MORPHOLOGICAL PRIMING IN TURKISH NOMINAL COMPOUND PROCESSING

A THESIS SUBMITTED TO THE GRADUATE
SCHOOL OF INFORMATICS
OF THE MIDDLE EAST TECHNICAL UNIVERSITY

BY

SİBEL ÖZER

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN
THE DEPARTMENT OF COGNITIVE SCIENCE

SEPTEMBER 2010

Approval of the Graduate School of Informatics

Prof. Dr. Nazife Baykal
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Prof. Dr. Deniz Zeyrek
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Assist. Prof. Annette Hohenberger
Supervisor

Examining Committee Members

Prof. Dr. Deniz Zeyrek	(METU, COGS)	
Assist. Prof. Annette Hohenberger	(METU, COGS)	
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Name, Last name : Sibel Özer

Signature :___________________

ABSTRACT

MORPHOLOGICAL PRIMING IN TURKISH
NOMINAL COMPOUND PROCESSING

Özer, Sibel
M. Sc., Department of Cognitive Science
Supervisor: Assist. Prof. Annette Hohenberger

September 2010, 306 pages

Compounding, constructing new words out of previously known words by means of simple concatenation mostly, can be counted as one of the major word production mechanisms in the majority of languages. Their importance in the history of human languages warrants a detailed study with respect to the language faculty and related cognitive aspects. In the last decade, compound production as well as comprehension have become highly debated and investigated areas of research. Morphological priming is one frequently employed paradigm for the investigation of compounding. Whether morphologically complex words undergo a decomposition-composition process, respectively, during comprehension and production or whether they are all listed in full form in the lexicon is one key question hitherto addressed in several studies related to English, German, Dutch and Chinese nominal compound words.

The present study is concerned with compound production in Turkish. Various types of Turkish compounds were investigated ((i) bare JCs (‘akbalık’, ‘dace’), (ii) indefinite (‘dil balığı’, ‘flounder’) and (iii) definite (‘gölün balığı’, ‘fish of the lake’) izafet constructions) in a morphological priming paradigm by means of a picture naming task. In the general implementation of this task, subjects name black-white line drawings of simple objects in a limited and pre-specified time-interval while at the same time, they have to ignore distractor words which are presented visually(or auditorily). The locus of interest in this paradigm is the evaluation of possible linguistic effects of the distractor word presentation on picture naming performance. In this study, distractor words were Turkish nominal compounds and picture names(e.g., ‘balık’, ‘fish’) were morphologically related (depicted either first or second part of the compound) or completely unrelated to these distractor words. Results of the experiment revealed equal amounts of morphological priming effect in all compound types investigated, that is, morphologically related compounds led to shorter naming latencies compared to unrelated distractors, a result which is in line with the decompositional view of compound processing. Furthermore, significant animacy effect found on naming latencies irrespective of the compound type, underlines another possible essential factor in compound processing. Finally, distractor-wise analysis revealed marginally significant reaction time advantages for the head part of the compound as compared to the modifier part, a finding which suggests a possible special role for the head constituent during lexical access.

Keywords: nominal compound processing, picture naming, morphological priming effect, priming constituent, animacy

ÖZ

TÜRKÇE BİRLEŞİK İSİMLERİN İŞLENİŞİNDE
BİÇİMBİRİMSEL HAZIRLAMA

Özer, Sibel
Yüksek Lisans, Bilişsel Bilimler
Tez Yöneticisi: Yrd. Doç. Dr. Annette Hohenberger

Eylül 2010, 306 sayfa

Birleştirme, çoğunlukla daha önce bilinen sözcüklerin basitçe yanyana getirilmesiyle yeni sözcük oluşturma, dillerin çoğunluğunda kullanılan en temek sözcük üretim mekanizmalarından birisi olarak sayılmaktadır. Birleşik sözcüklerin insan dilinin tarihindeki önemi, onların dil birimi ve ilişkili bilişsel kısım açısından detaylı bir şekilde çalışılmasını gerektirmektedir. Son on yılda, birleşik sözcük üretimi ve hatta algılanması yoğun olarak tartışılan ve çalışılan araştırma alanlarından biri haline gelmiştir. Biçimbirimsel hazırlama, birleşik sözcük incelemelerinde sıklıkla başvurulan paradigmalardan birisidir. Biçimbirimsel olarak karmaşık sözcüklerin, sırasıyla algılanmaları ve üretimleri sırasında, bilişsel sözcük haznesi içinde bir parçalama-birleştirme işlemine mi tabi tutulduğu yoksa şekilsel olarak bir bütün

halinde mi saklandıkları şu ana kadar İngilizce, Almanca, Hollandaca ve Çince dilleri üzerinde yapılan birkaç çalışmada ele alınan anahtar sorulardan birisidir.

Bu çalışma, Türkçe'de birleşik sözcük kurulması ile ilgilidir. Çeşitli tiplerdeki Türkçe birleşik sözcükler ((i) basit (sıralı, kök) birleşik isimler ('akbalık', 'dace'), (ii) belirtisiz ('dil balığı', 'flounder') ve (iii) belirtili ('gölün balığı', 'fish of the lake') izafet yapıları) resim isimlendirme testi kullanılarak biçimbirimsel hazırlama paradigması dahilinde incelenmiştir. Bu testin genel uygulanışında, denekler, aynı zamanda kendilerine görsel(ya da işitsel) olarak sunulan dikkat dağıtıcı sözcükleri de ihmal etmek durumundayken, kısıtlı ve daha önce belirlenmiş bir cevaplama süresinde, siyah-beyaz ve çizgisel resimlerle gösterilen basit objeleri isimlendirirler. Bu paradigmadaki ilgisel odak noktası, dikkat dağıtıcı sözcüklerin resim isimlendirme üzerindeki olası dilbilimsel etkilerinin ölçülmesidir. Bu çalışmada, dikkat dağıtıcı sözcükler, Türkçe bileşik isimlerdi ve resim isimleri(örneğin, 'balık', 'fish') şekilbilimsel olarak bu uyaranlarla ilgili(ya ilk ya da ikinci bileşenlerini göstermekteydi) ya da tamamen ilgisizdi. Deney sonuçları, araştırılan bütün birleşik isim türlerinnin eşit ölçüde hazırlama etkilerinin bulunduğunu, başka bir deyişle, biçimbirimsel olarak ilişkili birleşik sözcüklerin daha kısa isimlendirme gecikmelerine neden olduğunu göstermiştir ki, bu bulgu, birleşik isimlerin parçalanarak işlenmesi görüşüyle aynı doğrultudadır.Buna ek olarak, birleşik isim türünden bağımsız olarak bulunan önemli derecedeki canlılık etkisi, birleşik isimlerin işlenmesinde mühim olan muhtemel başka bir etkenin altını çizmektedir. Son olarak, uyaran bazında yapılan analiz, birleşik sözcüklerin ana bileşeninin niteleyen kısma kıyasla cevaplama sürelerinde marjinal düzeyde daha etkin olduğunu ortaya çıkarmıştır; bu da sözcük erişimi sırasında ana bileşenin olası özel bir rol üstlendiğini düşündürmektedir.

Anahtar Kelimeler: birleşik isim işleme, resim isimlendirme, biçimbirimsel hazırlama etkisi, hazırlayıcı bileşen, canlılık

To My Parents

ACKNOWLEDGMENTS

I have always had a great interest in languages, language systems and accomplishing such a study was kind of a dream for me prior to being a member of the Cognitive Science domain. Firstly, I am deeply grateful to my thesis advisor Assist. Prof. Dr. Annette Hohenberger, who made it possible to study linguistics on a multidisciplinary dimension and helped me achieve this dream of mine. Having a computer engineering background, I was quite naïve to the experimental issues, I learnt a great deal from her in the fields of cognitive psychology and linguistics. Without her guidance, motivating and inspiring ideas and suggestions, patience and invaluable support, such a study could never be initiated and completed.

I would like to express my special gratitude to Dr. Bilal Kırkıcı. He is the first person who encouraged and helped me to study linguistics on an academic platform. I owe my first theoretical insights into linguistic concepts to him.

I am thankful to Dr Dirk Koester who replied all my e-mails with patience and kindly shared his suggestions and comments on the behavioral experiment design. I am also indebted to Prof Dr. Nazife Baykal who provided the financial support for purchasing the necessary experimental tool and education department employees in Havelsan Software Company, who provided me a suitable education room for conducting the behavioral experiments, which has almost identical conditions of a laboratory environment. I also deeply appreciate the help of my colleagues who agreed to participate in my experiments on a voluntary basis.

I would like to thank my colleague and dear friend, Dilek Küçük who is also an active member of academic field. I learnt a lot from our discussions on the computational aspects of linguistics. She has always supported me not only with theoretical ideas but also with her precious friendship.

I acknowledge Meryem Özkan who accepted to produce the majority of the line-drawings in her already tight schedule.

Finally, I would like to express my great thanks to my parents and my brother for their patience, support and unlimited tolerance. My achievement of this thesis was fed with their love and existence.

