches.

8.2.4 Implications for the General Structural Priming Literature

As the present study investigated structural priming of a new structure pair in a typologically different language, it provided some insights for the general structural priming literature that the previous studies could not address. Exploiting the agglutinated morphology of Turkish, this study demonstrated priming effects at the morpho-syntactic level and thus filled in a gap in the general literature. The differential grammatical category information of the constituents of the same external template could be primed. Therefore, in a language which heavily depends on its morpho-syntax to deal with structure, structural priming could go parallel to the linguistic representation of the particular language. The findings regarding the role of matrix verb repetition further suggested that language-specific processing

strategies could influence the specific patterns of structural priming, which is presumably a universal phenomenon. Finally, as it will be explained in more detail in the following section (8.2.5), the present study also had methodological implications to the structural priming literature.

8.2.5 Methodological Implications

The systematic use of different methodologies to test structural priming on the same construction pair provided an outlook on the “big picture”. Different tasks put structural priming under scrutiny in production and comprehension, and bi-modally from the latter to the former. The variety of experimental methods provided intriguing findings such as the influence of the general context on priming. The various techniques also revealed the differences in the robustness (in terms of sensitivity to matrix verb repetition) and patterns (in the manner in which the effects are manifested on nouns and nominalized verbs) of priming in production and comprehension. To conclude, it turned out that some aspects of the knowledge of language were better uncovered under certain designs and not in the others. The choice of methodology was thus closely related to the nature and demands of the modality (among them temporal demands) in which structural priming was tested, and the tasks inevitably reflected the inherent characteristics of the modalities.

8.2.6 Implications for Cognitive Science

A core question in the investigation of human cognition is on the nature of the interaction between atemporal and abstract formal representations and the mechanisms of dynamic, online processing that operate on these representations. The study of language is informative for the understanding of cognition, because language is both product of the cognitive processes and also an input to the system. By investigating the structure of language and its use, we can learn about how it is represented and functionalized in the mind (see section 2.3.1 of Chapter 2).

Therefore, the investigation of the representation and processing of this prominent cognitive capacity through structural priming could prove to be a source of information for the more general discipline of cognitive science. Moreover, comparisons with the representation and processing mechanisms of other cognitive capabilities would have implications to the debate of the modularity of language. In this regard, a promising line of research would be the investigation of parallel priming effects in other cognitive domains. It is probable that such priming effects are not exclusive to language (Pickering & Ferreira, 2008).

Structural priming is relevant to several aspects of cognition. Given its functions, it can be considered as an instance of economy of processing resources. Its effect seems to be related to the allocation of available resources during processing. Moreover, by definition, it is intertwined with memory (in particular implicit, procedural memory, independent of conscious awareness (e.g. Medin, D. L., Ross, B. H. & Markman, A. B., 2005)). Its functioning can be explained in terms of node activation and memory traces, or in terms of the principles of dynamic systems, in which the current system depends on the previous one. Despite the availability of a vast domain of structural linguistic preferences, which supposedly provides freedom in the selection among possible options, processing seems to be guided by recent information and limited in a local field within a larger domain, which is typical of dynamic systems (e.g. Beer 2000; van Gelder, 1998).

Finally, the affinity between structural priming and the simulation theory proposed, among others, by Pickering and Garrod (2007), which argues that the production system is employed during language comprehension, can be further elaborated within the framework of the embodied cognition hypothesis (Barsalou, 2009).

To sum up, the language-related findings of structural priming raise intriguing research questions that are also of interest for other aspects of the study of cognition.

8.3 Limitations and Future Research

As the present thesis had an exploratory mission by virtue of being the first structural priming in Turkish and on GEN-POSS constructions, its theoretical purposes were limited to the basic questions related to the representation and processing of language. Given the fact that it also provided some methodological contributions to the investigation of the structural priming phenomenon, its scope was inevitably narrowed down. In this section, we present some limitations of the study and suggestions for future research. The suggestions for further inquiry include both possible follow-up studies to complement the aspects of the present study, particularly those that are outlined in the limitations section, and new lines of research on structural priming of different constructions in Turkish.

8.3.1 Limitations of the Study

In accordance with the specific purposes of the present study, all the experiments examined structural priming of Turkish GEN-POSS constructions with possessive NPs and noun clauses, which constituted an ideal construction pair by virtue of being composed of lexical items belonging to different grammatical categories (nominal *vs.* verbal) while nevertheless appearing in the same external morpho-syntactic template of the nominal paradigm. Being tailor-made, the investigation of this specific pair proved to be informative for the specific purposes of this thesis. However the nature of the pair is somewhat different from the traditionally investigated active/passive and PO/DO alternations which tested pairs conveying the same truth-conditional meaning in two different forms or the attachment ambiguities in which a single form can have two interpretations depending on the preferred structural relation. As a result, the present study cannot be directly compared to those experiments. This should be kept in mind during the interpretation of the present findings and methodological contributions about structural priming. Although the present findings are valid with respect to the general definition of the paradigm, whether they would

also apply to these above-mentioned specific types of priming requires further inquiry, as will be proposed in the following section.

Given that the present thesis was designed as an experimental psycholinguistic investigation, the methodologies were limited to the behavioral techniques of sentence completion, self-paced reading and eye-tracking. However, a complementary corpus study would also prove to be valuable for the investigation of Turkish GEN-POSS constructions. Such a corpus analysis would strengthen not only the priming results but also put the frequency of matrix verbs and types of the GEN-POSS construction in perspective. In the absence of a complete morpho-syntactically annotated Turkish corpus, the endeavor of taking up such a research either manually or computationally would constitute a project on its own. This would also be beyond the present scope, given the experimental focus of this study. However, a thorough frequency research on corpus data of natural spoken or written Turkish should also be placed on the complementary future research agenda.

Another specific research endeavor which calls for attention despite being out of the scope of this study is the challenge of designing experiments to specifically address linguistic disputes on the exact analysis of these and other constructions. This way, psycholinguistic experimentation could be not only a source of information for linguistic theory but also provide objective criteria of evaluation for the assumptions adopted by competing linguistic theories with cognitivist claims. Boiling this down to the investigation of structural priming in Turkish, before such an attempt, the whole set of nominalizations need to be covered. This includes the investigation of other nominalization suffixes such as -mA (and the relevant matrix verbs that go with it), subordinations of denominal verbs (verbs derived from nouns), and ambiguous forms. Moreover, all the combinations of the pairs could be scrutinized with each methodology to get the complete picture.

The results that emerged from the comparison of the self-paced reading and the eye-tracking studies also raised new questions with respect to the processing strategies of verb-final languages. In order to tease apart the possible explanations about the

convergence of the online self-paced reading results and the same matrix verb condition results of the eye-tracking experiment, a new design is required. This proposal is explained in somewhat more detail in the next section.

To conclude, as it is plausible to expect priming effects at all linguistic levels, the GEN-POSS constructions can also be compared to other types of structures. In other words, one could test whether the outer GEN-POSS template could be primed. This was not the purpose of the study to test priming at this higher level; however based on the present findings, it is possible to hypothesize that this outer template could also be primed, irrespective of its inner grammatical content.

Finally, the specific investigation of the fillers in addition to the experimental items could also reveal noteworthy results, for example with respect to the backtracking analysis.

8.3.2 Suggestions for Future Research

The findings of the present thesis led to several related questions and opened way for further studies on structural priming in Turkish. In this last section of the thesis, we present some suggestions for experiments that would complement the present study and ideas for future structural priming studies in Turkish.

In order to test the priming of Turkish possessive NPs and noun clauses in a way that is somewhat more directly comparable to the previous studies in the literature, different experimental designs can be set up. For instance, in a visual world eye-movement paradigm⁵³ or a picture description paradigm, participants could be shown (and asked to describe or just look at) pictures that can denote both possession and an action (e.g. a picture of a woman walking her dog); following unambiguous prime sentences with either possessive NPs or nominalized verbs or unambiguous prime pictures of either object or intransitive actions. Although the possible descriptions of

⁵³ Such an eye-tracking task might also be coupled with electrophysiological or neuroimaging methods to examine the localization and timing of concurrent brain activity.

the ambiguous picture would still not denote the same exact truth-conditional meaning, such a design would be relatively more comparable with the literature. This idea can be further elaborated according to particular research questions.

As indicated above, another study to complement the present thesis which adopted the method of eliciting linguistic data experimentally would be a comprehensive corpus study. Such an investigation would provide the overall frequencies of the matrix verbs and the co-occurrence frequencies of the complement types with these verbs. In addition, it would provide the general frequency of GEN-POSS constructions in Turkish in addition to the individual frequencies of each lexical item. Moreover, it is possible to search structural priming effects within natural language corpora as the early priming studies presented in Chapter 2 did.

Moreover, experiments similar to the ones presented in this thesis can be conducted on other types of Turkish nominalizations with -mA, -mAK and -(y)AcAK with appropriate matrix verbs to complete the picture. The investigation of the homophone morphemes and ambiguities (e.g. “tani-dığ-ı-nı” meaning either *that s/he knew* or *her/his acquaintance*) would also help better understand the underlying phenomena.

Furthermore, with the aim of distinguishing among the possible explanations about the convergence of the online self-paced reading results and the same matrix verb condition results of the eye-tracking experiment, the self-paced reading study could be replicated as a control with the addition of a new condition: i.e. different matrix verb condition. The comparison of the reading times of the same and different matrix verbs would be informative on the online processing strategies of Turkish readers in priming context⁵⁴. It would also be helpful to employ eye-tracking simultaneously and determine specific morphemes as AOIs. Of course, a morpheme-by-morpheme (either paced or self-paced) reading paradigm would also be conceivable. Another method to investigate the question of the pending matrix verb would be to create an

⁵⁴ Moreover, a design in which both same and different matrix verb pairs are randomly dispersed would also prove worthy by ensuring that the participants do not get habituated to the repeated patterns.

open ended self-paced reading design in which the participants would be asked to complete the matrix verb of the target instead of reading this last word on the screen. These follow-up studies would help to tease apart the two possible expectations, namely: the projection of a virtual verb and lexically specified expectancy driven processing. Finally, other possible follow-up studies could include: the investigation of priming of the whole GEN-POSS construction, which would complement the present study investigating priming at the deeper level of its constituents; and the analysis of the fillers especially the eye-tracking experiment, which could shed light on the natural backtracking patterns for two syntactically unrelated sentences.

In addition to these possible follow-up experiments addressing the questions that emerged as a consequence of the present study, there are also several research tracks that the future investigation of structural priming can take. For instance, although the present study investigated priming in written language comprehension and production, it is possible and desirable to test priming effects in spoken Turkish. The investigation of structural priming in dialogue between speakers of Turkish through the confederate scripting paradigm would also shed more light on bi-modal priming. Another path is to study how long priming effects persist in written and spoken Turkish.

Furthermore, the investigation of structural priming in different aspects of the Turkish grammar would also contribute to both the priming literature and the theoretical linguistics literature. Some of these aspects could for instance be different word orders, question-answer pairs, prosody and information structure, complex extractions, and different types of relative clauses in Turkish. The investigation of structural priming in such different constructions of Turkish would also motivate the investigation of comparable phenomena in other languages. One such line of research that was initiated in connection with the present study on Turkish GEN-POSS constructions is the project on structural priming in English Concealed Questions (Bahadır & Polinsky, 2010a, 2010b, 2011). The introduction of such new constructions from different languages would therefore open up promising research

strands in other languages, hopefully in those that are rather underrepresented in the psycholinguistics literature, as well.

To conclude, the present thesis paved the way for future structural priming studies that could build a bridge between experimental psycholinguistics and theoretical linguistics both for Turkish and for language in general. Such line of research investigating the relation between the representation and processing of language from both the production and the comprehension perspectives, will hopefully bring us closer to a complete understanding of “language and mind”.

REFERENCES

- Altmann, G. T. M. (2002). Introduction. In G. T. M. Altmann (Ed.), *Psycholinguistics. Critical concepts in psychology* (Vol. 1, pp. 1-58). London & NY: Routledge.
- Altmann, G. T. M., & Kamide, Y. (1999). Incremental interpretation at verbs: Restricting the domain of subsequent reference. *Cognition*, *73*, 247-264.
- Altmann, G. T. M., & Steedman, M. (1988). Interaction with context during human sentence processing. *Cognition*, *30*, 191-238.
- Arai, M., Van Gompel, R. P. G., & Scheepers, C. (2007). Priming ditransitive structures in comprehension. *Cognitive Psychology*, *54*, 218-250.
- Aronoff, M., & Rees-Miller, J. (2002). Preface. In M. Aronoff & J. Rees-Miller (Eds.), *The Handbook of Linguistics*. Blackwell Publishing. Retrieved August 12, 2012, from Blackwell Reference Online:
http://www.blackwellreference.com/subscriber/tocnode?id=g9781405102520_chunk_g9781405102520
- Bahadır, G., & Polinsky, M. (2010a, September). *Concealed questions in English: A structural priming study*. Paper presented at the Psycholinguistics and Cognitive Science Seminar, Middle East Technical University, Ankara.
- Bahadır, G., & Polinsky, M. (2010b, September). *Structural Priming of Concealed Questions*. Poster presented at the 6th International Workshop on Language Production, Edinburgh.

Bahadır, G., & Polinsky, M. (2011, May). *Structural Priming and the Phrasal/Clausal Distinction: The Case of CQs*. Poster presented at the ISCA (International Speech Communication Association) Workshop on Experimental Linguistics ExLing 2011, Paris.

Barsalou, L. W. (2009). Simulation, situated conceptualization, and prediction. *Philosophical Transactions of the Royal Society of London: Biological Sciences*, 364, 1281-1289.

Beer, R. D. (2000). Dynamical approaches to cognitive science. *Trends in Cognitive Sciences*, 4 (3), 91-99.

Bever, T. G. (1970). The cognitive basis for linguistic structures. In J. R. Hayes (Ed.), *Cognition and the development of language* (pp. 279-352). NY: Wiley.

Bock, J. K. (1986). Syntactic persistence in language production. *Cognitive Psychology*, 18, 355-387.

Bock, J. K. (1989). Closed-class immanence in sentence production. *Cognition*, 31, 163-186.

Bock, J. K., & Loebell, H. (1990). Framing sentences. *Cognition*, 35, 1-39.

Branigan, H. P. (2007). Syntactic priming. *Language and Linguistics Compass*, 1, 1-16.

Branigan, H. P., Pickering, M. J. & Cleland, A. A. (2000). Syntactic coordination in dialogue. *Cognition*, 75, B13-B25.

Branigan, H. P., Pickering, M. J., Liversedge, S. P., Stewart, A. J., & Urbach, T. P. (1995). Syntactic priming: Investigating the mental representation of language. *Journal of Psycholinguistic Research*, 24, 489-506.

Branigan, H. P., Pickering, M. J., & McLean, J. F. (2005). Priming prepositional-phrase attachment during language comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 31, 468-481.

Branigan, H. P., Pickering, M. J., Stewart, A. J., & McLean, J. F. (2000). Syntactic priming in spoken production: Linguistic and temporal interference. *Memory and Cognition*, 28, 1397-1302.

J. Bresnan (Ed.) (1982). *The Mental Representation of Grammatical Relations*. Cambridge, MA: MIT Press.

Bresnan, J., & Kaplan, R. M. (1982). Introduction: Grammars as mental representations of language. In J. Bresnan (Ed.), *The Mental Representation of Grammatical Relations* (pp. i-iii). Cambridge, MA: MIT Press.

Chang, F., Dell, G. S., & Bock, J. K. (2006). Becoming syntactic. *Psychological Review*, 113, 234-272.

Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.

Chomsky, N. (1968). *Language and mind*. NY: Harcourt, Brace & World.

Chomsky, N. (1980). *Rules and representations*. Oxford, England: Basil Blackwell.

Chomsky, N. (1986). *Knowledge of language: Its nature, origins, and use*. NY: Praeger.

Csató, É. Á., & Johanson, L. (1998). Turkish. In L. Johanson, & É. Á. Csató (Eds.), *The Turkic languages* (pp. 203-235). London & NY: Routledge.

Cutler, A. (Ed.) (2005). *Twenty-first century psycholinguistics. Four cornerstones*. Mahwah, NJ: Lawrence Erlbaum.

Cutler, A, Klein, W., & Levinson, S. C. (2005). The Cornerstones of Twenty-First Century Psycholinguistics. In A. Cutler (Ed.), *Twenty-first century psycholinguistics: Four cornerstones* (pp. 1-23). Mahwah, NJ: Lawrence Erlbaum.

Dik, S. C. (1989). *The theory of functional grammar, Part I: The structure of the clause*. Dordrecht: Foris Publications.

Duchowski, A. T. (2002). A breadth-first survey of eye tracking applications. *Behavior research methods, instruments, computers*, 34 (4), 455-470.

Duchowski, A. T. (2002). *Eye tracking methodology: Theory and practice* (2nd edition). London: Springer-Verlag.

Erdal, M. (1998). On the verbal noun in -(y)İş. In K. İmer & L. Subaşı Uzun (Eds.), *Doğan Aksan armağanı* (pp. 53-68). Ankara: Ankara Üniversitesi Basımevi.

Erguvanlı Taylan, E. (1998). What determines the choice of nominalizer in Turkish nominalized complement clauses? [CD ROM]. In B. Caron (Ed.), *Proceedings of the XVIth International Congress of Linguists* (paper no. 220). Oxford: Pergamon.

Field, A. P. (2009). *Discovering statistics using SPSS: (and sex and drugs and rock 'n' roll). Introducing Statistical Methods* (3rd edition). London: Sage.

Friederici, A. D. (1995). The time course of syntactic activation during language processing: A model based on neuropsychological and neurophysiological data. *Brain and Language*, 50 (3), 259-281.

Friederici, A. D. (2002). Towards a neural basis of auditory sentence processing. *Trends in Cognitive Sciences*, 6, 78-84.

Garrett, M. F. (2000). Remarks on the architecture of language processing systems. In Y. Gordzinsky, L. Shapiro, & D. Swinney (Eds.), *Language and the brain* (pp. 31-69). San Diego: Academic Press.

Garrod, S. (2006). Psycholinguistic Research Methods. In K. Brown (Ed.), *The encyclopedia of language and linguistics* (2nd edition) (pp. 251-257). Oxford: Elsevier.

Gazdar, G., Klein E., Pullum, G. K., & Sag, I. (1985). *Generalized Phrase Structure Grammar*. Oxford: Blackwell.

George, L. M., & Kornfilt, J. (1981). Finiteness and boundedness in Turkish. In F. Heny (Ed.), *Binding and filtering* (pp. 105-127). Cambridge, MA: MIT Press.

Gleitman, L. R., & Liberman, M. (1995). The cognitive science of language: Introduction. In D. N. Osherson (Series Ed.) & L. R. Gleitman & M. Liberman (Vol Eds.), *An invitation to cognitive science, Part I: Language* (pp. xix-xxxviii). Cambridge, MA: MIT Press.

Göksel, A., & C. Kerslake. (2005). *Turkish, a comprehensive grammar*. London: Routledge.

Göksel, A., & C. Kerslake. (2011). *Turkish, an essential grammar*. London: Routledge.

Göz, İ. (2003). *Yazılı Türkçe'nin kelime sıklığı sözlüğü*. Ankara: Türk Dil Kurumu.

Heim, I. (1979). Concealed Questions. In R. Bäuerle, U. Egli & A. von Stechow (Eds.), *Semantics from different point of views* (pp. 51-60). Berlin: Springer-Verlag.

Hommel, B., Müsseler, J., Aschersleben, G., & Prinz, W. (2001). The Theory of Event Coding (TEC): A framework for perception and action planning. *Behavioral and Brain Sciences*, 24, 849-937.

Indefrey, P. (2007). Brain-imaging studies of language production. In Gaskell, M. G. (Ed.), *The Oxford Handbook of Psycholinguistics* (pp. 547-564). Oxford: Oxford University Press.

Jackendoff, R. S. (1972). *Semantic interpretation in generative grammar*. Cambridge, MA: MIT Press.

Johanson, L., & Csató, É. Á. (Eds.) (1998). *The Turkic languages*. London & NY: Routledge.

Just, M. A., Carpenter, P. A., & Woolley, J.D. (1982). Paradigms and processes in reading comprehension. *Journal of Experimental Psychology: General*, 111 (2), 228-238.

Katz, J. J. (1981). *Language and other abstract objects*. Oxford, England: Blackwell.

Kempen, G. & Harbusch, K. (2002). Rethinking the architecture of human syntactic processing: The relationship between grammatical encoding and decoding. In *Proceedings of the 35th Societas Linguistica Europaea (SLE) Meeting - Rethinking Language and Mind*. Potsdam, Germany.

Kennelly, S. D. (1987). Turkish Gerunds. In H. E. Boeschoten & L. T. Verhoeven (Eds.), *Studies on modern Turkish: Proceedings of the third conference on Turkish linguistics* (pp. 136-148). Tilburg: Tilburg University Press.

Keskin, C. (2009). *Subject agreement-Dependency of accusative case in Turkish, or jump-starting grammatical machinery*. Utrecht: LOT.

Konieczny, L., Hemforth, B., Scheepers, C., & Strube, G. (1997). The role of lexical heads in parsing: Evidence from German. *Language and Cognitive Processes*, 12, 307-348.

Koptjevskaja-Tamm, M. (1993). *Nominalizations*. London/NY: Routledge.

Kornfilt, J. (1997). *Turkish Grammar*. London: Routledge.

Kornfilt, J. (2001). Functional projections and their subjects in Turkish clauses. In E. Erguvanlı Taylan (Ed.), *The verb in Turkish* (pp. 183-212). Amsterdam: John Benjamins.

Kornfilt, J. (2003). Subject case in Turkish nominalized clauses. In U. Junghanns, & L. Szucsich (Eds.), *Syntactic Structures and Morphological Information* (pp. 129-215). Berlin: Mouton de Gruyter.

Kornfilt, J. (2007). Verbal and Nominalized Finite Clauses in Turkish. In I. Nikolaeva (Ed.), *Finiteness: Theoretical and empirical foundations* (pp. 305-332). Oxford: Oxford University Press.

Kornfilt J., & Whitman, J. (2011a). Introduction: Nominalizations in syntactic theory. *Lingua*, 121 (7), 1160-1163.

Kornfilt J., & Whitman, J. (2011b). Afterword: Nominalizations in syntactic theory. *Lingua*, 121 (7), 1297-1313.

Kural, M. (1992). *Properties of scrambling in Turkish*. Ms, UCLA.

Kural, M. (1993). V-to(-C-to)-I in Turkish. *UCLA Occasional Papers in Linguistics*, 11, 17-53.

Ledoux, K., Traxler, M. J., & Swaab, T. Y. (2007). Syntactic priming in comprehension: Evidence from event-related potentials. *Psychological Science*, 18, 135-143.

Levelt, W. J. M., & Kelter, S. (1982). Surface form and memory in question answering. *Cognitive Psychology*, 14, 78-106.

Levelt, W. J. M. (1989). *Speaking: From intention to articulation*. Cambridge, MA: MIT Press.

Levelt, W. J. M., Roelofs, A., & Meyer, A. S. (1999). A theory of lexical access in speech production. *Behavioral and Brain Sciences*, 22, 1-75.

Lewis, G. L., (1967). *Turkish grammar*. Oxford: Oxford University Press.

MacKay, D. G. (1987). *The organization of perception and action: A theory for language and other cognitive skills*. NY: Springer-Verlag.

McNamara, T. P. (2005). *Semantic priming: Perspectives from memory and word recognition*. Hove, England: Psychology Press.

Medin, D. L., Ross, B. H., & Markman, A. B. (2005). *Cognitive Psychology* (4th edition). NY: John Wiley and Sons.

Mehler, J., & Carey, P. (1967). Role of surface and base structure in the perception of sentences. *Journal of Verbal Learning and Verbal Behavior*, 6, 335-338.

Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology*, 90, 227-234.

Nathan, L. (2006). *On the interpretation of concealed questions*. Unpublished doctoral dissertation, MIT, MA.

Osherson, D. N. (1995). The study of cognition. In D. N. Osherson (Series Ed.) & L. R. Gleitman & M. Liberman (Vol Eds.), *An invitation to cognitive science, Part I: Language* (pp. xi-xviii). Cambridge, MA: MIT Press.

Palmer, F. R. (1986). *Mood and Modality*. Cambridge: Cambridge University Press.

Pamir Dietrich, A. (1995). An Analysis of Subordinate Clauses in Turkish. *Dilbilim Araştırmaları*, 1995, 182-196.

Pickering, M. J., & Barry, G. D. (1991). Sentence processing without empty categories. *Language and Cognitive Processes*, 6, 229-259.

Pickering, M. J., & Branigan, H. P. (1998). The representation of verbs: Evidence from syntactic priming in language production. *Journal of Memory and Language*, 39, 633-651.

Pickering, M. J., & Branigan, H. P. (1999). Syntactic priming in language production. *Trends in Cognitive Sciences*, 3, 136-141.

Pickering, M. J. & Ferreira, V. S. (2008). Structural Priming: A Critical Review. *Psychological Bulletin*, 134 (3), 427-459.

Pickering, M. J., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences*, 27, 169-225.

Pickering, M. J., & Garrod, S. (2007). Do people use language production to make predictions during comprehension? *Trends in Cognitive Sciences*, 11, 105-110.

Poehpel, D., & Marantz, A. (2000). Cognitive neuroscience of speech processing. In A. Marantz, Y. Miyashita, & W. O'Neill (Eds.), *Image, language, brain. Papers from the first mind articulation project symposium* (pp. 29-50). Cambridge, MA: MIT Press.

Pollard, C., & Sag, I. A. (1994). *Head-driven phrase structure grammar*. Chicago: University of Chicago Press.

Prinz, W. (1997). Perception and Action Planning. *European Journal of Cognitive Psychology*, 9 (2), 129-154.

Pulvermüller, F., Shtyrov, Y., Hasting, A., & Carlyon, R. P. (2008). Syntax as a reflex: Neurophysiological evidence for early automaticity of grammatical processing. *Brain and Language*, 194, 244-253.

Roelofs, A. (1992). A spreading-activation theory of lemma retrieval in speaking. *Cognition*, 42, 107-142.

Roelofs, A. (1993). Testing a non-decompositional theory of lemma retrieval in speaking: Retrieval of verbs. *Cognition*, 47, 59-87.

Say, B., Zeyrek, D., Oflazer, K., & Özge, U. (2004) Development of a corpus and a treebank for present day written Turkish. In K. İmer, & G. Doğan. (Eds.), *Current Research in Turkish Linguistics. ICTL 2002* (pp. 183-192). T. R. North Cyprus: Eastern Mediarennean University.

Scheepers, C. (2003). Syntactic priming of relative clause attachments: Persistence of structural configuration in sentence production. *Cognition*, 89, 179-205.

Scheepers, C., & Crocker, M. W. (2004). Constituent order priming from listening to comprehension: A visual-world study. In M. Carreiras & C. Clifton Jr. (Eds.), *The on-line study of sentence comprehension: Eyetracking, ERPs, and beyond* (pp. 167-185). NY: Psychology Press.

Schenkein, J. (1980). A taxonomy for repeating action sequences in natural conversation. In B. Butterworth (Ed.), *Language production* (Vol. 1, pp. 21-47). London: Academic Press.

Sproat, R., Samuelsson, C., Chu-Carroll, J., & Carpenter, B. (2002). Computational Linguistics. In M. Aronoff & J. Rees-Miller (Eds.), *The Handbook of Linguistics*. Blackwell Publishing. Retrieved August 12, 2012, from Blackwell Reference Online: http://www.blackwellreference.com/subscriber/tocnode?id=g9781405102520_chunk_g978140510252027

Steedman, M. J. (1985). Dependency and coordination in the grammar of Dutch and English. *Language*, 61 (3), 523-568.

Steedman, M. J. (1987). Combinatory grammars and parasitic gaps. *Natural Language and Linguistic Theory*, 5, 403-439.

Steedman, M. J. (1988). Combinators and grammars. In E. Bach, R. T. Oehrle, & D. Wheeler (Eds.), *Categorial Grammars and Natural Language Structures* (pp. 417-442). Dordrecht: Riedel.

Steedman, M. J. (1989). Grammar, interpretation and processing from the lexicon. In W. Marslen-Wilson (Ed.), *Lexical Representation and Process* (pp. 463-504). Cambridge, MA: MIT Press.

Thagard, P. (2011). Cognitive Science. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Fall 2011 Edition). Retrieved August 12, 2012, from <http://plato.stanford.edu/archives/fall2011/entries/cognitive-science>

Thothathiri, M., & Snedeker, J. (2008). Syntactic priming during language comprehension in three- and four-year-old children. *Journal of Memory and Language*, 58, 188-213.

Tobii © Technology AB. (2010). *Product Description for Tobii T and X Series Eye Trackers*. Revision 2.1, June 2010.

Tobii © Technology AB. (2010). *Tobii Studio 2.X User Manual*, Manual Version 1.0.

Traxler, M. J. (2008). Lexically independent priming in online sentence comprehension. *Psychonomic Bulletin & Review*, 15, 149-155.

Traxler, M. J., & Tooley, K. M. (2008). Priming in sentence comprehension: Strategic or syntactic? *Language and Cognitive Processes*, 23 (5), 609-645.

Underhill, R. (1976). *Turkish grammar*. Cambridge, MA: MIT Press.

Urbach, T. P., Pickering, M. J., Branigan, H. P., & Myler, A. (1995, March). *Event-related potential effects and parsing*. Poster presented at the 8th CUNY Annual Sentence Processing Conference, Tucson, AZ.

Uygun, D. (2009). *A split model for category specification: Lexical categories in Turkish*. Unpublished doctoral dissertation, Boğaziçi University, İstanbul.

van Gelder, T. (1998). The dynamical hypothesis in cognitive science. *Behavioral and Brain Sciences*, 21, 615-665.

van Schaaik, G. J. (2001). *The Bosphorus Papers. Studies in Turkish Grammar 1996-1999*. İstanbul: Boğaziçi University Press.

Weber, K., & Indefrey, P. (2009). Shared syntactic information in German-English bilinguals: An fMRI repetition suppression study. *Neuroimage*, 46, 1164-1172.

Weiner, E. J., & Labov, W. (1983). Constraints on the agentless passive. *Journal of Linguistics*, 19, 29-58.

Zwitserslood, P., Bölte, J., & Dohmes, P. (2000). Morphological effects on speech production: Evidence from picture naming. *Language and Cognitive Processes*, 15, 563-591.

Zwitserslood, P., Bölte, J., & Dohmes, P. (2002). Where and how morphologically complex words interplay with naming pictures. *Brain and Language*, 81, 358-367.

APPENDICES

APPENDIX A: A SAMPLE BOOKLET USED IN STUDY 4.1

Muhabir, ofise

 uğradı.

Sanatçı bu yalıda

 büyüdü.

Öğrenci, arkadaşının

 düşündü.

Yaşlı hanım

 üşüdü.

Şövalye zindandan

 kurtuldu.

Sporcu, rakibiyle

 yarıştı.

Bahçıvan, marangozun

 gizledi.

Küçük çocuk

 susadı.

Güçlü ordu

 rastladı.

Başkan binadan

 uzaklaştı.

Korsan, prensesin

 hatırladı.

Futbolcu, taraftarlara

 baktı.

Ajan, havaalanına

 ulaştı.

Yorgun adam

 küstü.

Yolcu eski bir otelde

 konakladı.

Kadın, komşusunun

 gördü.

Elçi saraydan

 ayrıldı.

Ressam, sevgilisiyle

 haberleşti.

Mühendis, mimarın

 açıkladı.

Hemşire, hastaya

 gülümsedi.

Ünlü şarkıcı

 değişti.

Muhasebeci, avukatın

 onayladı.

Asker, ailesiyle

 helalleşti.

Yazar, istasyona

 vardı.

Genç denizci

 dokundu.

Şair bu kasabada

 öldü.

Doktor, meslektaşının

 anladı.

Kız, ağabeyine

 seslendi.

APPENDIX B: INSTRUCTIONS, INFORMED CONSENT FORM AND QUESTIONNAIRE USED IN STUDY 4.1

İyi Günler,

Benim adım Gözde Bahadır. Orta Doğu Teknik Üniversitesi, Enformatik Enstitüsü, Bilişsel Bilimler Programı'nda sürdürmekte olduğum doktora çalışmaları kapsamında, anadili Türkçe olan yetişkin bireylerin ne tür cümleler kurduklarını araştırmaktayım. Bu araştırmaya katılmayı kabul ettiğiniz için çok teşekkür ederim. Çalışmanın ana kısmına başlamadan aşağıdaki genel soruları yanıtlamanızı rica ediyorum. Çalışma sırasında vereceğiniz tüm bilgiler saklı tutulacak ve yalnız bilimsel araştırma amacıyla kullanılacaktır. Çalışmanın temel bölümündeki cümlelerde verilen boşlukları; çok fazla düşünmeden, mümkün olduğunca kısa sürede doldurmanız gerekmektedir. Boşlukları istediğiniz biçimde doldurabilirsiniz, yeter ki cümle gündelik hayatınızda kullanabileceğiniz bir cümle olsun. Boşluklara (en az bir sözcük olmak üzere) dilediğiniz sayıda sözcük yazabilirsiniz. Her cümle için farklı şekillerde doldurulmak üzere 4 ayrı boşluk verilmiştir. Aklınıza ilk gelen sözcüğü/sözcükleri ilk boşluğa, diğerlerini de sırayla onu izleyen boşluklara yazmanız gerekmektedir. Tüm boşlukları doldurmanız zorunlu değildir, en az bir tane olmak üzere kaç tanesini isterseniz doldurabilirsiniz.