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LIST OF ABBREVIATIONS

1SG.POSS	1rd person singular possessive marker
2SG.POSS	2rd person singular possessive marker
3SG.POSS	3rd person singular possessive marker
ABL	Ablative Case Marker
ACC	Accusative Case Marker
ADV	Adverb
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variances
AP	Adjective Phrase
CM	Compound Marker
DC	Definite Compounds (Definite Izafet Construction)
EC	Epenthetic Consonant
EEG	Electroencephalography
EN	English
ERP	Event-Related Potential
GEN	Genitive Case Marker
IC	Indefinite Compounds (Indefinite Izafet Construction)
IPL	Implicit Priming Paradigm
ITL	Inter-Translation
JC	Juxtaposed Compounds (Bare, Root, Primary Compounds)
MDN	Median
ms	Millisecond

N	Noun
NNder	Noun, Denominal
NN	Noun Noun
PASS	Passive
PF	Perfective Aspect
PNP	Picture Naming Paradigm
PNT	Picture Naming Task
PL	Plural Suffix
POSS	Possessive Marker
ROI	Regions of Interest
RT	Reaction Time
SOA	Stimulus Onset Asynchrony
TR	Turkish
V	Verb
NVder	Noun, deverbal

CHAPTER 1

INTRODUCTION

The mental lexicon[1] is the backbone of human language processing, circumscribing the ways of presenting (storage) and processing the words in the mind (Libben and Jarema, 2006). During speech production, speakers access this knowledge store, which includes information related to the meaning of the words as well as their syntactic, morphological and phonological properties. If it is assumed that naturally, language production proceeds from meaning to utterances, conceptual preparation takes place in the initial stages, whereas in the following, syntactic, morphologic and finally phonologic encoding occur by manipulating these properties in a step-wise manner (e.g., Levelt, 1989,1999, Levelt, Roelofs, and Meyer 1999). Thus, in order to explain language production and comprehension on a theoretical basis, firstly, the organization and access procedures in the mental lexicon should be identified. What is more, from a more-detailed perspective, revealing the properties of the human ability to create, store and activate both simple and complex representations necessitates a clear understanding of the mental lexicon. Compound words such as *elkitabı* ‘handbook’ or *bilgisayar* (information computer) ’computer’ are perhaps the most essential members of those complex representations.

[1] In Levelt’s words(1989, p. 182), a native speaker’s mental lexicon is “a repository of declarative knowledge about the words of his language”.

Compounding, constructing novel words out of (mostly) previously known words to describe new cognitive representations is one of the crucial ways of word formation processes in most languages alongside inflection and derivation (Fabb, 2001). However, it can be proposed that compounding behaves like a subordinate class of inflection and derivation, as it encapsulates these two systems also into itself and provide a more flexible means to form new words.[2]

In inflection, grammatical and syntactically relevant information such as gender, number and case is attached to a word. In this manner, inflection applies to the peripheral part of the word .Thus inflection takes place in the final form of a word. Inflection can also be applied in a recursive manner (araba-da-ki-ler-den, ‘car-LOC-REL-PLU-ABL’, ‘from those in the car’). On the other hand, derivation is a more flexible linguistic tool as compared to inflection. In this process, new words are

[2] There are a variety of classifications of word-formation mechanisms. For example, Francis (1994, pg 58) distinguishes the two main categories: inflection and derivation. He describes inflection as a syntactic operation to provide a grammatical word which is in conformity with the context it is used in. In that sense, Francis does not consider inflection as a word-formation mechanism, rather a process which enables the use of the words in various syntactic structures.

What he really considers as a way of creating new lexical items is derivation and under that name, he identifies three sub-categories:

1. Affixation: forming new words by adding prefixes, suffixes, etc. as described previously, e.g.: sil-gi,'wipe-NVder', 'rubber'
2. Conversion: it is also known as zero derivation and it is the operation of attributing different word classes to the same lexical item without making any form change. e.g.:'yeşil' can be both A as in 'yeşil elma','green apple' and N as in 'elma yeşili','apple green-CM','apple green'
3. Compounding (focus of this thesis)

Similar to Francis' stance on word formation mechanisms, some linguists also distinguish between inflection and derivation, calling the former inflectional derivation and the latter lexical derivation. In the so called "Separation Hypothesis", they state that lexical derivation takes place in the lexicon where new words are created, while the inflectional derivation takes place in the syntax without much recourse to meaning (Aronoff, 1976 and 1994).

In this study, compounds are handled as a separate category and derivation is conflated with affixation following the general trend in the literature.

created depending on the basis of the words, the stem or root[3]. Derivational suffixes are attached to these core units in order to create words (open-class) which are semantically related/unrelated to the base. Also, the new word may belong to the same word class with the root element or be totally different. Derivation also supports recursion. (*gözlükçülük*, (göz-lük-çü-lük), 'eye- NNder- NNder- NNder).

Inflectional and derivational word-formation mechanisms are subject to phonological, morphological and syntactic constraints (Aronoff, 1976, Katamba 1993). Therefore, they are rather rule-based operations. Even more, inflection in particular is an obligatory operation which blocks other processes such as derivation and compounding.[4] The following examples depict the issue: The plural suffix in Turkish applies to countable nouns only, as is the case for most languages: e.g.:*para-lar-ım var- *'I have moneys' para-m var- 'I have money'. Countability is a property of lexical items (morphological rule). Transitive verbs in Turkish require an accusative marker at the direct object (syntactic rule). A derivational or

inflectional suffix undergoes sound changes to provide vowel harmony. Abstract noun forming derivational suffix,-lIK has 4 variations (-lık,-lik,-luk,-lük) (phonological rule).

[3] A stem is the root(s) of a word (derivational suffixes included). A stem is composed of the root in the minimum. A stem may also be inflected, but inflectional affixes are not considered within the structure of a stem. Thus, a stem is also a base which is inflected with inflectional suffixes.
A root is the smallest meaningful and morphologically simple part of a word from which all affixes are removed and the part of a word that cannot be analysed into further distinct meaningful elements. All roots are classified under a specific lexical category, namely, noun, verb, etc. Derivation and inflection may apply to a root, e.g., göz:'eye' (root/stem), göz-lük (stem):' eye'-NNder, 'eyeglasses' (inflection is applied to the stem 'göz'-ler:'eye'+PL(Loos et al., 2004,"Glossary of linguistic terms"). (The root may also be the stem when no derivation is applied) (Katamba, 1995, pg. 54 and Loos et al., 2004,"Glossary of linguistic terms")

[4] This is the stance of "lexical morphology" with its various layers and the "level ordering hypothesis", According to this view, the mental lexicon is viewed as composed

Compounding, however, is quite different from inflection and derivation. Compounding contains these two processes as stated before. Selkirk (1982) suggests that compound structures could be formulated morphologically by using syntactic phrase structure rules which are more predictable and rule-based. The general and unexceptional nature of phrasal rules entails less sensitivity to individual morphological and syntactic properties of the individual words in contrast to inflectional and derivational rules. As long as suitable phonetic constraints are satisfied, two words can be combined (genel müdür toplantı-lar-I, genel müdür toplantı-PUL-CM, ‘general director-meetings’). Francis (1995, pg. 78) emphasizes that, also with reference to the work of Chomsky (Chomsky, 1957, pg. 13), as one can produce an infinite number of sentences from a finite set of words, an infinite number of compounds could be created. In the course of time, depending on ethnological and social factors, the two words in the compound may even evolve into a new word which denotes a totally different concept than its parts. This gives compounds syntactically and semantically more freedom in word formation compared to inflection and derivation. Dressler (according to Libben et al., 2006, pg. 23) even emphasizes that languages may have compounding without affixation while the reverse idea, affixation without compounding, is not confirmed.

As morphologically simple words like 'balık' are considered, the arbitrary relation between their form and meaning entails full-form storage of these words in the mental lexicon. On the other hand, syntactic structures like sentences are inevitably parsed into constituents to be comprehended online. However, when the morphological structure of compounds is considered, they are on the interface between morphology and syntax: the form-meaning relation is not arbitrary as it is the case with simple words, nor fully compositional like sentences. Therefore, investigating and understanding the nature of compounding would contribute to revealing the basic mental operations relevant to languages such as the interplay between storage (idiosyncratic compounds in Turkish -gözbebeği, baby of the eye, $\rightarrow$ ‘apple of the eye’) and computation (novel compounds) in the mental lexicon.

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of various layers which are ordered in a hierarchical manner. Inflectional and

Taking together all these aspects, it is not surprising that Downing (1977) describes nominal compounding as a ‘back door’ into the mental lexicon.

The present study is primarily concerned with language production, specifically compound production and only to a lesser degree with comprehension in as far as priming effects of morphology were tested. As NN compounds are cross-linguistically more frequent than other types, this study was aimed at investigating nominal compounding in Turkish. [5]Three types of Turkish nominal compounds, namely, juxtaposed (primary) (JC), indefinite(IC) and definite (DC) were taken into consideration.

derivational operations formulate layers of this hierarchy (see Kiparsky 1982).

[5] For some studies on NN compounds, the reader is referred to Becker 1992 (for German) and Booij 1992 (for Dutch).

CHAPTER 2

LINGUISTIC AND EMPRICAL BACKGROUND ON COMPOUNDING

It is difficult to give an exact classification and definition of compounding due to its flexible nature and lack of a cross-linguistic agreement on compound structure. Nevertheless, some compound structures are more or less similar across languages.

In many studies, compounds are mainly classified syntactically, semantically and in terms of head-modifier relations. For example, the classification of compounds by Spencer (1991)[6] depends on syntactic properties of compounds. He classifies compounds into two main groups: root ('primary') and synthetic compounds. According to his classification, root compounds *(e.g.:Kara tahta* (in Turkish, kara-'black'+ tahta-'board'), *'blackboard'* (in English), *Schultafel* (in German, Schule-'school'+Tafel-'board')) are composed of at least two words whereas synthetic compounds('verbal compounds')(e.g.: *baling-machine, vent searcher, voltmeter, washing-engine, and machine-readable*) are produced with syntactic manipulations on words in which a verb with an argument is combined, a process similar to sentence formation. The nominal compounds investigated are root ('primary') type of compound.

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[6] Most of the examples and descriptions were also taken from Lewis (1967), Kornfilt (1997) and Göksel et al. (2005).

Recently, another compound classification which is acknowledged and cross-linguistically adjusted was proposed by Scalise et al.(2005). Their classification depends on semantic relations between compound constituents. According to their classification, a compound may be classified under one of three types depending on the semantic relations between its constituents: subordinative, attributive/appositive or coordinative. Also, each main group is divided into two subgroups namely, endocentric and exocentric. Each type of relation will be described in the following subsections. However, briefly, juxatposed nominal Turkish compounds are classified as attributive and indefinite compounds as subordinating compound types.

1 Classification of Compounds

In this part, a detailed classification of Turkish compounds will not be provided as nominal compounds were to be investigated only. This classification is in a mid-way between two two approaches of compound classification stated above. Briefly, in that classification, nominal compounds were group considering their morpho-syntactic properties which mainly affect the semantic properties of the compounds investigated. Rather than providing a detailed classification of all Turkish compound types, it would be limited to nominal compounds only. Therefore, in the following section, general properties of compound notified by Spencer (1991) will be listed as they main relate to Turkish compounds, as well. Again, compound-specific properties which pertain to each Turkish nominal compound type will be described in the special subsection dedicated for the particular type.

2 Compound Properties

2.1 Syntax-Like Basic Properties

2.1.1 Recursiveness

Embedded, recursive structures may be constructed within compounds, e.g.:

student film

student film society

student film society committee

student film society committee scandal

student film society committee scandal inquiry …

2.1.2 Constituent (Compound) Structure

The compound structure shows how constituents of a compound word come together and in what hierarchical order (especially, in endocentric compounds). In right-headed languages (Turkish, English, German, Dutch and Greek), the head is the rightmost constituent mostly while it is the reverse in left-headed languages (Hebrew) and inter-changeable in some other languages (French, Italian). The other element is labeled as modifier.

[student [film society]] = film society for students (modifier: student, head: film society)

[[student film] society] = society for student films (modifier: student film, head: society)

Depending on the branching, constituent scope and meaning can vary within complex compound structures as it is the case for sentences.

2.1.3 Relations between compound elements

The relations between the compound (particularly, syntactic compounds) constituents may sometimes exhibit relations similar to the (semantic) relations between the constituents of a sentence.

Head-Modifier Relations:

- One of the compound constituents functions as the head (**endocentric** compound), e.g., in [student [film [society]]] and [[student [film]] society] compounds, "society" is the head (i.e., it is always a kind of society).
- The majority of English and Turkish compounds are of this type.
- A hierarchical relation between the modifier and head constituents may exist in the compound structure. While the head constituent may indicate the general type of the thing represented by the compound, the modifier element may describe a characteristic of the head and thus limit the scope of entity referred to by the head to a smaller subset. (e.g.: *kapı kolu* (door handle+CM)'door handle'. While the head indicates that the compound refers to handles in general, the modifier element identifies the particular type, which is the 'door').
- As a compound word is basically represented by the head, almost all typological ((morpho) syntactic features, for instance, word class, gender, number, etc), theoretical and semantic properties of a compound are derived from the head constituent (Selkirk, 1982; Williams, 1981). For example, in Turkish, 'kara tahta'(''black wood''; blackboard) consists of an adjective (''black'') and a noun (''board''), but as the head is a noun, the syntactic class of the entire compound is a noun, too.
- In **exocentric** compounds, none of the constituents is the head. In English, few compounds exemplify this relation: pickpocket, lazybones, etc. However, in Turkish, such compounds are abundant, e.g., kaçargöçer (running-migrating), kaptıkaçtı (grasped-ran away), çekyat (pull-lie)
- In some exocentric compounds, there is a predicate-argument type relation between the compound parts; nevertheless, neither element is the head. Those are also called 'bahuvrihi' compounds (from the grammar of Sanskrit). For example,

in Turkish, ‘‘dalbastı’’ (‘‘branch press+PF; a kind of big cherry) consists of a noun (‘‘dal’’) and an inflected verb (‘‘bas-tı’’), the constituents exhibit a predicate-argument relation; however, neither element is head. Furthermore, in this example, the compound meaning cannot be derived from its constituents.

Predicate-Argument Relations:

In this relation, one element behaves like the object of the other element as is the case for a number of exocentric English compounds, such as: pickpocket → pick the pocket; cut-throat → cut the throat.

In endocentric synthetic compounds, predicate-argument relations can be depicted clearly, e.g., truck driver → drive the truck (the modifier ‘truck’ acts as an object to the verb-like predicate head which is ‘drive-er’).

Appositional Relations:

The compound elements may be just in a coordinative relation and there may not be any dependency between them in terms of classical head-modifier relations observed in endocentric compounds. In general, both compounds in coordination may behave like the head. Appositional compounds are also called ‘dvandva’ compounds (again from Sanskrit).

E.g.: mother-child (‘mother-child relationship’) in English, okur yazar (‘reader - writer’, literally, ‘literate’) (Turkish).

Appositional compounds are also similar to some syntactic phrases such as *Ayşe, my friend*

Semanticity[7] of a Compound

'Frege's Principle', in other words the 'Principle of Compositionality' states that "The meaning of a compound expression is a function of the meaning of its parts and of the syntactic rule by which they are combined." (Janssen, 1991) However, it is obvious that compounds are not fully semantically transparent in the sense described by this principle. This is also emphasized in another, related, statement of Frege's, the "principle of contextuality": "Never ask for the meaning of a word in isolation, but only in the context of a sentence". (Janssen, 1991,)

By applying the syntactic rules, (novel) compound combinations may be understood to a certain extent, e.g.: 'bekleme odası' 'waiting room'. The rules of grammar (CM marker) state that the first noun (waiting) specifies the special sub-type of the item denoted by the second noun (room). However, syntax does not imply in any way that it is a special room which is located at public places.

Transparency and compositionality are highly correlated terms for compounds. Thus, no special sub-section was provided for compositionality here. Nevertheless, it should notified that there are exceptions where compositionality and transparency do not go together (Libben, 1998).

In this study, such a detailed semantic categorization was not done over the distractor compound words. They were roughly categorized into one of two groups, namely, transparent and opaque.

- <u>Transparent Compounds:</u> In this type of compounds, all constituents contribute to the whole compound meaning (to a certain extent), e.g., "ayakkabı" (foot+case, literally, shoe) (in Turkish)

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[7] Usage of the terms, transparency and opaqueness only relate to the semantic properties of the compound. By transparency, it was meant to what extent the meaning of the constituent meanings contribute to the whole compound meaning and have no relation to syntactic structure.

- Opaque Compounds: The compound meaning is isolated from the meanings of its constituents. e.g., ‘‘blackmail’’. An example in Turkish, (Kornfilt, 1997, pg. 474) iş güç, ‘occupation; one’s work or trade’ (iş: ‘work’, güç: ‘energy; power; force; strength’)

2.2 Word-Like Properties

2.2.1 Lexicalization

As is the case for some simple words, a compound may gain idiosyncratic status, lose its original meaning and become non-compositional (as is the case for opaque compounds), e.g., penknife - originally ‘knife for cutting quills’.

2.2.2 Paradigmatic gaps

There is no strict rule identifying which words can be combined with which other words to form a compound. The process may not be based on certain principles, but explained by custom usage only. Therefore, there are merely idiosyncratic lexical gaps in the system of compounding which cannot be explained in a straightforward manner. E.g.: while the English lexicon has examples of rainfall, snowfall -, *hailfall is not one of the entries.

2.2.3 Non-referentiality:

Especially in endocentric compounds in which one element is the modifier, the modifier elements can never point to specific objects, e.g., in ‘kadın doktoru’ one cannot refer to a specific woman or doctor. This issue will be handled in detail later on, in the section for Turkish compounds.

2.2.4 Morphological integrity:

No other word can interfere with the constituents of a compound. This property of compounds is also a result of the first lexicalization property described.