Başlamadan önce, prosedürle ilgili anlaşılmayan bir nokta olursa lütfen benimle iletişime geçiniz. Cep tel.: 0532 508 61 71, e-posta: gozdebahadir@yahoo.com.

Bu araştırmaya katkıda bulunduğunuz için tekrar çok teşekkür ederiz! Çalışma ile ilgili her türlü soru ve bilgi için benimle temas kurabilirsiniz.

Saygılarımla,

Gözde BAHADIR

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştuđunuz başka diller var mı? Varsa hangi düzeyde?

Düzenli olarak gazete okur musunuz?

Son altı ay içinde okuduđunuz kitap sayısı?

Günde ortalama kaç elektronik posta yazarsınız?

Günde ortalama kaç cep telefonu mesajı (SMS) yazarsınız?

Daha uzun metinleri (rapor, makale, vb.) hangi sıklıkta yazarsınız?

Her zaman Sık sık Bazen Nadiren Asla

APPENDIX C: A SAMPLE BOOKLET USED IN STUDY 4.2

Mahkum cezaevinden	fırar etti.
Ressam, sevgilisiyle	haberleşti.
Güçlü ordu	rastladı.
Sunucu, kameramanın	farz etti.
Müdür, valinin	öğrendi.
Bakan, danışmanına	inandı.
Kibar beyefendi	hapşırıldı.
Bitkin yarışmacı	gerindi.
Emlakçı, kiracının	aldı.
Manav, becerikli kasabın	gözlemledi.
Hemşire, hastaya	gülümsedi.
Futbolcu, taraftarlara	baktı.
Pilot otele	yerleşti.
Fotoğrafçı, oyuncunun	ödedi.
Dikkatli mühendis, mimarın	anladı.
Baba, oğluna	güçlendi.
Şövalye zindandan	kurtuldu.
Öğrenci okuldan	kaçtı.
Gazeteci, milletvekilinin	iddia etti.
Muslukçu, elektrikçinin	gözlemledi.

Genç denizci	dokundu.
Ajan havaalanına	ulaştı.
Başkan binadan	uzaklaştı.
Arkeolog, deneyimli diplomatın	okudu.
Bankacı, arkadaşının	unuttu.
Küçük çocuk	acıktı.
Müzişyen partide	eğlendi.
Cesur şerif	baktı.
Öğretmen, velinin	zannetti.
Satıcı, müşterinin	anlattı.
Ünlü aktör	değişti.
Sevimli nine	tutundu.
Uykulu bekçi	esnedi.
Şoför, yolcunun	aradı.
Bahçıvan, marangozun	duydu.
Sporcu, rakibiyle	yarıştı.
Elçi saraydan	ayrıldı.
Dalgıç denize	daldı.
Dolandırıcı, emektar polisin	sandı.
Yaya sürücünün	anladı.
Hoca sınıfa	girdi.
Gezgin handa	konakladı.
Yazar istasyona	vardı.
Ev sahibi, misafirin	getirdi.
Korsan, prensesin	hatırladı.
Yüzücü, cankurtarana	seslendi.

Muhabir ofise	uğradı.
Şair kasabada	öldü.
Tercüman, konuşmacının	ima etti.
Çalışkan garson, aşçının	hatırladı.
Tezgahtar, kasiyerle	tartıştı.
Sanatçı yalıda	büyüdü.
Şarkıcı, besteciyle	anlaştı.
Cerrah, araştırmacının	varsaydı.
Dede, yaramaz torununun	duydu.
Bebek beşikte	uyudu.
Yaşlı hanım	üşüdü.
Ziyaretçi odada	dinlendi.
Güzel kadın, komşusunun	beğendi.
Doktor, meslektaşının	anlattı.
Bakkal, çırağıyla	karşılaştı.
Asker, ailesiyle	helalleşti.
Sabırsız patron	bağırdı.
Yetenekli modacı, mankenin	haber verdi.
Kral, karısının	unuttu.
Kız, ağabeyine	bağlandı.
Rahip manastırdan	çıktı.
Yorgun adam	küstü.
Çiçekçi, berberin	kırdı.
Muhasabeci, avukatın	öğrendi.

APPENDIX D: INFORMED CONSENT FORM USED IN STUDY 4.2

Gönüllü Katılım Formu

Bu çalışma, ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı lisansüstü öğrencisi Gözde Bahadır'ın, Yrd. Doç. Dr. Annette Hohenberger danışmanlığında ve Prof. Dr. Deniz Zeyrek eş-danışmanlığında yürütmekte olduğu doktora tezi araştırmaları kapsamında yer almaktadır. Çalışmanın genel amacı, anadili Türkçe olan yetişkin bireylerin kurdukları cümleleri yapısal olarak incelemektir. Bu araştırma sonucunda Türkçe'nin işlenmesi konusundaki psiko-dilbilimsel literatüre katkıda bulunmak hedeflenmektedir. Katılımcıların ekteki formda yer alan cümlelerdeki boşlukları doldurmaları ve ilk sayfada yer alan genel soruları yanıtlamaları beklenmektedir. Bu işlemlerin yaklaşık 15-30 dakika süreceği tahmin edilmektedir. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Soru ve cümleler, genel olarak kişisel rahatsızlık verecek unsurları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakmakta serbestsiniz. Böyle bir durumda formu gönderen kişiye, formu tamamlamadığınızı belirtmek yeterli olacaktır. Katılımınız sonrasında, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Gözde Bahadır (Adres: ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı, 06531, Çankaya, Ankara; Tel: 0532 508 61 71; E-posta: gozdebahadir@yahoo.com) ile iletişim kurabilirsiniz.

Bu çalıřmaya tamamen gönüllü olarak katılıyorum ve istediđim zaman yarıda kesebileceđimi biliyorum. Verdiđim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya ulařtırınız).

İsim Soyad

Tarih

İmza

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APPENDIX E: INSTRUCTIONS AND QUESTIONNAIRE USED IN STUDY 4.2

İyi Günler,

Benim adım Gözde Bahadır. Orta Doğu Teknik Üniversitesi, Enformatik Enstitüsü, Bilişsel Bilimler Programı'nda Yrd. Doç. Dr. Annette Hohenberger danışmanlığında sürdürmekte olduğum doktora çalışmaları kapsamında, anadili Türkçe olan yetişkin bireylerin ne tür cümleler kurduklarını araştırmaktayım. Bu araştırmaya katılmayı kabul ettiğiniz için çok teşekkür ederim. Çalışmanın ana kısmına başlamadan aşağıdaki genel soruları yanıtlamanızı rica ediyorum. Çalışma sırasında vereceğiniz tüm bilgiler saklı tutulacak ve yalnız bilimsel araştırma amacıyla kullanılacaktır.

Çalışmanın temel bölümündeki cümlelerde verilen boşlukları; çok fazla düşünmeden, mümkün olduğunca kısa sürede doldurmanız gerekmektedir. Boşlukları istediğiniz biçimde doldurabilirsiniz, yeter ki cümle gündelik hayatınızda kullanabileceğiniz bir cümle olsun. Boşluklara (en az bir sözcük olmak üzere) dilediğiniz sayıda sözcük yazabilirsiniz.

Başlamadan önce prosedürle ilgili anlaşılmayan bir nokta olursa lütfen sormaktan çekinmeyiniz. Her türlü soru ve yorumunuz için iletişim bilgilerim şöyledir:
Cep tel.: 0532 508 61 71, e-posta: gozdebahadir@yahoo.com.

Bu araştırmaya katkıda bulunduğunuz için tekrar çok teşekkür ederim!

Saygılarımla,

Gözde BAHADIR

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğunuz başka diller var mı? Varsa hangi düzeyde?

APPENDIX F: A SAMPLE BOOKLET USED IN STUDY 4.3.5

AÇIKLAMALAR

Bu kitapçıkta boşluklu cümleler yer almaktadır. Lütfen bu **cümlelerin hepsini sırayla okuyunuz** ve boş bırakılanları **en az 1 sözcük yazarak doldurunuz**. Boş bırakılan cümleleri **çok fazla düşünmeden, dilediğiniz şekilde, istediğiniz sayıda sözcük kullanarak** doldurabilirsiniz. Yeter ki bu cümleler, günlük hayatınızda kullanabileceğiniz cümleler olsun. Bazı cümlelerdeki boşluklar hali hazırda tamamlanmıştır. Bu cümleleri **sadece okuyunuz**, ayrıca bir sözcük eklemeyiniz. Lütfen, başlamadan bir sonraki sayfada yer alan genel soruları yanıtlayınız. Çalışmamıza katıldığınız için çok teşekkür ederiz! ☺

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğünüz yabancı diller var mı?

Varsa hangi düzeyde?

Bankacı, arkadaşının	.....<i>macerasını</i>	anlattı.
Ev sahibi, misafirin	.....	hatırladı.
Sporcu, rakibiyle	.....	yarıştı.
Güçlü ordu	.....	rastladı.
Başkan binadan	.....<i>hızla</i>	uzaklaştı.
Şoför, yolcunun	.....<i>yorulduğunu</i>	gözlemledi.
Sunucu, kameramanın	.....	öğrendi.
Sabırsız patron	.....<i>yanında çalışanlara</i>	bağırdı.
Şövalye zindandan	.....<i>zar zor</i>	kurtuldu.
Kız, ağabeyine	.....	bağlandı.
Tezgahtar, kasiyerle	.....<i>ulu orta</i>	tartıştı.
Kral, karısının	.....<i>yaşlandığını</i>	unuttu.
Dolandırıcı, emektar polisin	.....	anladı.
Sanatçı yalıda	.....<i>kardeşleriyle</i>	büyüdü.
Bakan, danışmanına	.....	inandı.
Doktor, meslektaşının	.....<i>sesini</i>	duydu.
Emlakçı, kiracının	.....	gözlemledi.
Şair kasabada	.....<i>yapayalnız</i>	öldü.
Ünlü aktör	.....	değişti.
Falci köyde	.....	yaşadı.

Dikkatli mühendis, mimarın	.....<i>sözünü</i>	hatırladı.
Manav, becerikli kasabın	.....	unuttu.
Yaşlı hanım	.....	üşüdü.
Ajan havaalanına	.....<i>son anda</i>	ulaştı.
Yazar istasyona	.....	vardı.
Müdür, valinin	.....<i>gittiğini</i>	öğrendi.
Muslukçu, elektrikçinin	.....	anlattı.
Pilot otele	.....	yerleşti.
Küçük çocuk	.....<i>epey</i>	acıktı.
Ziyaretçi odada	.....<i>on dakika</i>	oturdu.
Marangoz, bahçıvanın	.....<i>derdini</i>	anladı.
Yaya, sürücünün	.....	duydu.
Sevimli nine	.....	tutundu.
Muhabir ofise	.....	uğradı.
Bakkal, چراغıyla	.....<i>aylar sonra</i>	karşılaştı.
Satıcı, hırsızın	.....<i>şaşırdığını</i>	anlattı.
Tercüman, konuşmacının	.....	hatırladı.
Rahip manastırdan	.....<i>koşar adım</i>	çıktı.
Kibar beyefendi	.....	hapşırıldı.
Elçi saraydan	.....	atıldı.

Baba, ođluna	.....<i>çok</i>	güçendi.
Profesör, genç asistanın	.....<i>yöntemini</i>	gözlemledi.
Çiçekçi, berberin	.....	öğrendi.
Uykulu bekçi	.....	esnedi.
Asker, ailesiyle	.....<i>son kez</i>	helalleşti.
Muhasebeci, avukatın	.....<i>belgesini</i>	unuttu.
Fotoğrafçı, oyuncunun	.....	anladı.
Yorgun adam	.....	küstü.
Dalgıç denize	.....<i>çivileme</i>	daldı.
Hemşire, hastaya	.....	gülümsedi.
Şarkıcı, besteciyle	.....<i>nihayet</i>	anlaştı.
Öğrenci okuldan	.....<i>arkadaşlarıyla birlikte</i>	kaçtı.
Dede, yaramaz torununun	.....<i>düştüğünü</i>	duydu.
Gazeteci, milletvekilinin	.....	gözlemledi.
Müzisyen partide	.....	eğlendi.
Çalışkan garson, aşçının	.....<i>kızdığını</i>	hatırladı.
Yetenekli modacı, mankenin	.....	unuttu.
Yüzücü, cankurtarana	.....	seslendi.
Gezgin handa	.....	konakladı.
Bitkin yarışmacı	.....<i>uzun uzun</i>	gerindi.

Korsan, prensesin	.....<i>adını</i>	öğrendi.
Güzel kadın, komşusunun	.....	anlattı.
Hoca sınıfa	.....<i>alelacele</i>	girdi.
Tecrübeli denizci	.....	dokundu.
Ressam, sevgiliyle	.....<i>gizlice</i>	haberleşti.
Cesur şerif	.....<i>azılı hayduda</i>	göz attı.
Öğretmen, velinin	.....<i>üzüldüğünü</i>	anladı.
Cerrah, araştırmacının	.....	duydu.
Futbolcu, taraftarlara	.....	baktı.
Mahkum cezaevinden	.....<i>sessizce</i>	fırar etti.

APPENDIX G: A SAMPLE BOOKLET USED IN STUDY 4.3.6

AÇIKLAMALAR

Bu kitapçıkta boşluklu cümleler yer almaktadır. Lütfen bu **cümlelerin hepsini sırayla okuyunuz** ve boş bırakılanları **en az 1 sözcük yazarak doldurunuz**. Boş bırakılan cümleleri **çok fazla düşünmeden, dilediğiniz şekilde, istediğiniz sayıda sözcük kullanarak** doldurabilirsiniz. Yeter ki bu cümleler, günlük hayatınızda kullanabileceğiniz cümleler olsun. Bazı cümlelerdeki boşluklar hali hazırda tamamlanmıştır. Bu cümleleri **sadece okuyunuz**, ayrıca bir sözcük eklemeyiniz. Lütfen, başlamadan bir sonraki sayfada yer alan genel soruları yanıtlayınız. Çalışmamıza katıldığınız için çok teşekkür ederiz! ☺

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğünüz yabancı diller var mı?

Varsa hangi düzeyde?

Satıcı, hırsızın	.....<i>şaşırdığını</i>	anlattı.
Tercüman, konuşmacının	.....	hatırladı.
Sevimli nine	.....	tutundu.
Hoca sınıfa	.....	girdi.
Şair kasabada	.....<i>yapayalnız</i>	öldü.
Şoför, yolcunun	.....<i>yorulduğunu</i>	gözlemledi.
Sunucu, kameramanın	.....	öğrendi.
Müzişyen partide	.....<i>oldukça</i>	eğlendi.
Falcı köyde	.....<i>beş yıl</i>	yaşadı.
Bakkal, ırağıyla	.....	karşılaştı.
Başkan binadan	.....<i>hızla</i>	uzaklaştı.
Muhasebeci, avukatın	.....<i>yazısını</i>	unuttu.
Fotoğrafçı, oyuncunun	.....	anladı.
Şarkıcı, besteciyle	.....<i>nihayet</i>	anlaştı.
Kibar beyefendi	.....	hapşırđı.
Dede, yaramaz torununun	.....<i>düştüğünü</i>	duydu.
Gazeteci, milletvekilinin	.....	gözlemledi.
Şövalye zindandan	.....<i>zar zor</i>	kurtuldu.
Güçlü ordu	.....	rastladı.
Dalgıç denize	.....	daldı.