Also, the non-head elements of a compound are not inflected and mostly the head part bears any inflectional suffix, e.g., *'pickedpocket' cannot be used for an ex-pickpocket or one of his victims.

2.2.5 Semantic Drift:

Constituents of lexicalized compounds may be used in compound structure so frequently that they may start acting like clitics/affixes rather than free stems. (e.g. Postpositions → inflectional affixes, adverbial modifiers → prefixes).

For example, in Russian, verbal prefixes such as ‘za’ developed from prepositions. Some verbal prefixes in Russian may gain idiosyncratic meaning in addition to their meanings as a preposition:
‘za’ (preposition): ‘behind’, ‘beyond’, ‘after’, ‘because of’, ‘on behalf of’
‘za’ (other usages): inception, preparatory activity, wrapping up, doing to excess or, just grammatically, to indicate the perfective aspect.

'bɛʒaʈˈ ‘to run’ ja vbɛʒaƫ f kɔmnatu ‘I in-ran into the room’ (here, -za indicates the perfective aspect)

For another example, in Turkish, ev bark, ‘house + family members’, ‘family’(literally) (here, the second constituent ‘bark’ lost its meaning and is used as a bound morpheme with ‘ev’).

2.2.6 Phonological processes:

Compounds differ from phrases in terms of stress assignment. While the constituent at the end of the phrase gains the stress in phrases (Nuclear Stress Rule), in contrast, the left-most constituent is stressed in compounds (in English).

Compound stress rule also applies to majority of the Turkish nominal compounds.

These compounds are a single word in terms of stress assignment.. The last syllable

of the first constituent takes the main stress similar to simple words, however, differing from stem+affix structures, the stress does not change when the compound is affixed.E.g.:

babà –'father'	büyǘk baba - 'grandfather'
baba-làr –'fathers'	büyǘk baba-lar - 'grandfathers'

In the literature, these compounds are called as *regularly stressed compounds. E.g.: báşbakan* (head + minister) 'prime minister', *sokák lambası*(street+light+CM) 'street light'. However, there are exceptions to this rule in which some compounds are stressed on the final syllable similar to regular stems, e.g.: *alışveríş* (*alíş* 'taking'+*veríş* 'giving') 'shopping'(Göksel et al., 2005,pg. 28-29)

3 Word Categories in Compounding

Syntactic word categories allowed in a compound structure differ from language to language. In English, nouns can be combined with other word types in many variations. What is more, adjectives and verbs are also used as head constituents, though, less than nouns. However, function words like prepositions cannot head any compound, e.g.: inhale not *halein. Some examples on possible patterns:

N+N *housewife*

A+N *blackboard*

P+N *input*

V+N *pickpocket*

4 Nominal Compounds in Turkish

There are many ways to form compounds in Turkish (Kornfilt, 1997, pg. 472). If reduplications (tabak mabak- 'dish and such'), regular doublets (yavaş yavaş –

‘slowly’), and doublets formed from antonyms (az çok- ‘more or less’) are included, it can be stated that there are many ways to produce compound words in Turkish, all differing in pattern.

For the aim of this thesis, as stated before, only the nominal compounding process will be taken into consideration. The current study is also limited to compounds with two-constituents and excluded left-headed Arabic loan compounds, e.g., *kabil-i tahammül* (able-CM tolerate, ‘tolerable’). Therefore, the following section is restricted to the description of Turkish nominal compounds.

4.1 Compound Types in Turkish[8]

Three nominal compound types are listed for Turkish: juxtaposed, indefinite and definite compounds. In the literature, these compounds are named differently or, furthermore, the classification also changes. In the following, a short outline of Turkish nominal compounds will be given in combination with their reference in the literature. Later on, each compound type will be discussed in detail. As will become clear, the boundary between the three types is not always clear, therefore, rather than in an isolated description, each type will be presented with respect to the others.

Dede (1978) describes three groups of Turkish nominal compounds: JC, IC and DC. She differentiates them firstly by a syntactic criterion. She bases her reasoning for this syntactic classification on the nature of the relation between the three compound types which is signaled more or less by the use of GEN and POSS suffixes:

1 Juxtaposed compounds: neither modifier nor the head constituent is inflected,

e.g., kadın doctor ‘woman doctor’ (a doctor who is a woman)

[8] In Turkish literature, JC and DC compound types are named as ‘and ‘belirtili tamlama’ respectively. On the other hand, several terms are used for ICs such as ‘belirtisiz tamlama’(König, FN1, p. 165, Lewis, 1967). , ‘adtakımı’ (Banguoğlu ,1998, pg. 331-39) and ‘ad tümlemesi’(Gencan ,1979, pg.135). In this study, ‘juxtaposed’, ‘indefinite’ and ‘definite’ compounds are used as labels for JC, IC and DC, similar to Lewis(1967)’ usage.

2 Indefinite compounds: only the head constituent is inflected with the POSS suffix, e.g., kadın doctor-u ‘ woman doctor-3SG.POSS’ (a doctor for women, gynecologist)

Definite compounds: both parts are inflected; the modifier is inflected with GEN suffix and head noun is inflected with 3SG.POSS suffix, e.g., kadın-ın doctor-u ‘woman-GEN doctor-3SG.POSS’

The first construction also seems structurally similar to primary compounds in English. However, it is the second nominal compound type that resembles most to root compounds in English. Marchand (1969, pg. 41) distinguishes the first two constructions by using the term "subsumptive construction". He states that while the first nominal construction is a non-subsumptive combination in which the relation is attributive, indefinite types are classified as subsumptive, as the modifier noun refers to a sub-class of the item denoted by the head noun. In languages like Turkish, this semantic relation is marked morphologically whereas in English, the two forms are syntactically similar.

Similar to Marchand (1969, pg. 41), König (1987) describes two basic types of compound formation in Turkish, derivational composition (IC) versus non-derivational (JC) composition; however, he excludes the DC group. He identifies JC as a canonical way of compounding which yields a common noun. He emphasizes that JCs are semantically marked and in order to extract the meaning of a JC construction, additional world-knowledge which exceeds linguistic knowledge is necessary. That is, information is not made available through the principle of compositionality but through Frege’s Principle of Contextuality (see section on Semanticity of Compounds). On the other hand, he identifies IC construction as a derivational process in which the head part of the compound is syntactically marked and Frege’s Principle of Compositionality holds, i.e., the compound meaning is the sum of the meaning of the two constitutive N’s.

König (1987) also states that each non-derivational type can be expressed with a derivational one; however, in that case, the choice of either type depends on the extra, non-linguistic world knowledge of the competent speaker/listener.

On the other hand, similar to Dede's (1978) approach, Lewis distinguishes nominal compounds in Turkish by calling the first group "root" compounds and classifying the other two under the common name "izafet group". In this study, as DC constructions are as widespread as the other types, Turkish nominal compound classifications reflected the stance of Dede (1978) and Lewis (1967).

4.1.1 Lexicalized concatenation of words (bare JC):

In the Turkish literature, they are also named as "takısız tamlama (compound with no inflection)". The first controversial issue related to juxtaposed compounds revolves around their naming in the Turkish literature and their difference from adjective phrases. Their formal and functional similarities with adjective phrases led to different classifications in the literature:

e.g.: yeşil çorap 'green socks' (AP)
yün çorap 'wool socks' (JC)

Some Turkish linguists focus on the similarities of JCs with APs and state that they should not be considered as a compound, but, rather an AP (Banguoğlu,1986; Ediskun,1988; Ergin,1990; Türkseven, ÇTD:77/78,91; Kahraman, ÇTD:91 and Erseven , ÇTD: 1994, pg. 77/78). They emphasize the fact that both constituents of a JC are not suffixed and the first noun modifies the second noun similar to adjective phrases. Furthermore, they state that the origin of JC construction is an adjective clause which underwent a transformation. They take this as a justification to consider it as an adjective phrase, e.g., yün çorap 'woolen socks' → yün (-den yapılmış) çorap 'wool (-ABL+MAKE+PASS+PF)→'socks made of wool'.

However, some linguists follow an opposite line of argumentation and classify JCs as a nominal compound with no suffix (Gencan, 1979: 158-170; Hatiboğlu, 1972:12-18; Eryasar, ÇTD: 85 and Bolulu, ÇTD: 88). They mainly focus on the fact that both constituents of a JC are Ns and this does not violate un-suffixed compound formation. Furthermore, Bolulu (ÇTD:1995, pg. 88) and Yavuz (1995) propose a methodological stance to distinguish juxtaposed constructions from adjective clauses and, firstly, suggest that juxtaposed compounds should be evaluated in four dimensions with respect to their constituent morphemes: morphology, meaning, lexicalization and function:

1 *meaning:* the first constituent which is the modifier is classified as noun. However, this criterion was not found sufficient as also first constituents may be adjectives in JC type compounds, e.g., akbalık, 'white fish', 'dace'
2 *morphology:* the first constituent may be inflected with suffixes which are used with noun, e.g., in taş duvar, 'stone wall', the first noun can be inflected with the adjectivizer suffix –li, yielding taş-lı duvar, which makes the construction an adjective phrase.
3 *function:* first constituent stands in a 'made-of' relation with the second noun, in other words, describes what the second noun is made of, e.g., taş duvar, 'stone wall' (the wall which is made of stone). If this fact leads to a classification of the first noun as adjective, a similar situation arises in ICs such as: mantar çorbası, 'mushroom soup+CM' (soup which contains mushrooms). In these examples, it is also a convenient usage to omit CM and replace IC with the JC alternative: mantar çorba (every JC has an IC version (with different functions related to the modifier). This is the stance advocated by König (1987))
4 *lexicalization:* this is the strongest dimension of JC-proponents' claim. JCs are frozen structures and no other word can interfere with the two constituents, e.g., *taş büyük duvar 'stone big wall' but büyük taş duvar 'big stone wall'

Bolulu (ÇTD: 1995, pg. 88) and Yavuz (1999) suggest that similar criteria can be found which distinguish JCs from APs. In this study, JCs denote "takısız isim tamlaması" in Turkish.

Word class patterns which can be found in JCs are:

N+N *babaanne* 'grandmother'
A+N *sivrisinek* 'mosquito'
N+A *kan kırmızı* 'blood red'

N+V *dal bastı* ‘branch pressed’ (‘large’ (cherries))

Other word class categories are also allowed, however, as stated before, not included in the scope of this study.

V+V *çekyat* ‘sofa bed’

?+V *şıp sevdi* ‘plop he-has-fallen-in-love’(‘impressionable’)

V+N *çalar saat* ‘ringing clock’ (alarm clock)

These compounds are similar to the root compounds described above.

Properties of Turkish Simple Compounds

- These compounds usually have attributive meaning in that the first constituent denotes a property of the second constituent which is usually the head, e.g., *demir kapı* -‘iron door’
- Compound constituents may also be used in a coordinative relation, in which both parts behave like a head, e.g., *yaz kış* –‘summer winter’ (literally: ‘continuously’)
- They violate vowel harmony in contrast to the majority of simple words.
- Their meanings are generally frozen and cannot be derived from the meanings of its constituents due to their idiosyncratic nature. Therefore, the constituents either do not occur in isolation or the meaning changes when the constituents are separated. Thus, the order of the constituents is fixed except “variant compounds”[9] (Göksel et al., 2004), e.g., çek yat or * yat çek, ‘pull lie.down’, ‘sofa bed’ (literally)
- They are not very productive.

4.1.2 Izafet (annexation) Construction *(-(s)I compounds)*

The Izafet Construction mechanism partially reflects the English compounding system. It is signaled by possessive affixes and forms compounds using possessive morphology. However, functionally, the relation between the constituents of the ICs

9 Variant compounds form a quite limited subset of nouns used to name some of the dishes, e.g., balık ızgara –‘fish grill’ and ızgara balık- ‘grill fish’ are both valid usages.

is not possessive, but rather, attributive. Following the literature on Turkish compounds, to differentiate between possession and attribution, CM notation is used to depict the affixed noun in ICs whereas POSS notation (generally, 3SG.POSS) is used for DCs in this thesis (see König, 1978; Underhill, 1976).

There are two types of izafet constructionss defined in the literature, namely, definite and indefinite.

Indefinite Izafet

Grammatical Form: Noun + Noun-CM (compound marker[10]: -I (after consonants) / -sI (after vowels))

Examples:

yemek oda-sı	*dil balığ-ı*
dinner room-CM	tongue fish-CM
'lunchroom'	'swordfish'

Definite Izafet (Göksel et al., 2005, pg. 102-107&182-190):

The genitive-possessive construction, also known as syntactic possessives, is a composite noun phrase constructed of two noun phrases inflected as follows:

Grammatical Form: Noun phrase-GEN[11] + Noun phrase-POSS[12] (genitive suffix: -In (after consonants) / -nIn (after vowels))

[10] Also called Nominal Relation Marker (Göksel, 1988).

[11] The genitive suffix is (-n)In. When this suffix is added to a word ending with a consonant, n(EC) is dropped. Also, due to vowel harmony, the I high vowel also undergoes changes in conformity with the vowel in the preceding syllable. In that condition, I has eight variations:

-nın	-nin	-nün	-nun	-ın	-in	-ün	-un

[12] The third person singular possessive suffix has eight variations, too, due to vowel harmony. –s can be interpreted as EC:

-sı	-si	-sü	-su	-ı	-i	-ü	-u

There are variations of the possessive suffix depending on the first constituent (see Table 1)

Table 1 Possessive suffixes

-(i)m	*-(i)miz*	*owned by me*	*owned by us*
-(i)n	*-(i)niz*	*owned by you*	*owned by you*
-(s)i	*-leri*	*owned by it*	*owned by them*

The first noun phrase, which carries genitive case marking, is the modifier and indicates the possessor. The second noun phrase, which carries possessive marking, is the head of the composite noun phrase and indicates the entity which is possessed[13]. The possessive suffix (Table-1) on the head has to agree in terms of grammatical person with the possessor-modifier, as illustrated below:

komşu-n-un tavuğ-u		*bardak-ın desen-i*
neighbour-EC-GEN	report-	glass-GEN design-3SG.POSS
3SG.POSS		'the design of the glass'
'the neighbour's chicken'		

Furthermore, the possessive-marked head of the genitive-possessive construction also carries any case marking needed to indicate the relation of this composite noun phrase with the other sentence constituent. In the below example, the source of the news is marked with "ablative" case:

Bu haber-i {Ali-nin oğl-**un**}-**dan** al-dı-m.

This news-ACC Ali-GEN son-3SG.POSS-ABL get-PF-1SG

'I heard this news from {Ali's son}.'

The status of definite compositions as a "compound word" is highly debated in the

[13] The relation between compound elements is usually possessive when the first constituent is animate and part-of when it refers to an inanimate item.

literature. However, they are formally very similar to the indefinite izafet group (which will be stated more explicitly in the following sub-sections). Also, as in this study, DCs are mainly novel constructions except their occurrence in idiomatic expressions (e.g., ‘armut-un sap-ı üzüm-ün çöp-ü’, ‘pear-GEN stem-CM grape-GEN leavings-CM’, (literally) ’find fault in everything’). Gagne et al. (in Libben et al., 2006, pg. 148) point out that novel compounds have no conceptual representation and thus no lemma in the mental lexicon of native speakers. They further state that as all lexicalized compounds start as novel constructions, therefore, investigating novel compounds may also reveal the processing mechanisms of lexicalized compounds.

4.1.3 Definite vs. Indefinite Izafet

a Linking Element vs Possessive Marker

As stated before, even though the compound marker in the indefinite izafet group is formally identical to the third person singular possessive (3SG.POSS) suffix, the relation between the constituents indicated by the suffix is not possession, but rather attributive. However, in the definite izafet group, the relation is possession, in contrast. This difference is also clearly stated by Lewis (1967, pg.42): ‘The indefinite izafet is used when the relationship between the two elements is merely qualificatory and not so intimate or possessive as indicated by the definite izafet.’

One important thing which must be also added is the kind of possession indicated in a DC structure. The degree of possession can be manipulated through morphology which will be described in the section on ‘Morphological flexibility’ below. On the other hand, the degree of possession can vary and even without a morphological change, possessor and possessed relation can be exchanged by the constituents depending on the semantic properties of the constituents in a DC.

Even though all the examples below have the same meaning that both constituents are fully inflected, the degree of the possessive relation is different:

- Ayağ-ın sahib-I ‘the owner of the foot’

Even though morphologically the modifier (foot) is the owner of the head (owner), semantically, the owner possesses the foot)

- Kadın-ın saç-ı ‘the woman’s hair’ (strong possession)

  Kadın-ın ölüm-ü ‘the woman’s death’ (predicate-argument relation, ‘woman’ is the subject of the predicate ‘öl’)

  Kadın-ın ölü-sü ‘the woman’s corpse’ (both modifier and head part refers to the same physical object. X=‘kadın’=’ölü’. This usage is similar to the JC’s, e.g., kadın doctor ‘woman doctor’, also see the section ‘Transitions between compound types’)

  Even though morphologically the indicated relation is possession, the degree and nature of possession is different in the above cases.

b Referentiality

The 3SG.POSS suffix provides a definite/referential status to the noun it is attached to, whereas the CM makes the nominal compound indefinite/non-referential.

Also Ediskun (1963, pg. 129) points out the difference in referentiality between the constituent relations of the two constructions and the context-dependence of the DCs. He states that a DC is "concrete and pertains to reality at the moment of speaking” whereas he ascribes a more general nature to ICs which is "abstract and does not have any reference to reality at the moment of speaking", as in:

" *Orhan ism-i*	*Orhan-ın ism-i*
Orhan name-CM	Orhan-GEN name-3SG.POSS
‘the name “Orhan”’	*‘Orhan’s name’*
çoban kız-ı	*çoban-ın kız-ı*
shepherd girl-CM	shepherd-GEN girl-3SG.POSS
‘the shepherd girl’	‘the shepherd’s daughter’
(first element used non-referentially)	(first element used referentially)

However, if the IC is suffixed with accusative marker in the second constituent, it acquires a definite/referential status:

[Yemek kitab-ı]-n-ı nereye koydun?