Dikkatli mühendis, mimarın	.....<i>yanılgısını</i>	hatırladı.
Manav, becerikli kasabın	.....	unuttu.
Tezgahtar, kasiyerle	.....	tartıştı.
Cesur şerif	.....<i>azılı hayduda</i>	göz attı.
Baba, oğluna	.....	güçendi.
Müdür, valinin	.....<i>gittiğini</i>	öğrendi.
Muslukçu, elektrikçinin	.....	anlattı.
Sabırsız patron	.....	bağırды.
Küçük çocuk	.....<i>epey</i>	acıktı.
Ressam, sevgilisiyle	.....<i>gizlice</i>	haberleşti.
Öğretmen, velinin	.....<i>üzüldüğünü</i>	anladı.
Cerrah, araştırmacının	.....	duydu.
Yazar istasyona	.....	vardı.
Yüzücü, cankurtarana	.....	seslendi.
Ünlü aktör	.....<i>bir anda</i>	değişti.
Bankacı, arkadaşının	.....<i>gezisini</i>	anlattı.
Ev sahibi, misafirin	.....	hatırladı.
Muhabir ofise	.....<i>şöyle bir</i>	uğradı.
Bitkin yarışmacı	.....	gerindi.
Sporcu, rakibiyle	.....	yarıştı.

Rahip manastırdan	.....<i>koşar adım</i>	çıktı.
Profesör, genç asistanın	.....<i>başarısını</i>	gözlemledi.
Çiçekçi, berberin	.....	öğrendi.
Elçi saraydan	.....	atıldı.
Tecrübeli denizci	.....<i>dümenine hafifçe</i>	dokundu.
Kral, karısının	.....<i>yaşlandığını</i>	unuttu.
Dolandırıcı, emektar polisin	.....	anladı.
Asker, ailesiyle	.....	helalleşti.
Gezgin handa	.....<i>üç gece</i>	konakladı.
Hemşire, hastaya	.....	gülümsedi.
Yaşlı hanım	.....<i>biraz</i>	üşüdü.
Öğrenci okuldan	.....<i>arkadaşlarıyla birlikte</i>	kaçtı.
Doktor, meslektaşının	.....<i>sorusunu</i>	duydu.
Emlakçı, kiracının	.....	gözlemledi.
Kız, ağabeyine	.....	bağlandı.
Çalışkan garson, aşçının	.....<i>kızdığını</i>	hatırladı.
Yetenekli modacı, mankenin	.....	unuttu.
Ajan havaalanına	.....	ulaştı.
Sanatçı yalıda	.....	büyüdü.
Pilot otele	.....<i>kısa süreliğine</i>	yerleşti.

Korsan, prensesin	.....<i>dileđini</i>	öđrendi.
Güzel kadın, komşusunun	.....	anlattı.
Uykulu bekçi	.....<i>usulca</i>	esnedi.
Bakan, danışmanına	.....	inandı.
Yorgun adam	.....<i>tüm dostlarına</i>	küstü.
Ziyaretçi odada	.....<i>on dakika</i>	oturdu.
Marangoz, bahçıvanın	.....<i>isteđini</i>	anladı.
Yaya, sürücünün	.....	duydu.
Mahkum cezaevinden	.....	fırar etti.
Futbolcu, taraftarlara	.....<i>sevgiyle</i>	baktı.

APPENDIX H: A SAMPLE BOOKLET USED IN STUDY 4.3.7

AÇIKLAMALAR

Bu kitapçıkta boşluklu cümleler yer almaktadır. Lütfen bu **cümlelerin hepsini sırayla okuyunuz** ve boş bırakılanları **en az 1 sözcük yazarak doldurunuz**. Boş bırakılan cümleleri **çok fazla düşünmeden, dilediğiniz şekilde, istediğiniz sayıda sözcük kullanarak** doldurabilirsiniz. Yeter ki bu cümleler, günlük hayatınızda kullanabileceğiniz cümleler olsun. Bazı cümlelerdeki boşluklar hali hazırda tamamlanmıştır. Bu cümleleri **sadece okuyunuz**, ayrıca bir sözcük eklemeyiniz. Lütfen, başlamadan bir sonraki sayfada yer alan genel soruları yanıtlayınız. Çalışmamıza katıldığınız için çok teşekkür ederiz! ☺

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğunuz yabancı diller var mı?

Varsa hangi düzeyde?

Bankacı, arkadaşının	.....<i>gezisini</i>	anlattı.
Ev sahibi, misafirin	.....	hatırladı.
Uykulu bekçi	.....	esnedi.
Bakkal, çırağıyla	.....	karşılaştı.
Ziyaretçi odada	.....<i>on dakika</i>	oturdu.
Profesör, genç asistanın	.....<i>başarısını</i>	gözlemledi.
Çiçekçi, berberin	.....	öğrendi.
Sevimli nine	.....<i>kapıya sıkıca</i>	tutundu.
Öğrenci okuldan	.....<i>arkadaşlarıyla birlikte</i>	kaçtı.
Şarkıcı, besteciyle	.....	anlaştı.
Sabırsız patron	.....<i>yanında çalışanlara</i>	bağırdı.
Kral, karısının	.....<i>gülüşünü</i>	unuttu.
Dolandırıcı, emektar polisin	.....	anladı.
Ajan havaalanına	.....<i>son anda</i>	ulaştı.
Sanatçı yalıda	.....	büyüdü.
Doktor, meslektaşının	.....<i>sorusunu</i>	duydu.
Emlakçı, kiracının	.....	gözlemledi.
Başkan binadan	.....<i>hızla</i>	uzaklaştı.
Rahip manastırdan	.....	çıktı.
Tezgahtar, kasiyerle	.....	tartıştı.

Çalışkan garson, aşçının	.....<i>ayrılışını</i>	hatırladı.
Yetenekli modacı, mankenin	.....	unuttu.
Kız, ağabeyine	.....	bağlandı.
Yazar istasyona	.....<i>tam zamanında</i>	vardı.
Hemşire, hastaya	.....	gülümsedi.
Korsan, prensesin	.....<i>dileğini</i>	öğrendi.
Güzel kadın, komşusunun	.....	anlattı.
Mahkum cezaevinden	.....	fırar etti.
Yüzücü, cankurtarana	.....<i>var gücüyle</i>	seslendi.
Güçlü ordu	.....<i>düşman birliklerine</i>	rastladı.
Marangoz, bahçıvanın	.....<i>isteğini</i>	anladı.
Yaya, sürücünün	.....	duydu.
Şair kasabada	.....	öldü.
Asker, ailesiyle	.....	helalleşti.
Yaşlı hanım	.....<i>biraz</i>	üşüdü.
Satıcı, hırsızın	.....<i>kaçışını</i>	anlattı.
Tercüman, konuşmacının	.....	hatırladı.
Şövalye zindandan	.....<i>zar zor</i>	kurtuldu.
Kibar beyefendi	.....	hapşırıldı.
Elçi saraydan	.....	atıldı.

Falci köyde	.....<i>beş yıl</i>	yaşadı.
Şoför, yolcunun	.....<i>uyuyuşunu</i>	gözlemledi.
Sunucu, kameramanın	.....	öğrendi.
Futbolcu, taraftarlara	.....	baktı.
Müzişyen partide	.....<i>oldukça</i>	eğlendi.
Muhasabeci, avukatın	.....<i>yazısını</i>	unuttu.
Fotoğrafçı, oyuncunun	.....	anladı.
Bitkin yarışmacı	.....	gerindi.
Ünlü aktör	.....<i>bir anda</i>	değişti.
Ressam, sevgilişyle	.....	haberleşti.
Dalgıç denize	.....<i>çivileme</i>	daldı.
Hoca sınıfa	.....<i>alelacele</i>	girdi.
Dede, yaramaz torununun	.....<i>bağırışını</i>	duydu.
Gazeteci, milletvekilinin	.....	gözlemledi.
Baba, oğluna	.....	gücendi.
Dikkatli mühendis, mimarın	.....<i>yanılgısını</i>	hatırladı.
Manav, becerikli kasabın	.....	unuttu.
Muhabir ofise	.....	uğradı.
Cesur şerif	.....	göz attı.
Bakan, danışmanına	.....<i>yürekten</i>	inandı.

Müdür, valinin	.....<i>gelişini</i>	öğrendi.
Muslukçu, elektrikçinin	.....	anlattı.
Pilot otele	.....<i>kısa süreliğine</i>	yerleşti.
Yorgun adam	.....	küstü.
Tecrübeli denizci	.....<i>dümen</i> hafifçe.....	dokundu.
Sporcu, rakibiyle	.....<i>kıran kırana</i>	yarıştı.
Öğretmen, velinin	.....<i>yalvarışını</i>	anladı.
Cerrah, araştırmacının	.....	duydu.
Gezgin handa	.....	konakladı.
Küçük çocuk	.....<i>epey</i>	acıktı.

APPENDIX I: A SAMPLE BOOKLET USED IN STUDY 4.3.8

AÇIKLAMALAR

Bu kitapçıkta boşluklu cümleler yer almaktadır. Lütfen bu **cümlelerin hepsini sırayla okuyunuz** ve boş bırakılanları **en az 1 sözcük yazarak doldurunuz**. Boş bırakılan cümleleri **çok fazla düşünmeden, dilediğiniz şekilde, istediğiniz sayıda sözcük kullanarak** doldurabilirsiniz. Yeter ki bu cümleler, günlük hayatınızda kullanabileceğiniz cümleler olsun. Bazı cümlelerdeki boşluklar hali hazırda tamamlanmıştır. Bu cümleleri **sadece okuyunuz**, ayrıca bir sözcük eklemeyiniz. Lütfen, başlamadan bir sonraki sayfada yer alan genel soruları yanıtlayınız. Çalışmamıza katıldığınız için çok teşekkür ederiz! ☺

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğünüz yabancı diller var mı?

Varsa hangi düzeyde?

Satıcı, hırsızın	.....<i>kaçışını</i>	anlattı.
Tercüman, konuşmacının	.....	hatırladı.
Ziyaretçi odada	.....	oturdu.
Mahkum cezaevinden	.....	fırar etti.
Sabırsız patron	.....<i>yanında çalışanlara</i>	bağırды.
Profesör, genç asistanın	.....<i>çekindiğini</i>	gözlemledi.
Çiçekçi, berberin	.....	öğrendi.
Küçük çocuk	.....<i>epey</i>	acıktı.
Kız, ağabeyine	.....<i>zaman içinde</i>	bağlandı.
Şövalye zindandan	.....	kurtuldu.
Gezgin handa	.....<i>üç gece</i>	konakladı.
Kral, karısının	.....<i>gülüşünü</i>	unuttu.
Dolandırıcı, emektar polisin	.....	anladı.
Yorgun adam	.....<i>tüm dostlarına</i>	küstü.
Bitkin yarışmacı	.....	gerindi.
Dede, yaramaz torununun	.....<i>bağırışını</i>	duydu.
Gazeteci, milletvekilinin	.....	gözlemledi.
Asker, ailesiyle	.....<i>son kez</i>	helalleşti.
Sevimli nine	.....	tutundu.
Başkan binadan	.....	uzaklaştı.

Dikkatli mühendis, mimarın	.....<i>kızdığını</i>	hatırladı.
Manav, becerikli kasabın	.....	unuttu.
Bakkal, çırağıyla	.....	karşılaştı.
Öğrenci okuldan	.....<i>arkadaşlarıyla birlikte</i>	kaçtı.
Baba, oğluna	.....	güçlendi.
Müdür, valinin	.....<i>gelişini</i>	öğrendi.
Muslukçu, elektrikçinin	.....	anlattı.
Sanatçı yalıda	.....	büyüdü.
Müzisyen partide	.....<i>oldukça</i>	eğlendi.
Dalgıç denize	.....<i>çivileme</i>	daldı.
Öğretmen, velinin	.....<i>yalvarışını</i>	anladı.
Cerrah, araştırmacının	.....	duydu.
Muhabir ofise	.....	uğradı.
Şarkıcı, besteciyle	.....	anlaştı.
Tezgahtar, kasiyerle	.....<i>ulu orta</i>	tartıştı.
Bankacı, arkadaşının	.....<i>şaşırdığını</i>	anlattı.
Ev sahibi, misafirin	.....	hatırladı.
Rahip manastırdan	.....<i>koşar adım</i>	çıktı.
Elçi saraydan	.....	atıldı.
Hemşire, hastaya	.....	gülümsedi.

Sporcu, rakibiyle	.....<i>kıran kırana</i>	yarıştı.
Şoför, yolcunun	.....<i>uyuyuşunu</i>	gözlemledi.
Sunucu, kameramanın	.....	öğrendi.
Tecrübeli denizci	.....	dokundu.
Hoca sınıfa	.....<i>alelacele</i>	girdi.
Muhasabeci, avukatın	.....<i>çalıştığını</i>	unuttu.
Fotoğrafçı, oyuncunun	.....	anladı.
Ressam, sevgiliyle	.....	haberleşti.
Kibar beyefendi	.....<i>aniden</i>	hapşırıldı.
Güçlü ordu	.....	rastladı.
Uykulu bekçi	.....<i>usulca</i>	esnedi.
Yazar istasyona	.....<i>tam zamanında</i>	vardı.
Doktor, meslektaşının	.....<i>gittiğini</i>	duydu.
Emlakçı, kiracının	.....	gözlemledi.
Futbolcu, taraftarlara	.....	baktı.
Çalışkan garson, aşçının	.....<i>ayrılışını</i>	hatırladı.
Yetenekli modacı, mankenin	.....	unuttu.
Ünlü aktör	.....	değişti.
Yüzücü, cankurtarana	.....	seslendi.
Cesur şerif	.....<i>azılı hayduda</i>	göz attı.

Korsan, prensesin	.....<i>üzüldüğünü</i>	öğrendi.
Güzel kadın, komşusunun	.....	anlattı.
Yaşlı hanım	.....<i>biraz</i>	üşüdü.
Pilot otele	.....	yerleşti.
Falcı köyde	.....<i>beş yıl</i>	yaşadı.
Bakan, danışmanına	.....<i>yürekten</i>	inandı.
Marangoz, bahçıvanın	.....<i>yorulduğunu</i>	anladı.
Yaya, sürücünün	.....	duydu.
Ajan havaalanına	.....	ulaştı.
Şair kasabada	.....<i>yapayalnız</i>	öldü.

APPENDIX J: A SAMPLE BOOKLET USED IN STUDY 4.3.11

AÇIKLAMALAR

Bu kitapçıkta boşluklu cümleler yer almaktadır. Lütfen bu **cümlelerin hepsini sırayla okuyunuz** ve boş bırakılanları **en az 1 sözcük yazarak doldurunuz**. Boş bırakılan cümleleri **çok fazla düşünmeden, dilediğiniz şekilde, istediğiniz sayıda sözcük kullanarak** doldurabilirsiniz. Yeter ki bu cümleler, günlük hayatınızda kullanabileceğiniz cümleler olsun. Bazı cümlelerdeki boşluklar hali hazırda tamamlanmıştır. Bu cümleleri **sadece okuyunuz**, ayrıca bir sözcük eklemeyiniz. Lütfen, başlamadan bir sonraki sayfada yer alan genel soruları yanıtlayınız. Çalışmamıza katıldığınız için çok teşekkür ederiz! ☺

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğunuz yabancı diller var mı?

Varsa hangi düzeyde?

Dikkatli mühendis, mimarın	<i>sözünü</i>	hatırlıyor.
Manav, becerikli kasabın	.....	unutuyor.
Ziyaretçi odada	<i>on dakika</i>	oturdu.
Yazar istasyona	.....	vardı.
Tecrübeli denizci	.....	dokunuyor.
Müzişyen partide	<i>oldukça</i>	eğleniyor.
Muhasebeci, avukatın	<i>belgesini</i>	unuttu.
Fotoğrafçı, oyuncunun	.....	anladı.
Şarkıcı, besteciyle	<i>nihayet</i>	anlaşıyor.
Sporcu, rakibiyle	.....	yarışıyor.
Kral, karısının	<i>yaşlandığını</i>	unutuyor.
Dolandırıcı, emektar polisin	.....	anlıyor.
Şövalye zindandan	<i>zar zor</i>	kurtulmuş.
Yorgun adam	.....	küsmüş.
Bakkal, çırağıyla	.....	karşılaştı.
Şoför, yolcunun	<i>yorulduğunu</i>	gözlemlemiş.
Sunucu, kameramanın	.....	öğrenmiş.
Başkan binadan	<i>hızla</i>	uzaklaşıyor.
Güçlü ordu	.....	rastlıyor.
Bitkin yarışmacı	<i>uzun uzun</i>	gerindi.
Çalışkan garson, aşçının	<i>kızdığını</i>	hatırlıyor.
Yetenekli modacı, mankenin	.....	unutuyor.
Ajan havaalanına	<i>son anda</i>	ulaştı.
Elçi saraydan	.....	atıldı.
Sanatçı yalıda	.....	büyümüş.