‘Cook book-CM-EC-ACC to-where put-PF?

‘Where did you put the cookbook?’

b Morphological flexibility

In DC constructions, the 3SG.POSS suffix (and variants of possessive suffixes) is mandatory in any definite izafet group; otherwise, it would lead to ungrammaticality, e.g.:

bebeğin süt-ü hazır. *bebeğ-in süt hazır.

GEN 3SG.POSS

‘Baby’s milk is ready’

However, Göksel et al. (2005, pg. 184) refer to an exceptional case in which the possessive suffix can be omitted, especially, when the first constituent is the first or second person pronoun (informal style) and the possession relation between the the constituents describes an alienable[14] type of possession (the possessor can disclaim the possession of the entity identified by the first noun). In that kind of usage, the relation between the modifier and head noun turns into an identity relation rather than possession and the relation is understood from the context (Dede, 1978, pg. 26 and Sebüktekin, 1969, pg. 176), e.g.:

Biz-im iş_ bitmeyecek gibi. ‘Our work will most probably not finish.’ (alienable possession and identity relation)

GEN (the full version: Biz-im iş-i-miz)

* biz-im anne ‘our mother’ → biz-im anne-miz’

* ben-im baş ‘my head’ → ben-im baş-ım

What leads to ungrammaticality in the above two cases is due to inalienable possession relation between the constituents in which the possessor has a physically, undeniable relation with the possessed item.

As explained above, this usage is only restricted to the first or second person pronoun (singular or plural) and leads to ungrammaticality when the third person pronoun (singular or plural) or a proper name is used instead. In those cases, the full form of the DC must be used in which both modifier and head nouns are present, e.g.:

* o-nun masa → o-nun- masa-sı ‘his/her/its table

*onlar-ın masa → onlar-ın masa-sı ‘their table’

*Ali-nin masa → Ali-nin masa-sı ‘Ali’s table’

There is also an exceptional case to the above rule which states that in inalienable possession the possessive suffix cannot be omitted. The case is as follows: When the head noun refers to the name of a person or place, the common usage is to omit the

[14] Inalienable possession (opposed to alienable possession) in linguistics is a relationship between two objects indicating that they are (possibly on a less-than-physical level) connected in some way that cannot be changed. Kornfilt(1997,pg. 186)

possessive suffix. However, in that case the nature of the relation changes and turns into an identity relation, e.g.:

Biz-im Ankara ‘our Ankara’ (meaning:’the Ankara we know’ rather than the Ankara we possess)
Siz-in Ayşe ‘your Ayşe’ (meaning:’the Ayşe you know’ rather than the Ayşe you possess)

Also when the first noun is a pronoun, omission of the modifier noun in DC is possible, especially when the possessor is understood from the context or when there is no particular need to emphasize the possessor.

Biz-im masa-mız ‘our table’ (strong emphasis on the possession)
Masa-mız ‘our table’ (less emphasis on possession)

In this study, all DC structures used have a strong emphasis on possession and the possessor. As the constituent priming technique is used, a full realization of both constituents is mandatory to provide equivalence between JC, IC and DC in terms of processing.

Omission of the constituent cannot be considered in CM type of compounding as it refers to a single entity as a whole. Nevertheless, Hayasi (1996) underlines several cases in which CM in indefinite compounds can be omitted[15]:

- When the head of an indefinite izafet is inflected with a possessive suffix:

gece elbise-s-i → gece elbise-m, ‘my night dress’ not: *gece elbise-s-i-m
CM 1SG.POSS

[15] When translated into English, the CM suffix disappears (Kramer, 2008), or, when Slavic languages are considered, as in Turkish loan ICs, it is dropped or exchanged with other suffixes denoting gender, etc.

- When the head of an indefinite izafet is already inflected with the derivational suffix -lI:

zeytin yağı   zeytinyağ-lı fasulye

CM

'olive oil' 'bean with olive oil'

- When the indefinite izafet becomes the modifier of an another indefinite izafet group:

Büyükşehir Belediye-si   [Büyükşehir Belediye] Bina-sı

CM   CM

'Metropolitain Municipality' The Building of Metropolitain Municipality'

- Conventionally, the compound marker may be omitted in place and street names and in names of dishes in colloquial speech, e.g.:

Savaş Sokak (-ı) 'Savaş Street'
balık ızgara (-sı) 'fish grill'

In the majority of the cases, CM cannot be omitted without a change in the meaning and function, e.g., IC without CM can be interpreted as an adjective clause. In that case, IC turns into its JC version, however, gains a new interpretation:

kadın berber-i	kadın berber
'women's barber'	'woman barber'
(a barber who serves women in particular)	(a barber whose gender is woman)

c lexicalization ('frozen'-similar to juxtaposed constructions): some of the ICs become lexicalized and thus refer to a single entity; e.g.
ayakkabı 'foot case-CM' ('shoe')

In this example, the CM behaves like a linking element combining the two constituents rather than a suffix and any other suffix is attached to the compound word after CM, e.g.:

plural suffix : ayakkabı-lar ‘shoes’ (normally, the plural suffix would precede the CM, this exceptional case was studied in detail under the name of “bracketing paradox” by Göksel(1988))

possessive suffix: ayakkabısı ‘her shoe’

d No element can interfere within the constituents of a lexicalized indefinite izafet. However, in contrast, definite izafets have a more flexible structure and allow syntactic modification. Thus, even if an indefinite izafet chain is to be modified, it automatically turns into a definite izafet:

Istanbul camiler-I
Istanbul mosques-3SG
‘Istanbul’s mosques’

Istanbul-un tarihi camiler-I
Istanbul-GEN historic mosques-3SG
‘Istanbul’s historic mosques’

When the indefinite izafet above is translated into English, the same situation holds:

Istanbul mosque / **Istanbul historic mosque*
Istanbul’s mosques / *Istanbul’s historic mosques*

An exceptional case when the indefinite *izafets* can be ‘modified’ is when the head constituent is also an indefinite izafet (used in a recursive way):

Türkiye Büyükelçisi
Turkey great-envoy-3SG
‘the Turkish ambassador’

The fact that genitive-possessive constructions allow adjective interference between the constituents in contrast to indefinite constructions also shows that ICs have a lexical status and thus represent a single concept in the mind.

However, the definite izafet clearly refers two objects: possessor and possessed. Thus, the location of the adjective creates meaning difference in the DCs in terms of modifying the constituent it precedes.

Also, an indefinite izafet may be the modifier of the constituents of a definite construction. E.g.:

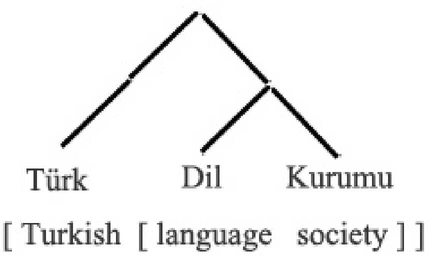
yazılım-ın [analiz rapor]-u	[yazılım analiz-i]-nin rapor-u
‘of-software analysis its-report’	‘software of-its-analysis its-report’
‘the analysis report of the software’	‘the report of the software analysis’

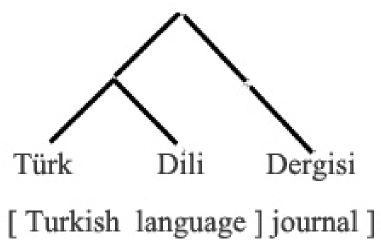
e Recursion: There are two types of recursion observed in the indefinite izafet group:

a) right-branching: The indefinite izafet is modified by the noun preceding it.

b) left-branching: The indefinite izafet modifies a noun.

right-branching	left-branching
Türk Dil Kurum-u	*Türk Dil-i Dergi-si*
Turk Language Society-CM	Turk language-CM journal-CM
‘Turkish [Language Society]’	‘[Turkish Language] Journal’



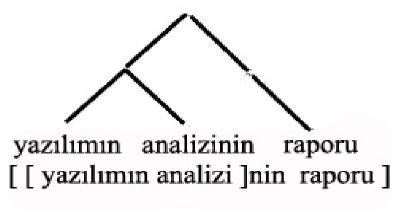


On the other hand, only left-branching recursion is possible in the definite izafet group:

yazılım-In analiz-I-nIn rapor-u

‘of-software of-its-analysis its-report’

‘The report of the analysis of the software’



f DCs in Turkish correspond to three basic English structures:

Possessive Pronoun + N (not included in this study): ben-im baba-m, 1st Person Singular Pronoun+GEN father+3rd POSS, 'my father'

N1's+ N2: Ali'nin babası, 'Ali+GEN baba-3rdPOSS', 'Ali's father'

N2 of N1: Evin bacası, 'house+GEN baca-3rdPOSS', 'chimney of the house'

The indefinite izafet groups are similar to Germanic right-branching compounds as stated before, e.g.: [[seat belt] law]

g Indefinite izafets are considered more like compound structures. While there are many examples of indefinite izafets transferred into a Balkan Slavic language (assimilated in form or not, taboragasƏ 'Commander of a Turkish military unit' , xaloolu 'first cousin', kana ƈiƈe(k) (kana çiçek-I,'Impatiens balsamina')) definite izafet constructions of the type kadin-In sapka-sI generally appear only where there is an exact translation from Turkish (Kramer, 2008).

h Like English compounds, the head of an indefinite *izafet* must be a word. N and A are the two major categories involved in Turkish nominal compounds. However, the most productive class indicated in the literature, as stated before, is Nouns.

N+N adaçayı 'island tea' ('garden sage')

A+N kara elmas 'black diamond' ('coal')

i In both compound types, the order of the two elements is fixed, the first element is the 'determinans', the second element the 'determinatum' (Kramer, 2008), e.g., cep parası (pocket its-money) 'pocket money'. However, it is also possible to interpret some ICs as left-headed, e.g.:

dut kuru-su (mulberry dry-CM) 'dried mulberries'

Here, if the word 'kuru' is classified as adjective, labeling the first constituent which is a noun as head is more acceptable. But, if 'kuru' is also classified as noun meaning ‘something dry’, then a right-headed interpretation also becomes available.

4.2 Transitions between Compound Types:

Sogaard (2007) suggests a hierarchy for compounds in which nominal compounds are the initial (or primordial) elements of complex noun phrases. The branching in that tree depends on the semantic relations indicated by the elements of the noun phrases. He suggests that, by time, endocentric compounds are formed from prepositional and possessive phrases whereas adpositional and copulative compounds emerge from noun phrases in coordination. In that account, he also suggests that linking elements generally lose their semantic meaning and either get lost or bear a pure role of binding the compound constituents.

This may be the case for some of the nominal compound examples in Turkish in which transition from one type to another is possible, as in:

DC	**IC**	**JC**
patlıcan-ın dolma-s-ı	patlıcan dolma-s-I	patlıcan dolma
‘patlıcan-GEN dolma-EC- 3SG.POSS	‘patlıcan dolma-EC-CM’	Filled eggplants
	Filled eggplants	

However, as indicated, this is not a general rule and thus applies to only some examples. In other compounds, the compound is more embedded in the linking suffixes; thus, removing them leads to a meaning loss and ungrammaticality, e.g.:

‘bal mumu’- ‘bee’s-wax’

JC	**IC**	**DC**
*bal mum	‘bal mum-u’	‘bal-ın mum-u’
	‘bal mum-CM’- ‘bee’s-wax’	*bal-GEN mum-3SG.POSS

5 Compound Representation in the Mental Lexicon: Several Alternatives

Most studies on compound production and comprehension adopt either of the two main symbolic approaches to compound processing or prefer to stand on the midway between the two: full-listing versus full-parsing. Also, recently, distributed connectionist theories have emerged which state that morphemes have no representation and are just a realization of the interaction between syntax and semantics (Plaut & Gonnerman, 2000). In that respect, these theories are similar to lexeme-based theories of morphology and the full-parsing strategy. However, also contrasting with the latter two, they are distributed, not symbolic accounts. In this study, as the priming effects of morphology is of primary concern, morphology-based symbolic accounts were adopted and will be described in detail in a comparative manner with the other symbolic theories.

The ‘‘Full-listing’’[16] hypothesis (Butterworth, 1983) of compound processing assumes that possibly compound words are stored in the mental lexicon in their full form. This view is based on the idea of enhancing process efficiency in the mental store and in visual word recognition. If any morphological parsing is found necessary, it would only occur as a post-lexical operation, after the whole word representation is reached. Actually, when frequently used, thus accessed compound words as well as opaque ones in which the whole compound meaning cannot be derived from the constituents, are taken into consideration, the full-listing strategy of compounding seems the most reasonable and efficient method. As soon as a novel compound word such as ‘boathouse’ is encountered, it is represented in full form with no reference to its compound structure in terms of single constituents.) (see Figure 1)

[16] The full-listing hypothesis is also known as “semantic dependency hypothesis”. According to this hypothesis, morphemes are related to words only in semantic ways; thus, only transparent complex words are parsed into their constituents (Roelofs et al., 2002).

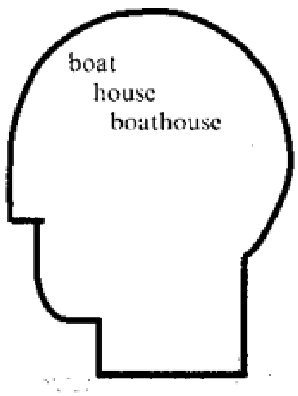


Figure 1 Full-form representation of compounds words (taken from Libben et al. (2006, pg.6)

The second alternative assumes that compounds have no unique lexical entry in the mental lexicon. Rather, the compound meaning is computed from its constituents (‘‘full-parsing-decomposition’’[17] approach; Libben, Derwing, & de Almeida, 1999; Taft & Forster, 1976). According to this view, in visual word recognition, morphological parsing is essential and a pre-lexical operation prior to whole word recognition.

As soon as a novel compound word such as ‘boathouse’ is encountered, it is represented in terms of its constituents and no link is provided between the structural representation of the compound and its constituents (see Figure 2).

Each time an existing compound word is encountered, possible meanings should be computed in an online manner.

[17] also known to be “morphological autonomy hypothesis”. According to this hypothesis, morphological form is crucial and all complex words are decomposed into their constituents regardless of the semantic contribution of their morphemes. (Aronoff, 1994)

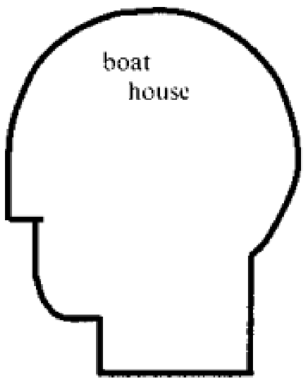


Figure 2 Decomposed representation of compounds words (taken from Libben et al. (2006, pg.6)

Both theories point out regular and less-complex systems as they have one compound processing option, being either full-parsing or full-storage. However, they have some disadvantages. First of all, the full-parsing approach suffers from over-representation whereas the latter from over-parsing. In both mechanisms, a pre-sorter-searcher should be used to find out the lexical status of each word encountered. What is more, in each system, there is a particular bottleneck case. While the full-listing approach cannot adequately provide an explanation for novel compounds in which parsing the constituents is mandatory in order to process and build a representation, a reverse situation arises for the full-parsing approach in the case of opaque compounds in which the compound meaning is partly or completely independent of the meanings of its constituents.

As a third alternative, dual-route models take an intermediate position. They do not depend on providing storage or process efficiency separately and during compound processing, one of these two alternatives is selected. This selection relies on factors related to compound-specific properties such as frequency, semantic compositionality (transparent vs. opaque), etc.. While full-listing is favored for frequently used compounds and semantically opaque ones, full-parsing is preferred for transparent and low–frequency compounds. However, the problematic point for the dual-route models is to provide an exact, rule-based explanation on the switching mechanism between these two routes. In the last decade, several studies appeared presenting evidence for dual route models (Zwitserlood, 1994, Koester et al., 2004, 2007 and 2008).

All three models mentioned are based on the idea of providing efficiency either in storage or computation or both. Similar to the dual-route models but with a different logic, Libben et al. (2006, pg. 9) propose a model for compound processing which relies on opportunity rather than efficiency. In the system they describe, the basic concern is neither providing processing nor storage efficiency; rather, all possible alternatives for a compound in terms of its constituents are represented in the mind. For example, for the compound “blackboard”, all possible alternatives, full form and decomposed form, are represented in the model. All representations have bi-directional links to each other, thus the full compound form gets activation from both morphological parsing of the constituents and fully structured form representation of

the compound in the mind. Libben et al. (2002) suggest that morphological parsing is a pre-lexical and obligatory operation prior to compound (existing or novel) recognition and morphological parsing due to activation by the structured representation of the compound is a post-lexical and optional operation. They notify that these two approaches are different in that pre-lexical parsing activates both constituents, post-lexical activation may inhibit or suppress activation of the less related constituents of the (partially or fully) semantically opaque compounds which have incompatible decomposed and full-form representations due to opacity. As soon as a novel compound word such as ‘boathouse’ is encountered, it is represented both in terms of its constituents and full-form (see Figure 3). Also, optionally, there might be bidirectional links between the compound constituents at the full form representation. Therefore, in such a system single constituent morphemes may have more than one link as ‘boat’ has links to both ‘boathouse’ and ‘houseboat’. Also, pre- as well as post-lexical parsing may be going on. As soon as a compound word is encountered, the pre-lexical parser activates all possible representations for a compound word – ‘black’,’board’,’blackboard’, etc. – until a satisfactory representation is chosen (see also Figure 4). In that way, constituents of a compound word both get activation from the serial parsing and later on optionally from the full compound representation.