Hemşire, hastaya	<i>şefkatle</i>	gülümsüyor.
Müdür, valinin	<i>gittiğini</i>	öğrendi.
Muslukçu, elektrikçinin	.....	anlattı.
Dalgıç denize	<i>çivileme</i>	dalıyor.
Yaşlı hanım	.....	üşüyor.
Bankacı, arkadaşının	<i>macerasını</i>	anlatıyor.
Ev sahibi, misafirin	.....	hatırlıyor.
Mahkum cezaevinden	<i>sessizce</i>	fırlar edecek.
Pilot otele	.....	yerleşecek.
Baba, oğluna	.....	güçlendi.
Korsan, prensesin	<i>adını</i>	öğrenecek.
Güzel kadın, komşusunun	.....	anlatacak.
Öğrenci okuldan	<i>arkadaşlarıyla birlikte</i>	kaçıyor.
Sevimli nine	.....	tutunuyor.
Küçük çocuk	<i>epey</i>	acıkmış.
Profesör, genç asistanın	<i>yöntemini</i>	gözlemliyor.
Çiçekçi, berberin	.....	öğreniyor.
Şair kasabada	<i>yapayalnız</i>	öldü.
Kibar beyefendi	.....	hapşırıldı.
Futbolcu, taraftarlara	.....	bakıyor.
Yüzücü, cankurtarana	<i>var gücüyle</i>	sesleniyor.
Dede, yaramaz torununun	<i>düştüğünü</i>	duydu.
Gazeteci, milletvekilinin	.....	gözlemledi.
Sabırsız patron	<i>yanında çalışanlara</i>	bağırıyor.
Kız, ağabeyine	.....	bağlanıyor.

Satıcı, hırsızın	<i>şaşırdığını</i>	anlatıyor.
Tercüman, konuşmacının	.....	hatırlıyor.
Ressam, sevgilisiyle	<i>gizlice</i>	haberleşir.
Bakan, danışmanına	.....	inanır.
Gezgin handa	.....	konaklayacak.
Öğretmen, velinin	<i>üzüldüğünü</i>	anlamış.
Cerrah, araştırmacının	.....	duymuş.
Rahip manastırdan	<i>koşar adım</i>	çıkıyor.
Falcı köyde	.....	yaşıyor.
Cesur şerif	<i>azılı hayduda</i>	göz attı.
Doktor, meslektaşının	<i>sesini</i>	duyuyor.
Emlakçı, kiracının	.....	gözlemliyor.
Tezgahtar, kasiyerle	<i>ulu orta</i>	tartışıyor.
Ünlü aktör	.....	değişiyor.
Muhabir ofise	.....	uğrar.
Asker, ailesiyle	<i>son kez</i>	helalleşecek.
Marangoz, bahçıvanın	<i>derdini</i>	anlar.
Yaya, sürücünün	.....	duyar.
Hoca sınıfa	<i>alelacele</i>	giriyor.
Uykulu bekçi	.....	esniyor.

APPENDIX K: INFORMED CONSENT FORM USED IN STUDIES IN SECTION 4.3

Gönüllü Katılım Formu

Bu çalışma, ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı lisansüstü öğrencisi Gözde Bahadır'ın, Yrd. Doç. Dr. Annette Hohenberger danışmanlığında ve Prof. Dr. Deniz Zeyrek eş-danışmanlığında yürütmekte olduğu doktora tezi araştırmaları kapsamında yer almaktadır. Çalışmanın genel amacı, anadili Türkçe olan yetişkin bireylerin kurdukları cümleleri yapısal olarak incelemektir. Bu araştırma sonucunda Türkçe'nin işlenmesi konusundaki psiko-dilbilimsel literatüre katkıda bulunmak hedeflenmektedir. Katılımcıların ekteki kitapçıkta yer alan cümleleri okuyup, boşluklu olanları doldurmaları ve ilk sayfada yer alan genel soruları yanıtlamaları beklenmektedir. Bu işlemlerin yaklaşık 15-20 dakika süreceği tahmin edilmektedir. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Soru ve cümleler, genel olarak kişisel rahatsızlık verecek unsurları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakmakta serbestsiniz. Böyle bir durumda kitapçığı dağıtan kişiye, formu tamamlamadığınızı belirtmek yeterli olacaktır. Katılımınız sonrasında, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Gözde Bahadır (Adres: ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı, 06531, Çankaya, Ankara; Tel: 0532 508 61 71; E-posta: gozdebahadir@yahoo.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesebileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya iletiniz).

İsim Soyad

Tarih

İmza

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APPENDIX L: A SAMPLE BOOKLET USED IN STUDY 4.4

AÇIKLAMALAR

Bu kitapçıkta birbirinden bağımsız, boşluklu cümleler yer almaktadır. Her bir cümlenin fiili (eylemi) parantez içerisinde master halde verilmiştir. Örneğin:

Güvenlik görevlisi duruma (müdahale etmek)

Lütfen her bir cümledeki boşluğu, parantez içerisinde verilen fiili bir sonraki sayfadaki tabloda belirtilen zamanlardan uygun bulduğunuz herhangi birinde çekerek, bir başka deyişle tabloda verilen eklerden istediğiniz her hangi birini uygun biçimde kullanarak doldurunuz.

Şimdiki zaman	-iyor
Görülen geçmiş zaman	-di
Öğrenilen geçmiş zaman	-miş
Gelecek zaman	-ecek
Geniş zaman	-er

Örneğin:

Güvenlik görevlisi duruma (müdahale etmek) ...*müdahale etti*.....

veya

Güvenlik görevlisi duruma (müdahale etmek) ...*müdahale ediyor*.....

gibi.

Fiilleri, çok fazla düşünmeden, yukarıda belirtilen 5 zamandan dilediğiniz her hangi biriyle, istediğiniz şekilde çekebilirsiniz. Yeter ki tamamlanan cümleler, kulağınıza düzgün gelen ve günlük hayatınızda kullanabileceğiniz cümleler olsun.

Lütfen belirtilen zamanlar dışında farklı zamanlar (örneğin, *müdahale edecekti*) veya farklı kipler (örneğin, *müdahale edebilmiş*) kullanmayınız; olumsuzluk eki gibi farklı ekler getirmeyiniz (örneğin, *müdahale etmiyor*).

Bütün cümleleri aynı ekle çekmeniz ya da belirtilen 5 zamanın hepsini kullanmanız zorunlu değildir.

Lütfen boşluklara çektiğiniz fiil dışında fazladan herhangi bir sözcük eklemeyiniz.

Cümlelerin hepsini sırayla okuyup, hiçbirini atlamadan tamamlayınız.

Lütfen, cümleler bittikten sonra, kitapçığın son sayfasında yer alan **genel soruları** yanıtlayınız.

Çalışmamıza katıldığınız için çok teşekkür ederiz! 😊

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğünüz yabancı diller var mı?

Varsa hangi düzeyde?

Çalışmamıza katıldığınız için tekrar çok teşekkür ederiz! 😊

Priming Group

- Cesur şerif azılı hayduda (göz atmak)
- Yazar istasyona tam zamanında (varmak)
- Ziyaretçi odada on dakika (oturmak)
- Şoför, yolcunun yorulduğunu (gözlemlemek)
- Sunucu, kameramanın bayıldığını (öğrenmek)
-
- Ajan havaalanına son anda (ulaşmak)
- Şarkıcı, besteciyle nihayet (anlaşmak)
- Korsan, prensesin adını (öğrenmek)
- Güzel kadın, komşusun sırrını (anlatmak)
- Pilot otele kısa süreliğine (yerleşmek)
-
- Çalışkan garson, aşçının kızdığını (hatırlamak)
- Yetenekli modacı, mankenin zayıfladığını (unutmak)
- Falcı köyde beş yıl (yaşamak)
- Gezgin handa üç gece (konaklamak)
- Elçi saraydan dışarı (atılmak)
-
- Bitkin yarışmacı uzun uzun (gerinmek)
- Marangoz, bahçıvanın derdini (anlamak)
- Yaya, sürücünün kornasını (duymak)
- Bakkal, çırağıyla aylar sonra (karşılaşmak)
- Müzisyen partide oldukça (eğlenmek)

- Küçük çocuk epey (acıkmak)
- Tecrübeli denizci dümene hafifçe (dokunmak)
- Kibar beyefendi aniden (hapşırarak)
- Kral, karısının yaşlandığını (unutmak)
- Dolandırıcı, emektar polisin baktığını (anlamak)
- Hemşire, hastaya şefkatle (gülümsemek)
- Doktor, meslektaşının sesini (duymak)
- Emlakçı, kiracının evini (gözlemlemek)
- Yorgun adam tüm dostlarına (küsmek)
- Bakan, danışmanına yürekten (inanmak)
- Muhabir ofise şöyle bir (uğramak)
- Baba, oğluna çok (gücenmek)
- Satıcı, hırsızın şaşırdığını (anlatmak)
- Tercüman, konuşmacının ağladığını (hatırlamak)
- Mahkûm cezaevinden sessizce (fırar etmek)
- Profesör, genç asistanın yöntemini (gözlemlemek)
- Çiçekçi, berberin maksadını (öğrenmek)
- Tezgâhtar, kasiyerle ulu orta (tartışmak)
- Futbolcu, taraftarlara sevgiyle (bakmak)
- Uykulu bekçi tembelce (esnemek)
- Ressam, sevgilisiyle gizlice (haberleşmek)
- Yüzücü, cankurtarana var gücüyle (seslenmek)
- Müdür, valinin gittiğini (öğrenmek)

- Muslukçu, elektrikçinin korktuğunu (anlatmak)
- Ünlü aktör son günlerde (değişmek)
- Dalgıç denize çivileme (dalmak)
- Dikkatli mühendis, mimarın sözünü (hatırlamak)
- Manav, becerikli kasabın hünerini (unutmak)
- Sabırsız patron yanında çalışanlara (bağırarak)
- Hoca sınıfa alelacele (girmek)
- Öğretmen, velinin üzülmesini (anlamak)
- Cerrah, araştırmacının kaybolduğunu (duymak)
- Güçlü ordu düşman birliklerine (rastlamak)
- Öğrenci okuldan arkadaşlarıyla birlikte (kaçmak)
- Sevimli nine kapıya sıkıca (tutunmak)
- Kız, ağabeyine zaman içinde (bağlanmak)
- Şair kasabada yapayalnız (ölmek)
- Rahip manastırdan koşar adım (çıkarmak)
- Muhasebeci, avukatın belgesini (unutmak)
- Fotoğrafçı, oyuncunun hilesini (anlamak)
- Başkan binadan hızla (uzaklaşmak)
- Sporcu, rakibiyle kıran kırana (yarışmak)
- Dede, yaramaz torununun düştüğünü (duymak)
- Gazeteci, milletvekilinin zorlandığını (gözlemlemek)
- Şövalye zindandan zar zor (kurtulmak)

Sanatçı yalıda kardeşleriyle (büyüme)
Asker, ailesiyle son kez (helalleşme)
Yaşlı hanım birden (üşüme)
Bankacı, arkadaşının macerasını (anlatma)
Ev sahibi, misafirin gafını (hatırlama)

Non-Priming Group

Cesur şerif azılı hayduda (göz atma)
Yazar istasyona tam zamanında (varma)
Ziyaretçi odada on dakika (oturma)
Şoför, yolcunun yorulduğunu (gözlemleme)
Sunucu, kameramanın yalanını (öğrenme)

Ajan havaalanına son anda (ulaşma)
Şarkıcı, besteciyle nihayet (anlaşma)
Korsan, prensesin adını (öğrenme)
Güzel kadın, komşusun sıkıldığını (anlatma)
Pilot otele kısa süreliğine (yerleşme)

Çalışkan garson, aşçının kızdığını (hatırlama)
Yetenekli modacı, mankenin kıyafetini (unutma)
Falcı köyde beş yıl (yaşama)
Gezgin handa üç gece (konaklama)
Elçi saraydan dışarı (atılma)

Bitkin yarışmacı uzun uzun (gerinmek)	
Marangoz, bahçıvanın derdini (anlamak)	
Yaya, sürücünün bağırdığını (duymak)	
Bakkal, چراغıyla aylar sonra (karşılaşmak)	
Müzisyen partide oldukça (eğlenmek)	
Küçük çocuk epey (acıkmak)	
Tecrübeli denizci dümene hafifçe (dokunmak)	
Kibar beyefendi aniden (hapşirmek)	
Kral, karısının yaşlandığını (unutmak)	
Dolandırıcı, emektar polisin tecrübesini (anlamak)	
Hemşire, hastaya şefkatle (gülümsemek)	
Doktor, meslektaşının sesini (duymak)	
Emlakçı, kiracının terlediğini (gözlemlemek)	
Yorgun adam tüm dostlarına (küsmek)	
Bakan, danışmanına yürekten (inanmak)	
Muhabir ofise şöyle bir (uğramak)	
Baba, oğluna çok (gücenmek)	
Satıcı, hırsızın şaşırdığını (anlatmak)	
Tercüman, konuşmacının heyecanını (hatırlamak)	
Mahkûm cezaevinden sessizce (fırar etmek)	
Profesör, genç asistanın yöntemini (gözlemlemek)	
Çiçekçi, berberin ayrıldığını (öğrenmek)	

Tezgâhtar, kasiyerle ulu orta (tartışmak)	
Futbolcu, taraftarlara sevgiyle (bakmak)	
Uykulu bekçi tembelce (esnemek)	
Ressam, sevgilisiyle gizlice (haberleşmek)	
Yüzücü, cankurtarana var gücüyle (seslenmek)	
Müdür, valinin gittiğini (öğrenmek)	
Muslukçu, elektrikçinin öyküsünü (anlatmak)	
Ünlü aktör son günlerde (değişmek)	
Dalgıç denize çivileme (dalmak)	
Dikkatli mühendis, mimarın sözünü (hatırlamak)	
Manav, becerikli kasabın öldüğünü (unutmak)	
Sabırsız patron yanında çalışanlara (bağırarak)	
Hoca sınıfa alelacele (girmek)	
Öğretmen, velinin üzüldüğünü (anlamak)	
Cerrah, araştırmacının niyetini (duymak)	
Güçlü ordu düşman birliklerine (rastlamak)	
Öğrenci okuldan arkadaşlarıyla birlikte (kaçmak)	
Sevimli nine kapıya sıkıca (tutunmak)	
Kız, ağabeyine zaman içinde (bağlanmak)	
Şair kasabada yapayalnız (ölmek)	
Rahip manastırdan koşar adım (çıkılmak)	
Muhasebeci, avukatın belgesini (unutmak)	
Fotoğrafçı, oyuncunun saklandığını (anlamak)	

- Başkan binadan hızla (uzaklaşmak)
- Sporcu, rakibiyle kıran kırana (yarışmak)
- Dede, yaramaz torununun düştüğünü (duymak)
- Gazeteci, milletvekilinin ilgisini (gözlemlemek)
- Şövalye zindandan zar zor (kurtulmak)
-
- Sanatçı yalıda kardeşleriyle (büyümek)
- Asker, ailesiyle son kez (helalleşmek)
- Yaşlı hanım birden (üşümek)
- Bankacı, arkadaşının macerasını (anlatmak)
- Ev sahibi, misafirin kaldığını (hatırlamak)

APPENDIX M: INFORMED CONSENT FORM USED IN STUDY 4.4

Gönüllü Katılım Formu

Bu çalışma, ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı lisansüstü öğrencisi Gözde Bahadır'ın, Yrd. Doç. Dr. Annette Hohenberger danışmanlığında ve Prof. Dr. Deniz Zeyrek eş-danışmanlığında yürütmekte olduğu doktora tezi araştırmaları kapsamında yer almaktadır. Çalışmanın genel amacı, anadili Türkçe olan yetişkin bireylerin kurdukları cümleleri yapısal olarak incelemektir. Bu araştırma sonucunda Türkçe'nin işlenmesi konusundaki psiko-dilbilimsel literatüre katkıda bulunmak hedeflenmektedir. Katılımcıların ekteki kitapçıkta yer alan boşluklu cümleleri okuyup, cümledeki boşluğu, kitapçığın açıklamalar kısmında belirtilen zamanlardan uygun buldukları her hangi birinde çekerek tamamlamaları ve son sayfada yer alan genel soruları yanıtlamaları beklenmektedir. Bu işlemlerin en fazla 15-20 dakika süreceği tahmin edilmektedir. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Soru ve cümleler, genel olarak kişisel rahatsızlık verecek unsurları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakmakta serbestsiniz. Böyle bir durumda kitapçığı dağıtan kişiye, formu tamamlamadığınızı belirtmek yeterli olacaktır. Katılımınız sonrasında, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Gözde Bahadır (Adres: ODTÜ Enformatik Enstitüsü, A Blok Z10, 06531, Çankaya, Ankara; Tel: 0532 508 61 71; E-posta: gozdebahadir@yahoo.com) ile iletişim kurabilirsiniz.

Bu çalıřmaya tamamen gönüllü olarak katılıyorum ve istediđim zaman yarıda kesebileceđimi biliyorum. Verdiđim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya iletiniz).

İsim Soyad

Tarih

İmza

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APPENDIX N: FULL STIMULUS SET USED IN CHAPTERS 5 AND 6

SAME MATRIX VERB CONDITION

Trial	Fillers added in Eye-Tracking Experiment
1 Yavru kedi bütün gün uyumuş.	
2 Dışarıda kuş cıvıltıları yankılanıyor.	
3 Otobüs şehir içi yolda yavaşlar.	Sabahları caddeler boş oluyor.
Otobüs şehirlerarası yolda mı yavaşlar?	E H H
<u>SETA</u>	
GrupAa	
1 Şarkıcı, besteciyle nihayet anlaşmış.	
2 Şövalye zindandan zar zor kurtulur.	Postacı, kapıcıyla her gün tartışıyor.
Şövalye zindandan mı zar zor kurtulur?	E H E
3 Oyuncakçı, palyaçolara ,ilgiyle bakıyor.	
4 İtfaiyeci, jandarmanın cevabını unutmuş.	
Kral, karısının suratını unutmuş.	
GrupAb	
1 Ünlü aktör son günlerde değişmiş.	
Ünlü aktör son günlerde değişmiş mi?	E H E
2 Ziyaretçi odada on dakika oturur.	Paşa, sarrafa hemen inanır.
3 Dalgıç denize çivileme atlıyor.	
4 Assolist, yardımcısının vedasını hatırlıyor.	
Muavin, hemşehrisinin kızdığını hatırlıyor.	

GrupAc

- 1 Yorgun adam tüm dostlarına küser.
- 2 Sporcu, rakibiyle kıran kırana yarışıyor. Terzi ilçede uzun yıllar yaşar.
Sporcu, koçuyla mı kıran kırana yarışır? E H H
- 3 Elçi saraydan dışarı atılmış.
- 4 **Damat, akrabasının kaçtığıını anlatır.**
Çiçekçi, berberin battığını anlatır.

GrupAd

- 1 Sanatı yalıda kardeşleriyle büyümüş.
- 2 Uykulu bekçi tembelce esniyor.
- 3 Kız, ağabeyine zaman içinde bağlanır.
Kız, ablasına mı zaman içinde bağlanır? E H H
- 4 **Muhasebeci, avukatın sustuğunu gözlemliyor.** İhtiyar çiftçi aniden üşümüş.
Cerrah, araştırmacının çabasını gözlemliyor.

SETB

GrupBa

- 1 Ajan havaalanına son anda ulaşır. Oduncu kulübeye bir süreliğine yerleşiyor.
Ajan havaalanına erken mi ulaşır? E H H
- 2 Güçlü ordu, düşman birliklerine rastlamış.
- 3 Öğrenci okuldan, arkadaşlarıyla birlikte kaçıyor.
- 4 **Şoför, yolcunun ricasını hatırlıyor.**
Kovboy, şerifin imasını hatırlıyor.

GrupBb

- 1 Asker, ailesiyle son kez helalleşir.
- 2 Baba, oğlunda çok gücenmiş.
Baba, oğluna mı çok gücenmiş? E H E
- 3 Gezgin handa üç gece konaklıyor. Çeşnicibaşı yemeğe şüpheyle dokunur.
- 4 **Padişah, vezirinin sorununu öğrenir.**
Muhtar, köylünün bezdiğini öğrenir.

GrupBc

- 1 Yaşlı hanım birden üşür.
- 2 Muhabir ofise şöyle bir uğramış.
- 3 Sinirli patron yanında çalışanlara bağıyor. Matador arenadan koşar adım kaçmış.
Sinirli patron mu yanında çalışanlara bağıyor? E H E
- 4 **Korsan, prensesin korktuğunu anlıyor.**
Teknisyen, stajyerin kandiğini anlıyor.
GrupBd
- 1 Madenci ocaktan güç bela kurtulur.
- 2 Dekoratör, tasarımcıyla sonunda anlaşmış.
Dekoratör, boyacıyla mı sonunda anlaşmış? E H H
- 3 Hemşire, hastaya şefkatle gülümsüyor. Ağa, adamıyla sürekli haberleşir.
- 4 **Fizikçi, astronotun döndüğünü unutmuş.**
Öğretmen, velinin arzusunu unutmuş.
SETC
-
- GrupCa
- 1 Editör ajansta bir saat oturur. Simitçi, hamala dostça gülümsüyor.
Editör dershane mi bir saat oturur? E H H
- 2 Başarılı dansçı bu aralar değişmiş.
- 3 Çevreci suya korkusuzca atlıyor.
- 4 **Tarihçi, felsefecinin yorumunu duymuş.**
Dolandırıcı, polisin yanıtını duymuş.
GrupCb
- 1 Huysuz ihtiyar, bütün yakınlarına küser.
- 2 Soyтары salondan dışarı atılmış.
Soyтары yemekhaneden mi dışarı atılmış? E H H
- 3 Müdür, halefiyle koltuk için yarışıyor. İzci kampta iki gece konaklıyor.
- 4 **Satıcı, hırsızın cüretini anlatır.**
Emlakçı, kiracının bıkıldığını anlatır.
GrupCc
- 1 Voleybolcu, antrenörüne kısa sürede bağlanır.

2	Balıkçı adada kuzenleriyle büyümüş.				
3	Bitkin onbaşı gizlice esniyor.				Hünerli kuaför birden acikir.
	Bitkin onbaşı gizlice esniyor mu?	E	H	E	
4	Dedektif, kumarbazın daldığını gözlemliyor.				
	Teyze, misafirin doyduğunu gözlemliyor.				
	GrupCd				
1	Gardiyan koğuşa tam vaktinde ulaşır.				
2	Seyyar satıcı, sokak çocuklarına rastlamış.				
3	Tüccar pazardan, ortaklarıyla birlikte kaçıyor.				
	Tüccar pazardan mı ortaklarıyla birlikte kaçıyor?	E	H	E	
4	Teğmen, komutanın gittiğini hatırlıyor.				Çilingir eve tam zamanında ulaşır.
	Kaymakam, müteahhidin kaygısını hatırlıyor.				
	SETD				
<hr/>					
	GrupDa				
1	Seyyah, dostuyla son defa helalleşir.				Kibirli milyoner heyecanlı görevliye bağırıyor.
	Seyyah, dostuyla mı son defa helalleşir?	E	H	E	
2	Veznedar, dünürüne epey gücenmiş.				
3	Keşiş, tapınakta iki gün konaklıyor.				
4	Dede, yaramaz torununun oyununu öğrenir.				
	Astrolog, medyumun hilesini öğrenir.				
	GrupDb				
1	Emekli memur aniden üşür.				
2	Mübaşir, adliyeye kısa süreliğine uğramış.				
	Mübaşir, adliyeye uzun süreliğine mi uğramış?	E	H	H	
3	Stresli nörolog, hasta bakıcılara bağırıyor.				Kaptan limandan sakince uzaklaşıyor.
4	Tercüman, konuşmacının hatasını anlıyor.				
	Doktor, meslektaşının çıktığını anlıyor.				
	GrupDc				
1	Başkan binadan hızla uzaklaşır.				
2	Bakkal, چراغıyla aylar sonra karşılaşmış.				

3	Kont, düşese çapkınca gülümsüyor.				Samuray, ikiziyle seneler sonra karşılaşmış.
	Kont, düşese mi çapkınca gülümsüyor?	E	H	E	
4	Hizmetçi, uşağın yattığını unutmuş.				
	Savcı, tanığın tüydüğünü unutmuş.				
	GrupDd				
1	Falci köyde beş yıl yaşar.				
2	Küçük çocuk epey acıkmış.				
	Genç anne mi epey acıkmış?	E	H	H	
3	Pilot otele kısa süreliğine yerleşiyor.				Tiyatrocu, hayranına hayretle bakıyor.
4	Yaya, sürücünün kalktığını duymuş.				
	Kondüktör, makinistin düdüğünü duymuş.				
	SETE				
<hr/>					
	GrupEa				
1	Tecrübeli denizci dümene hafifçe dokunur.				Davetli törende epey eğleniyor.
	Tecrübesiz denizci mi dümene hafifçe dokunur?	E	H	H	
2	Mahkûm cezaevinden ustalıkla firar etmiş.				
3	Tezgâhtar, kasiyerle ulu orta tartışıyor.				
4	Gazeteci, milletvekilinin öyküsünü anlatır.				
	Komiser, valinin maksadını anlatır.				
	GrupEb				
1	Bakan, danışmanına yürekten inanır.				
2	Şair kasabada yapayalnız ölmüş.				
	Şair kasabada mı yapayalnız ölmüş?	E	H	E	
3	Bitkin yarışmacı törenden önce geriniyor.				Emektar arabacı sessizce esniyor.
4	Garson, aşçının tarifini unutmuş.				
	Hostes, eltisinin baktığını unutmuş.				
	GrupEc				
1	Hoca sınıfa alelacele girer.				
2	Cesur barmen, azılı hayduda öfkelenmiş.				
3	Rahip manastırdan koşar adım çıkıyor.				Pizzacı restorana tam saatinde varmış.

	Rahip bahçeden mi koşar adım çıkıyor?	E	H	H	
4	Prens, büyüçünün güldüğünü hatırlıyor.				
	Bankacı, arkadaşının yüzdüğünü hatırlıyor.				
	GrupEd				
1	Usta, kalfasıyla sıkça haberleşir.				
2	Yüzücü, cankurtarana var gücüyle seslenmiş.				
3	Reklamcı partide oldukça eğleniyor.				
	Reklamcı partide mi oldukça eğleniyor?	E	H	E	
4	Subay, hâkimin öldüğünü öğrenir.				Alınan darbukacı, çalgıcı dostlarına küsmüş.
	Modacı, mankenin sırrını öğrenir.				
	SETF				
<hr/>					
	GrupFa				
1	Kibar insan sessizce hapsirir.				Konuk köşkten çok kolay kurtulmuş.
	Kibar insan gürültülü mü hapsirir?	E	H	H	
2	Yazar istasyona tam zamanında varmış.				
3	Sevimli nine kapiya sıkıca tutunuyor.				
4	Sekreter, görünmesinin niyetini anlıyor.				
	Hakem, boksörün acısını anlıyor.				
	GrupFb				
1	Katil evden hemen uzaklaşır.				
2	Derviş, neyzenle yıllar sonra karşılaşmış.				
	Derviş, neyzenle mi yıllar sonra karşılaşmış?	E	H	E	
3	Futbolcu, taraftarlara sevgiyle bakıyor.				Okçu, süvariyle rahatça anlaşır.
4	Sunucu, kameramanın hünerini gözlemliyor.				
	Profesör, asistanının yıldığını gözlemliyor.				
	GrupFc				
1	Dadı, mâlikanede yedi sene yaşar.				
2	Çalışkan taksici çok acıkmış.				
3	Kapıcı apartmana bir aylığına yerleşiyor.				Kaynana, gelinine yine güvenmiş.
	Kapıcı apartmana iki yıllığına mı yerleşiyor?	E	H	H	

4 **Manav, kasabın kaldığını duymuş.**

Marangoz, bahçivanın koştüğünü duymuş.

GrupFd

1 Çavuş kışladan serinkanlılıkla firar etmiş.

2 Ürkek kuaför makasa yavaşça dokunur.

Ürkek kuaför mü makasa yavaşça dokunur? E H E

3 Radyocu, dinleyiciyle yayın sırasında tartışıyor.

Çoban çayırdı dört saat oturmuş.

4 **Fotoğrafçı, oyuncunun düştüğünü anlatır.**

Koreograf, balerinin ödülünü anlatır.

SETG

GrupGa

1 Müsteşar, müşavirine gönülden inanır.

Yetenekli hattat zaman içinde değişiyor.

Müsteşar, müşavirine mi gönülden inanır? E H E

2 Komedyen sahnede aniden ölmüş.

3 Yorgun atlet yarıştan sonra geriniyor.

4 **Muslukçu, elektrikçinin yöntemini gözlemliyor.**

Rektör, dekanın ilgisini gözlemliyor.

GrupGb

1 Kimyacı laboratuvara hızla girer.

2 Sabırsız amir yeni çaycıya öfkelenmiş.

Asabi koruma mı yeni çaycıya öfkelenmiş? E H H

3 Psikiyatrist muayenehaneden son hız çıkıyor.

Çingene çadıra bir süreliğine uğrar.

4 **Rahibe, papazın duasını duymuş.**

Mühendis, mimarın indiğini duymuş.

GrupGc

1 Ressam, sevgilisiyle gizlice haberleşir.

2 Seyis, jokeye olanca gücüyle seslenmiş.

3 Müzisyen düğünde çok eğleniyor.

Yabancı turist, uyanık rehberle öfkelenmiş.

Müzisyen düğünde mi çok eğleniyor? E H E

4 **Kadın, komşusunun geldiğini öğrenir.**

Yeniçeri, sadrazamın vardığını öğrenir.

GrupGd

- 1 Utangaç kâtip sessizce hapşırır.
- 2 Öfkeli siyasetçi kürsüye sınıksız tutunuyor.
- 3 Başhekim kliniğe tam vaktinde varmış.

Başhekim kliniğe çok geç mi varmış?

E H H

- 4 **Piyanist, kemancının küstüğünü anlıyor.**

Kâhya çiftlikten çabucak çıkar.

Silahşor, leydinin kederini anlıyor.

DIFFERENT MATRIX VERBS CONDITION

Trial	Fillers added in the Eye-Tracking Experiment
1 Yavru kedi bütün gün uyumuş.	
2 Dışarıda kuş cıvıltıları yankılanıyor.	
3 Otobüs şehir içi yolda yavaşlar.	Sabahları caddeler boş oluyor.
Otobüs şehirler arası yolda mı yavaşlar?	E H H
SETA	
GrupAa	
1 Şarkıcı, besteciyle nihayet anlaşmış.	
2 Şövalye zindandan zar zor kurtulur.	Postacı, kapıcıyla her gün tartışıyor.
Şövalye zindandan mı zar zor kurtulur?	E H E
3 Oyuncakçı, palyaçolara ilgiyle bakıyor.	
4 İtfaiyeci, jandarmanın cevabını unutmuş.	
Dolandırıcı, polisin yanıtını duymuş.	
GrupAb	
1 Ünlü aktör son günlerde değişmiş.	
Ünlü aktör son günlerde değişmiş mi?	E H E
2 Ziyaretçi odada on dakika oturur.	Paşa, sarrafa hemen inanır.
3 Dalgıç denize çivileme atlıyor.	
4 Assolist, yardımcısının vedasını hatırlıyor.	
Teyze, misafirin doyduğunu gözlemliyor.	
GrupAc	

1	Yorgun adam tüm dostlarına küser.				
2	Sporcu, rakibiyle kıran kırana yarışıyor.				Terzi ilçede uzun yıllar yaşar.
	Sporcu, koçuyla mı kıran kırana yarışır?	E	H	H	
3	Elçi saraydan dışarı atılmış.				
4	Damat, akrabasının kaçtığıını anlatır.				
	Yeniçeri, sadrazamın vardığını öğrenir.				
	GrupAd				
1	Sanatı yalıda kardeşleriyle büyümüş.				
2	Uykulu bekçi tembelce esniyor.				
3	Kız, ağabeyine zaman içinde bağlanır.				
	Kız, ablasına mı zaman içinde bağlanır?	E	H	H	
4	Muhasebeci, avukatın sustuğunu gözlemliyor.				İhtiyar çiftçi aniden üşümüş.
	Kondüktör, makinistin düdüğünü duyuyor.				
	SETB				
<hr/>					
	GrupBa				
1	Ajan havaalanına son anda ulaşır.				Oduncu kulübeye bir süreliğine yerleşiyor.
	Ajan havaalanına erken mi ulaşır?	E	H	H	
2	Güçlü ordu, düşman birliklerine rastlamış.				
3	Öğrenci okuldan, arkadaşlarıyla birlikte kaçıyor.				
4	Şoför, yolcunun ricasını hatırlıyor.				
	Komiser, valinin maksadını anlatıyor.				
	GrupBb				
1	Asker, ailesiyle son kez helalleşir.				
2	Baba, oğlunda çok gücenmiş.				
	Baba, oğluna mı çok gücenmiş?	E	H	E	
3	Gezgin handa üç gece konaklıyor.				Çeşnicibaşı yemeğe şüpheyle dokunur.
4	Padişah, vezirinin sorununu öğrenir.				
	Savcı, tanığın tüydüğünü unuttur.				
	GrupBc				
1	Yaşlı hanım birden üşür.				

- 2 Muhabir ofise şöyle bir uğramış.
- 3 Sinirli patron yanında çalışanlara bağırıyor. Matador arenadan koşar adım kaçmış.
Sinirli patron mu yanında çalışanlara bağırıyor? E H E
- 4 **Korsan, prensesin korktuğunu anlıyor.**
Hostes, eltisinin baktığını unutuyor.
GrupBd
- 1 Madenci ocaktan güç bela kurtulur.
- 2 Dekoratör, tasarımcıyla sonunda anlaşmış.
Dekoratör, boyacıyla mı sonunda anlaşmış? E H H
- 3 Hemşire, hastaya şefkatle gülümsüyor. Ağa, adamıyla sürekli haberleşir.
- 4 **Fizikçi, astronotun döndüğünü unutmuş.**
Koreograf, balerinin ödülünü anlatmış.
SETC
-
- GrupCa
- 1 Editör ajansta bir saat oturur. Simitçi, hamala dostça gülümsüyor.
Editör dershanede mi bir saat oturur? E H H
- 2 Başarılı dansçı bu aralar değişmiş.
- 3 Çevreci suya korkusuzca atlıyor.
- 4 **Tarihçi, felsefecinin yorumunu duymuş.**
Kaymakam, müteahhidin kaygısını hatırlamış.
GrupCb
- 1 Huysuz ihtiyar, bütün yakınlarına küser.
- 2 Soytarı salondan dışarı atılmış.
Soytarı yemekhaneden mi dışarı atılmış? E H H
- 3 Müdür, halefiyle koltuk için yarışıyor. İzci kampta iki gece konaklıyor.
- 4 **Satıcı, hırsızın cüretini anlatır.**
Mühendis, mimarın indiğini duyar.
GrupCc
- 1 Voleybolcu, antrenörüne kısa sürede bağlanır.
- 2 Balıkçı adada kuzenleriyle büyümüş.

3	Bitkin onbaşı gizlice esniyor.				Hünerli kuaför birden acılır.
	Bitkin onbaşı gizlice esniyor mu?	E	H	E	
4	Dedektif, kumarbazın daldığını gözlemliyor.				
	Bankacı, arkadaşının yüzdüğünü hatırlıyor.				
	GrupCd				
1	Gardiyan koğuşa tam vaktinde ulaşır.				
2	Seyyar satıcı, sokak çocuklarına rastlamış.				
3	Tüccar pazardan, ortaklarıyla birlikte kaçıyor.				
	Tüccar pazardan mı ortaklarıyla birlikte kaçıyor?	E	H	E	
4	Teğmen, komutanın gittiğini hatırlıyor.				Çilingir eve tam zamanında ulaşır.
	Hakem, boksörün acısını anlıyor.				
	SETD				
<hr/>					
	GrupDa				
1	Seyyah, dostuyla son defa helalleşir.				Kibirli milyoner heyecanlı görevliye bağıyor.
	Seyyah, dostuyla mı son defa helalleşir?	E	H	E	
2	Veznedar, dünürüne epey gücenmiş.				
3	Keşiş, tapınakta iki gün konaklıyor.				
4	Dede, torununun oyununu öğrenir.				
	Silahşör, leydinin kederini anlar.				
	GrupDb				
1	Emekli memur aniden üşür.				
2	Mübaşir, adliyeye kısa süreliğine uğramış.				
	Mübaşir, adliyeye uzun süreliğine mi uğramış?	E	H	H	
3	Stresli nörolog, hasta bakıcılara bağıyor.				Kaptan limandan sakince uzaklaşıyor.
4	Tercüman, konuşmacının hatasını anlıyor.				
	Muavin, hemşehrisinin kızdığını hatırlıyor.				
	GrupDc				
1	Başkan binadan hızla uzaklaşır.				
2	Bakkal, çırağıyla aylar sonra karşılaşmış.				
3	Kont, düşese çapkınca gülümsüyor.				Samuray, ikiziyle seneler sonra karşılaşmış.

	Kont, düşese mi çapkınca gülümsüyor?	E	H	E	
4	Hizmetçi, uşağın yattığını unutmuş.				
	Teknisyen, stajyerin kandiğini anlamış.				
	GrupDd				
1	Falcı köyde beş yıl yaşar.				
2	Küçük çocuk epey acıkmış.				
	Genç anne mi epey acıkmış?	E	H	H	
3	Pilot otele kısa süreliğine yerleşiyor.				Tiyatrocu, hayranına hayretle bakıyor.
4	Yaya, sürücünün kalktığını duymuş.				
	Modacı, mankenin sırrını öğrenmiş.				
	SETE				
<hr/>					
	GrupEa				
1	Tecrübeli denizci dümene hafifçe dokunur.				Davetli törende epey eğleniyor.
	Tecrübesiz denizci mi dümene hafifçe dokunur?	E	H	H	
2	Mahkûm cezaevinden ustalıkla firar etmiş.				
3	Tezgâhtar, kasiyerle ulu orta tartışıyor.				
4	Gazeteci, milletvekilinin öyküsünü anlatır.				
	Rektör, dekanın ilgisini gözlemler.				
	GrupEb				
1	Bakan, danışmanına yürekten inanır.				
2	Şair kasabada yapayalnız ölmüş.				
	Şair kasabada mı yapayalnız ölmüş?	E	H	E	
3	Bitkin yarışmacı törenden önce geriniyor.				Emektar arabacı sessizce esniyor.
4	Garson, aşçının tarifini unutmuş.				
	Muhtar, köylünün bezdiğini öğrenmiş.				
	GrupEc				
1	Hoca sınıfa alelacele girer.				
2	Cesur barmen, azılı hayduda öfkelenmiş.				
3	Rahip manastırdan koşar adım çıkıyor.				Pizzacı restorana tam saatinde varmış.
	Rahip bahçeden mi koşar adım çıkıyor?	E	H	H	

4 **Prens, büyücünün güldüğünü hatırlıyor.**

Marangoz, bahçivanın koştüğünü duyuyor.

GrupEd

- 1 Usta, kalfasıyla sıkça haberleşir.
- 2 Yüzücü, cankurtarana var gücüyle seslenmiş.
- 3 Reklamcı partide oldukça eğleniyor.

Reklamcı partide mi oldukça eğleniyor? E H E

4 **Subay, hâkimin öldüğünü öğrenir.**

Alınan darbukacı, çalgıcı dostlarına küsmüş.

Kovboy, şerifin imasını hatırlar.

SETF

GrupFa

1 Kibar insan sessizce hışırır.

Konuk köşkten çok kolay kurtulmuş.

Kibar insan gürültülü mü hışırır? E H H

2 Yazar istasyona tam zamanında varmış.

3 Sevimli nine kapiya sıkıca tutunuyor.

4 **Sekreter, görüncesinin niyetini anlıyor.**

Astrolog, medyumun hilesini öğreniyor.

GrupFb

1 Katil evden hemen uzaklaşır.

2 Derviş, neyzenle yıllar sonra karşılaşmış.

Derviş, neyzenle mi yıllar sonra karşılaşmış? E H E

3 Futbolcu, taraftarlara sevgiyle bakıyor.

Okçu, süvariyle rahatça anlaşır.

4 **Sunucu, kameramanın hünerini gözlemliyor.**

Çiçekçi, berberin battığını anlatıyor.

GrupFc

1 Dadi, mâlikanede yedi sene yaşar.

2 Çalışkan taksici çok acıkmış.

3 Kapıcı apartmana bir aylığına yerleşiyor.

Kaynana, gelinine yine güvenmiş.

Kapıcı apartmana iki yıllığına mı yerleşiyor? E H H

4 **Manav, kasabın kaldığını duymuş.**

Emlakçı, kiracının baktığını anlatmış.

GrupFd

1 Çavuş kışladan serinkanlıkla firar etmiş.

2 Ürkek kuaför makasa yavaşça dokunur.

Ürkek kuaför mü makasa yavaşça dokunur? E H E

3 Radyocu, dinleyiciyle yayın sırasında tartışıyor.

Çoban çayırda dört saat oturmuş.

4 **Fotoğrafçı, oyuncunun düştüğünü anlatır.**

Kral, karısının suratını unuttur.

SETG

GrupGa

1 Müsteşar, müşavirine gönülden inanır.

Yetenekli hattat zaman içinde değişiyor.

Müsteşar, müşavirine mi gönülden inanır? E H E

2 Komedyen sahnede aniden ölmüş.

3 Yorgun atlet yarıştan sonra geriniyor.

4 **Musulukçu, elektrikçinin yöntemini gözlemliyor.**

Öğretmen, velinin arzusunu unutuyor.

GrupGb

1 Kimyacı laboratuvara hızla girer.

2 Sabırsız amir yeni çaycıya öfkelenmiş.

Asabi koruma mı yeni çaycıya öfkelenmiş? E H H

3 Psikiyatrist muayenehaneden son hız çıkıyor.

Çingene çadıra bir süreliğine uğrar.

4 **Rahibe, papazın duasını duymuş.**

Doktor, meslektaşının çıktığını anlamış.

GrupGc

1 Ressam, sevgiliyle gizlice haberleşir.

2 Seyis, jokeye olanca gücüyle seslenmiş.

3 Müzisyen düğünde çok eğleniyor.

Yabancı turist, uyanık rehberle öfkelenmiş.

Müzisyen düğünde mi çok eğleniyor? E H E

4 **Kadın, komşusunun geldiğini öğrenir.**

Profesör, asistanının yıldığını gözlemler.

GrupGd

- 1 Utangaç kâtip sessizce hapşırır.
- 2 Öfkeli siyasetçi kürsüye sınıksız tutunuyor.
- 3 Başhekim kliniğe tam vaktinde varmış.

Başhekim kliniğe çok geç mi varmış?

E H H

- 4 **Piyonist, kemancının küstüğünü anlıyor.**

Kâhya çiftlikten çabucak çıkar.

Cerrah, araştırmacının çabasını gözlemliyor.

APPENDIX O: QUESTIONNAIRE AND INFORMED CONSENT FORM USED IN THE STUDY IN CHAPTER 5

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu:

Konuştüğünüz yabancı diller var mı?

Varsa hangi düzeyde?

Ağırlıklı olarak hangi elinizi kullanırsınız? Sol Sağ

Çalışmamıza katıldığınız için çok teşekkür ederiz! ☺

Günülü Katılım Formu

Bu çalışma, ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı öğretim üyesi Yrd. Doç. Dr. Annette Hohenberger tarafından yürütülen proje kapsamında yer almaktadır. Çalışmanın genel amacı, anadili Türkçe olan yetişkin bireylerin, yazılı cümleleri anlama süreçlerini incelemektir. Bu araştırma sonucunda Türkçe'nin işlenmesi konusundaki psiko-dilbilimsel literatüre katkıda bulunmak hedeflenmektedir. Katılımcıların bilgisayar ekranı karşısında oturup, ekranda belirecek tümcelerini okumaları ve bazı cümlelerden sonra sorulacak “evet”/”hayır” cevabı gerektiren basit

soruları ve ayrı, basılı bir formda yer alan genel demografik soruları yanıtlamaları beklenmektedir. Bu işlemlerin yaklaşık 20-30 dakika kadar süreceği tahmin edilmektedir. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Cümle ve sorular, genel olarak kişisel rahatsızlık verecek unsurları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakmakta serbestsiniz. Böyle bir durumda deneyciye, deneyi tamamlamayacağınızı belirtmeniz yeterli olacaktır. Katılımınız sonrasında, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Yrd. Doç. Dr. Annette Hohenberger (Adres: ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı, A-213, 06800, Çankaya, Ankara; Tel: 0312 210 3789, E-posta: hohenberger@ii.metu.edu.tr) veya doktora öğrencisi Gözde Bahadır (Adres: ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı, A-Z10, 06800, Çankaya, Ankara; Tel: 0312 210 7864; E-posta: gozdebahadir@yahoo.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesebileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra lütfen deneyciye teslim ediniz).

İsim Soyad

Tarih

İmza

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APPENDIX P: QUESTIONNAIRE AND INFORMED CONSENT FORM USED IN THE STUDY IN CHAPTER 6

GENEL SORULAR

Cinsiyet: K E

Yaş:

Meslek:

Eğitim Durumu ve Alanı:

Konuştüğünüz bir ya da daha fazla yabancı dil var mı? Varsa hangi dil(ler) ve hangi düzey(ler)de?

Ağırlıklı olarak hangi elinizi kullanırsınız? Sol Sağ

Çalışmamıza katıldığınız için çok teşekkür ederiz! 😊

Gönüllü Katılım Formu

Bu çalışma, ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı öğretim üyesi Yrd. Doç. Dr. Annette Hohenberger tarafından yürütülen proje kapsamında yer almaktadır. Çalışmanın genel amacı, anadili Türkçe olan yetişkin bireyler tümceleri okurken, gözlerinin sözcükleri nasıl izlediğini incelemektir. Bu araştırma sonucunda Türkçe'nin işlenmesi konusundaki psiko-dilbilimsel literatüre katkıda bulunmak hedeflenmektedir. Katılımcıların bilgisayar ekranı karşısında oturup, ekranda belirecek tümceleri okumaları ve bazı cümlelerden sonra sorulacak “evet”/”hayır”

cevabı gerektiren basit soruları ve ayrı, basılı bir formda yer alan genel demografik soruları yanıtlamaları beklenmektedir. Katılımcılar tümceleri okurken, sistem göz hareketlerini kaydedecektir. Bu işlemlerin yaklaşık 20-30 dakika kadar süreceği tahmin edilmektedir. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Tümce ve sorular, genel olarak kişisel rahatsızlık verecek unsurları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakmakta serbestsiniz. Böyle bir durumda deneyciye, deneyi tamamlamayacağınızı belirtmeniz yeterli olacaktır. Katılımınız sonrasında, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Yrd. Doç. Dr. Annette Hohenberger (Adres: ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı, A-213, 06800, Çankaya, Ankara; Tel: 0312 210 3789, E-posta: hohenberger@ii.metu.edu.tr) veya doktora öğrencisi Gözde Bahadır (Adres: ODTÜ Enformatik Enstitüsü, Bilişsel Bilimler Programı, A-Z10, 06800, Çankaya, Ankara; Tel: 0312 210 7864; E-posta: gozdebahadir@yahoo.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesebileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra lütfen deneyciye teslim ediniz).

İsim Soyad

Tarih

İmza

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**APPENDIX Q: CONTINGENCY TABLES OF BACKTRACKING
COUNTS FOR THE TWO GROUPS IN 6.4.2**

Group A: SAME MATRIX VERB - Sums				
From/To	1	2	3	4
1	71	45	8	3
2	40	100	8	0
3	16	68	20	4
4	57	135	45	17

Group B: DIFFERENT MATRIX VERBS - Sums				
From/To	1	2	3	4
1	44	24	5	1
2	28	57	8	2
3	11	39	17	3
4	46	132	38	17

**APPENDIX R: CONTINGENCY TABLE OF ALL
BACKTRACKING COUNTS IN 6.4.2**

Groups A&B: SAME & DIFFERENT MATRIX VERBS - Sums				
From/To	1	2	3	4
1	115	69	13	4
2	68	157	16	2
3	27	107	37	7
4	103	267	83	34

APPENDIX S: CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Bahadır, Gözde

Nationality: Turkish (TC)

Date and Place of Birth: 16 May 1981, Ankara/TURKEY

Marital Status: Single

Phone: +90 532 508 61 71

E-mail: gozdebahadir@yahoo.com

EDUCATION

Degree	Institution/Department	Year of Graduation
M.A.	University of Sorbonne Nouvelle, Paris/ Foreign Language Teaching	2005
B.A.	Bilkent University, Ankara/ Translation & Interpretation (Eng.-Fr.-Tur.)	2004

TEACHING EXPERIENCE

Year	Place	Enrollment
2012	Department of Psychology, Bilkent University, Ankara	Part-Time Instructor
2012	Department of English Linguistics, Hacettepe University, Ankara	Part-Time Instructor

LAB AFFILIATIONS

Year	Lab
2006-2012	METU Baby Lab
2009-2010	The Polinsky Language Sciences Lab

LANGUAGES

Turkish: Native

English: Advanced

French: Advanced

Spanish, German, Turkish Sign Language, Greek: Beginner

PUBLICATIONS (Related to the Present PhD Dissertation)

Bahadır, G. & Hohenberger, A. (2012, September). *Structural Priming in the Comprehension on Turkish Nouns and Nominalized Verbs*. Paper presented in ICTL 2012 (16th International Conference on Turkish Linguistics), Middle East Technical University, Ankara.

Bahadır, G. & Hohenberger, A. (2012, April). *An Eye-Tracking Study on Structural Priming in Turkish Language Comprehension*. Poster presented in COGNITIVE-IX (International Cognitive Neuroscience Meeting), İstanbul Medipol University, İstanbul. (APPENDIX T)

Bahadır, G. (2011, December). *Structural Priming in the Comprehension of Turkish*. Paper presented in the Language Acquisition and Processing in Monolingual or Multilingual Settings Colloquium, Middle East Technical University, Ankara.

Bahadır, G. & Hohenberger, A. (2011, September). *Structural Priming and the Investigation of Syntactic Alignment in Conversation*. Paper presented in UDKEK 2011 (International Congress on Linguistics and Comparative Literature), İstanbul Kültür University, İstanbul.

Bahadır, G. & Hohenberger, A. (2010, September). *Degrees of Nominalization in Turkish: A Comprehension-to-Production Priming Study*. Poster presented in AMLaP 2010 Architectures and Mechanisms for Language Processing, York. (APPENDIX T)

Bahadır, G. & Hohenberger A. (2010, August). *Structural Priming in Turkish Genitive-Possessive Constructions*. Paper presented in 15th International Conference on Turkish Linguistics, Szeged.

Bahadır, G. (2009, November). *Structural Priming in Turkish: Noun Phrases vs. Noun Clauses in Genitive-Possessive Constructions*. Paper presented in the Polinsky Language Processing Lab, Harvard University, Cambridge, MA.

Bahadır, G. (2009, March). *Syntactic Representations in Language Production and Comprehension: Insights from Structural Priming*. Paper presented in 2nd Mediterranean Graduate Meeting in Linguistics- MGML, Mersin.

Bahadır, G. & Hohenberger, A. (2009, May). *Türkçenin Biçimdizimsel İşlemlenmesinde Yapısal Hazırlama (Structural Priming in the Morpho-Syntactic Processing of Turkish)*. Paper presented in 23. Ulusal Dilbilim Kurultayı (23rd National Linguistics Workshop), Eastern Mediterranean University, Famagusta.

Bahadır, G. & Hohenberger, A. (2009, March). *Morpho-syntactic Processing and Priming in Turkish: Noun Phrases vs. Noun Clauses*. Poster presented in 22nd Conference on Human Sentence Processing - CUNY, UC Davis, CA. (APPENDIX T)

Bahadır, G. (2008, November). *What Can Structural Priming Tell Us About Structural Representations?* Paper presented at Ankara Linguistic Circle-ALC, Ankara.



DEGREES OF NOMINALIZATION IN TURKISH: A Comprehension-to-Production Priming Study

AMLaP 2010 Architectures and Mechanisms for Language Processing, York, UK, September 6-8, 2010.

Gözde BAHADIR & Annette HOHENBERGER Middle East Technical University (METU), Ankara, TURKEY



ABSTRACT

This study investigates degrees of nominalization in the processing of a set of constructions used in the general genitive-possessive (GEN-POSS) template in Turkish. The constructions examined in four comprehension-to-production priming experiments are: **Noun Phrases (NPs)** with regular nouns or **deverbal nouns** as heads and **Noun Clauses (NCs)** with predicates nominalized by the morphemes *-i* and *-dik*. Specifically, we test whether NPs with different nominalization suffixes are processed more like nouns or verbs. Theoretical arguments suggest that they show both **nominal** and **verbal** behaviour but to different extents. *-dik* being less nominal. Our results also indicate a hierarchy: indeed *-dik* behaves strongly **verbal** in priming, whereas *-i* is relatively more nominal and demonstrates both **noun** and **verb**-like behaviour depending on the prime context. **Lexical Deverbal NPs** with **verbal** roots are similar to regular NPs in being robustly nominal.

THEORETICAL BACKGROUND

Possessive Noun Phrases

All [Ayşe'nin ses-i] ni duy-du
-GEN voice-3sg -ACC hear-Past3sg
"All heard Ayşe's voice."

- The possessor ("Ayşe") is in GEN case.
- The possessum (head) ("voice") agrees with the possessor in person & number (1).

Noun Clauses

All [Ayşe'nin gel-i] ni duy-du
-GEN arrive -3sg -ACC hear-Past3sg
"All heard that Ayşe had arrived."/ Literal translation: "All heard Ayşe's arriving."

- NCs are clausal NPs subordinated in larger constructions by verb nominalizing suffixes (e.g. *-dik*, *-i*).
- NCs play the same functions as regular NPs (2).

Degrees of Nominalization in NCs

- In Turkish, NCs demonstrate both **noun-like** and **verb-like** behavior.
- **Nominal Properties of NCs:**
 - Case and agreement morphology drawn from the **noun** paradigm.
 - Overall GEN-POSS structure like possessive NPs.

Verbal/Sentential Properties of NCs:

- The nominalized verb in NCs can take the passive morpheme and be modified by adverbs.
- The predicate of the NC can take **direct objects** and assign **ACC** case to them.

HOWEVER: NCs are NOT **deverbal** lexical nouns such as "noun" (task-derivational suffix = "nounness") which are syntactically treated as non-derived nouns (N) as they can be pluralized and modified by adjectives. NCs cannot.

Verbal/Sentential Properties of NCs:

- The nominalized verb in NCs can take the passive morpheme and be modified by adverbs.
- The predicate of the NC can take **direct objects** and assign **ACC** case to them.

HOWEVER: NCs are NOT fully inflected verbs as in the following sentence, either. The nominalization marker in the NC predicate occupies the position corresponding to tense in fully finite verbs.

Ayşe gel-e
arrive -Past3sg
"Ayşe arrived."

The degree to which NCs show **nominal/sentential** properties seem to depend on the nominalizing suffixes attached to the verb.

- This study focuses on two nominalizing suffixes: *-dik* (the most **verbal/sentential** nominalizer) and *-i* (the most **noun-like** nominalizer) (1). It investigates situations where the NC is the direct object of a verb of perception or cognition (2).

-dik vs. -i

Noun Clauses Formed with -dik

- *-dik* clauses express the **factual status** of an event or state.
- *-dik* is considered to be the most **sentential** of the nominalizing suffixes. It alternates with another suffix: *-dik* on the basis of the **temporal components** of their meaning. *-dik* refers to a time earlier than or simultaneous to that that referred to by the matrix verb, whereas *-dik* refers to a future time (2).

Noun Clauses Formed with -i

- *-i* clauses express (1) the manner in which an action is performed, or (2) a single instance of an event or an action (2).
- *-i* clauses are the most **noun-like** NCs.

Unlike *-dik* clauses, they can

- be affixed with the plural,
- co-occur with determiners such as demonstratives, and
- be coordinated with the conjunctive conjunction *-A11*.

To sum up: Although all Turkish NCs seem to demonstrate both **noun-like** and **verb-like** behaviour, theoretically, NCs formed with *-i* are considered to be more **nominal** than those formed with *-dik*.

RESEARCH QUESTIONS AND PREDICTIONS

Question 1: Are Turkish NCs with nominalized verbs, which appear in the GEN-POSS constructions are processed more like nouns or verbs?

Predictions:

- If participants are only sensitive to the general morpho-syntactic template in which the construction appears during processing, NCs might be processed in a way similar to NPs (noun-like) due to the similarity of the overall GEN-POSS structure.
- If they are more sensitive to the grammatical category of the constituents within the template, nominalized verbs in NCs might behave differently (verb-like) than NPs.
- As independent linguistic arguments suggest that NCs have both noun-like and verb-like properties, we need to investigate what is happening in processing experimentally. Structural priming turns out to be an appropriate method to adopt for this purpose.

Question 2: Is there a hierarchy in processing in terms of degree of nominality among the different structures that appear in the morpho-syntactic GEN-POSS template (regular nouns, deverbal nouns, NCs with *-i* and NCs with *-dik*)?

Predictions:

- NPs with different grammatical types of root and NCs with predicates nominalized by different suffixes may show varying degrees of noun-like/verb-like.
- Lexical nouns might be more nominal than verb nominalizations.
- Among lexical nouns, those derived from **verbal** roots might be less nominal, than regular, non-derived nouns. If priming is strong enough, the effect should persist from comprehension to production and for other types of NPs and NCs, as well.

Question 3: Is there structural priming (3) from comprehension-to-production (4) in Turkish NPs and NCs?

Predictions:

- A previous study found structural priming effects in written production for Turkish regular NPs and NCs with *-dik* (2). If priming is strong enough, the effect should persist from comprehension to production and for other types of NPs and NCs, as well.



Question 3: Is there structural priming (3) from comprehension-to-production (4) in Turkish NPs and NCs?

Predictions:

- A previous study found structural priming effects in written production for Turkish regular NPs and NCs with *-dik* (2). If priming is strong enough, the effect should persist from comprehension to production and for other types of NPs and NCs, as well.

EXPERIMENTS

Methodology & Stimuli

- In four comprehension-to-production experiments, participants read full prime sentences and completed target fragments.
- 14-page A5 size spiral-bound booklets with 3 sentences/fragments (1 Prime-target pair and 3 complete or incomplete fillers).
- 70 items / 7 Prime-target pairs appearing twice with alternating prime types (4 experimental items, and 3 fillers per Prime-target pair). 14 x 2 = 28 fillers half of which were completed and half were left empty.
- Fillers were the same in all four experiments whereas each experiment tested the effect of a different alternation in Prime sentences: overall.

Experiment 1: Regular N vs. *-dik*
Experiment 2: Deverbal N vs. *-dik*
Experiment 3: Deverbal N vs. *-i*
Experiment 4: *-i* vs. *-dik*

Sample Experimental Items

PRIME SENTENCES

Regular N Prime:

All [Ayşe'nin ses-i] ni duy-du
-GEN voice-3sg -ACC hear-Past3sg
"All heard Ayşe's voice."

Deverbal N Prime:

All [Ayşe'nin soru-su] nu duy-du
-GEN question-3sg -ACC hear-Past3sg
"All heard Ayşe's question."

-i Prime:

All [Ayşe'nin gel-i] ni duy-du
-GEN arrive -3sg -ACC hear-Past3sg
"All heard Ayşe arrive."

-dik Prime:

All [Ayşe'nin gel-dik] ni duy-du
-GEN arrive -3sg -ACC hear-Past3sg
"All heard that Ayşe had arrived."/ Literal translation: "All heard Ayşe's arriving."

TARGET FRAGMENTS

Adam [bade'nin] hatırla -dı.
Man woman-GEN remember-Past3sg
"The man remembered the woman's / (that) the woman...."

Adam [bade'nin] hatırla -dı.
Man woman-GEN remember-Past3sg
"The man remembered the woman's / (that) the woman...."

Participants

The participants in all four studies are young adults, who are native speakers of Turkish.

Experiment 1: 29 participants; 13 males & 16 females; mean age: 23.93 years
Experiment 2: 43 participants; 13 males & 30 females; mean age: 22.07 years
Experiment 3: 20 participants; 7 males & 13 females; mean age: 24.3 years
Experiment 4: 27 participants; 14 males & 13 females; mean age: 25.96 years

Design

For all four studies: 2X2 within-subjects Repeated Measures ANOVA

-Independent Variable 1 = Prime Type (Regular N / *-dik*) / Deverbal N / *-i* / *-dik* / *-i*)

-Independent Variable 2 = Completion Type (Nominal (all NP completions) / Verbal (all NC completions))

-Dependent Variable = Frequency of Completions (%)

Results

Experiment 1: Regular N vs. *-dik*



- No main effect "Prime Type"
- No main effect "Completion Type"
- Significant interaction "Prime Type" x "Completion Type", $F(1, 28) = 4.511, p < .05, \eta^2 = .139$

- Priming: Regular N Primes increase the number of Nominal Completions and *-dik* Primes increase the number of Verbal Completions.

Experiment 2: Deverbal N vs. *-dik*



- No main effect "Prime Type"
- No main effect "Completion Type"
- Significant interaction "Prime Type" x "Completion Type", $F(1, 42) = 9.965, p < .01, \eta^2 = .178$

- Priming: Deverbal N Primes increase the number of Nominal Completions and *-dik* Primes increase the number of Verbal Completions.

Experiment 3: Deverbal N vs. *-i*



- No main effect "Prime Type"
- Significant main effect "Completion Type", $F(1, 18) = 18.424, p < .001, \eta^2 = .482$
- Nominal Completions > Verbal Completions (irrespective of Prime Type)
- No interaction "Prime Type" x "Completion Type"

- Priming: Both Prime Types (Deverbal N and *-i*) increase the number of Nominal Completions.

Experiment 4: *-i* vs. *-dik*



- No main effect "Prime Type"
- No main effect "Completion Type"
- Significant interaction "Prime Type" x "Completion Type", $F(1, 26) = 6.809, p < .05, \eta^2 = .181$

- Priming: *-dik* Primes increase the number of Verbal Completions while *-i* Primes seem to be hybrid/balanced as they lead to an almost equal number of Nominal and Verbal completions (i.e. Experiment 3).

DISCUSSION & FUTURE DIRECTIONS

In the four experiments with prime types, characteristic patterns of SP were found:

- NCs with *-dik* most predominantly prime **verbal** completions, and indeed behave strongly **verbal**. The salience of *-dik* could be due to the fact that it is the only suffix that could be related to the fact that in Turkish, *-dik* has some homophones that are also **verbal** suffixes: the object relationship particle *-dik* and the **3rd** person singular present progressive auxiliary *-dik*.

- NCs with *-i* behave both **nominal** and **verbal** depending on the other type of prime they are presented with. The comparison of Experiment 1 (Regular N vs. *-dik*) and Experiment 2 (Deverbal N vs. *-dik*) suggests that despite the present study has an influence on the behaviour of the prime roots, *-dik* seems to prime more **nominal** completions than *-i* (and vice versa) presented together with *-dik*. This could be due to the comparison of Experiment 1 (Regular N vs. *-dik*) and Experiment 2 (Deverbal N vs. *-dik*). The results are also consistent with the theoretical behaviour of *-i*. The fact that *-i* has homophones suffixes that denotes lexical nouns from verbal roots might also be relevant to the hybrid/balanced nature of *-i*.

- Although *-dik* behaves more **verbal** when presented in the same stimulus set as *-dik* primes, this is not the case when *-i* is also present (Experiment 4). This could again be due to the strong salience of *-dik*, interestingly, despite the **verbal** root, *-dik* seems to prime more **nominal** completions than *-i* (and vice versa) presented together with *-dik*. This could be due to the comparison of Experiment 1 (Regular N vs. *-dik*) and Experiment 2 (Deverbal N vs. *-dik*). The results are also consistent with the theoretical behaviour of *-i*. The fact that *-i* has homophones suffixes that denotes lexical nouns from verbal roots might also be relevant to the hybrid/balanced nature of *-i*.

- Despite their **verbal** root, lexical *-dik* seems to be almost indistinguishable from *-dik* primes; this is not the case when *-i* is also present (Experiment 4). This could again be due to the strong salience of *-dik*, interestingly, despite the **verbal** root, *-dik* seems to prime more **nominal** completions than *-i* (and vice versa) presented together with *-dik*. This could be due to the comparison of Experiment 1 (Regular N vs. *-dik*) and Experiment 2 (Deverbal N vs. *-dik*). The results are also consistent with the theoretical behaviour of *-i*. The fact that *-i* has homophones suffixes that denotes lexical nouns from verbal roots might also be relevant to the hybrid/balanced nature of *-i*.

- To sum up: The experiment provides some support for the proposed hierarchy.

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Bahadır, G. & Hohenberger, A. (2010, September):

http://scholar.harvard.edu/gbahadir/files/bahadirhohenberger_2010a_poster_eng.pdf

APPENDIX U: TEZ FOTOKOPİ İZİN FORMU

ODTÜ ENFORMATİK ENSTİTÜSÜ

YAZARIN

Soyadı : BAHADIR

Adı : GÖZDE

Bölümü : BİLİŞSEL BİLİMLER

TEZİN ADI (İngilizce) : STRUCTURAL PRIMING IN TURKISH GENITIVE-POSSESSIVE CONSTRUCTIONS

TEZİN TÜRÜ : Yüksek Lisans

Doktora X

- 1) Tezimden fotokopi yapılmasına izin vermiyorum.
- 2) Tezimden dipnot gösterilmek şartıyla bir bölümünün fotokopisi alınabilir.
- 3) Kaynak gösterilmek şartıyla tezimin tamamının fotokopisi alınabilir.

Yazarın imzası

Tarih 03.09.2012