Frequency, transparency, family size etc. are important parameters which define the strength of a particular link (or strength of the post-activation) and identify the choice of a suitable representation in the opportunity-based network. In the best case, for example, for transparent compounds, all representations are activated and the one

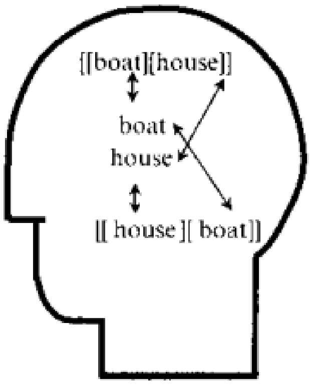


Figure 3 Opportunity-based representation of compounds words (taken from Libben et al. (2006, pg.6)

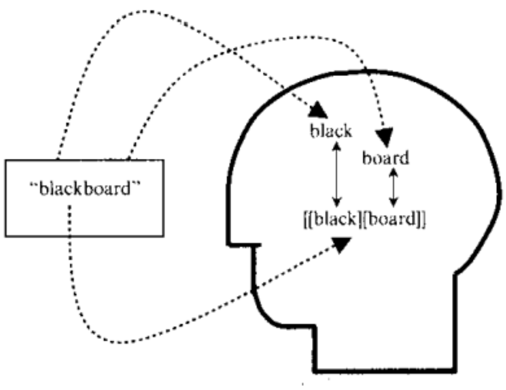


Figure 4 Detailed processing of the opportunity-based model. Pre-lexical and post-lexical parsers processing compounds words (taken from Libben et al. (2006, pg. 9))

whose connection with the conceptual representation of the compound is stronger gets activated. However, in the worst case, the selection mechanism has to deal with extra inhibitory links related to semantic representations of the compound constituents particularly in the case for fully or partially opaque compounds.

Considering the special status of opaque compounds in particular, Libben (1998) suggests that a compound word may be represented on three levels, namely: stimulus, lexical and conceptual. He further suggests that opacity of a compound may be represented by missing links between the whole compound representation and constituents at the conceptual level. For example, the below picture (Figure 5) depicts the (re)presentation of two Turkish nominal compounds, one transparent (a) and one partially opaque (b) : süt beyaz, 'milk white', literally, 'snow-white' and sütliman 'milk harbour', 'dead calm'.

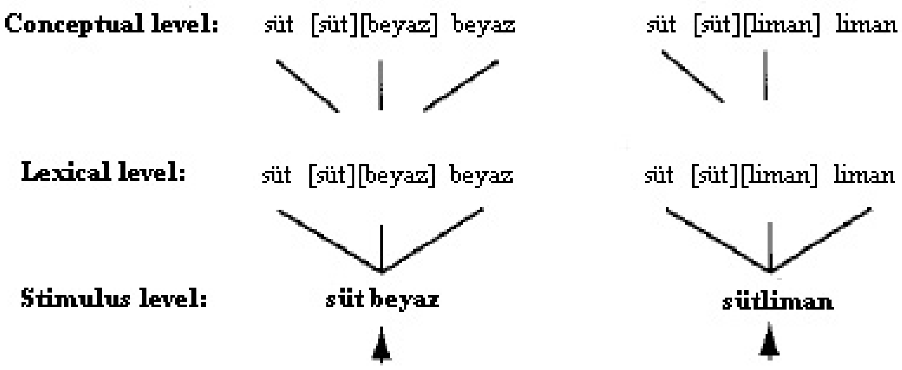


Figure 5 : Three levels of representation of Turkish compounds (adapted from Libben (1998))

These two compounds have similar representations at the stimulus and lexical levels. However, Libben's suggestion of an opportunity-based model is in line with dual route models; however, it does not seek for specific rules. In this system, with the words of Libben (2006, pg. 9) "… it does not require anything to be decided. Rather, all representations that can be activated will be activated. …" When the in-deterministic nature of compounds and the ambiguous results from various behavioral studies related to compound words are considered, a flexible compound processing such as the one which seeks for opportunity, rather than a rule-based one (full-parsing and full-storage models) seems most appropriate.

A similar, but more complicated and detailed account to compound representation is proposed by Jackendoff, in his “Full Entry Model” (Jackendoff, 2009, pg. 109 and pg. 162). This model does not depend on a list of morphemes and generative rules of word formation which would be applied to them in order to form lexical entries. Each existing and possible lexical entry ready for insertion in the mental lexicon contains morphological, semantic and syntactic information and this information is used as an input to semantic, phonologic and syntactic units of word formation. Each unit has its own word formation constraints, rules and structural representation for a particular word. However, the units do not behave independently and they interact with each other in terms of interfaces and bidirectional links between these structured representations. A specification in one unit may have more than one specification in other units.

At the lexical entry side, Jackendoff describes each lexical entry in terms of three components: (1) the information which denotes the existence of that entry. (2) The information if that lexical entry could be represented by a rule or not (3) The cost of applying that rule. For example, for a compound like 'balık adam', if that word is an existing one (as is true for the example) and also a frequent one, it will have an entry in the mental lexicon. This is indicated by the first component of the lexical entry. If no entry is found, knowing that the lexicon also has entries for "balık" and "adam", possible rules are considered to combine them in a single entry. The possibility of applying a syntactic rule to concatenate two nouns to the extent that the information represented by them would be in conformity with phonologic and semantic constraints (whether 'balık adam' is a fish or a fish-kind man or a man with similar properties as a fish). If applying a rule yields a feasible cost, than it is chosen.

6 How Are Words Processed in the Mental Lexicon?

In the literature, several models of language processing (production and comprehension) have been proposed to explain language phenomena and related linguistic processes. They vary in terms of the steps (one and two-step models) involved in the models and the manner of activation (modular, cascading and interactive).

The model proposed by Levelt at al. (1999, see also Roelof (1992)) is a very well-known model which is accepted as a working mechanism of lexical access and language production. This model is a two-step model in which lexical and morphological encoding constitute separate layers and activation between these layers occurs on a modular basis, meaning that activation serially proceeds from lexical representation to morphemic representation, whereby each representation is only formed after a full representation is completed in the preceding layer. This model was also chosen as a working model for this study. Several reasons can be adduced for this choice. Firstly, for studying with the morphological priming paradigm, as stated before, Levelt's model is one of the most influential and widely accepted models. Also, the reference studies which this thesis builds upon (Zwitserlood et al., 2002, 2004 and Koester et al., 2008) accept Levelt's model as reference model for language production. To be able to come up with cross-linguistic results, interpretations, and comparisons, Levelt's model was therefore chosen. Secondly, Levelt's model does not merely rely on patient data, but also on normal subjects' language data. The model matured along a long history, it was tested, validated and corrected not only depending on computer simulations (WEAVER (Word-form Encoding by Activation and VERification), Roelof, 1997) but also on the results of behavioral and, recently, ERP studies. Finally, as will become clearer in the following sections, the paradigm used for this study, namely the Picture Naming Paradigm (PNP), and this model complement each other. Therefore, a special section was devoted to describing this model and meanwhile, details of the model architecture are provided.

In this model, depending on the assumption that speaking normally proceeds from meaning to speech, the mental lexicon is viewed as having three layers: *conceptual stratum*, *lemma stratum* and *lexeme stratum*. Morphological encoding is assumed to be taking place at the lexeme layer.

The first stratum, the conceptual layer is architecturally similar to the Spreading Activation Model of Semantic Memory by Collins and Loftus (1975). This layer is composed of interconnected concept nodes. The links between each node are labeled with the relevant semantic relationship type. Concept nodes are also linked to the next layer in which their corresponding lemma nodes are represented. Some concept nodes and lemma nodes have bidirectional links. Syntactic properties (such as lexical category (verb, noun, adverb, adjective, etc.), variable information such as plural inflection, tense, case and constant information such as gender etc. of the words are represented in the lemma layer. These diacritic parameters are crucial in building correct syntactic structures. Then each lemma, with monodirectional links, is connected to its specific lexeme which represents the phonological/formal information related to words. This stage is also described as morphological encoding as the morphemes are the basic units. The segmental pattern of a word is also represented by morphemes, for example, the morpheme < balık > (‘fish’), is composed of the segments /b/ /a/ /l/ /ı/ and /k/. In the following step, selected segments are ordered within syllable(s). For example, for the word *balık,* the syllabification would be as follows: [ba] [lık.]. In that stage, all morphemes (and phonemes) get activation through parallel links, however, they are processed one by one in an incremental manner, from left-to-right (Roelofs, 1996).

Finally, this information is used in the phonological/articulatory domain where appropriate articulatory gestures are produced from the previously selected lexemes.

In this network of layers, word processing is accomplished via spreading activation between nodes and within layers. If the picture naming task (PNT) is simulated on this network of layers, when the subject first encounters the picture, a conceptual representation of the object represented by the picture is activated. Due to bidirectional links with other concepts, related concept nodes are also activated. Then activation proceeds to the next layer in which lexical representation(s) of the concept-related lemmas is/are activated. If more than one lemma gets activated, the lemma activated most highly is chosen Later on, phonological information representing the word form of the activated lexical representation is accessed and, finally, this information is used to invoke corresponding articulation units.

The starting point for this process is different for the case of distractor words in the PNP. Even more, in their model, Levelt et al. (1999) distinguish between word perception/recognition and production and suggests that different systems handle these two processes. Furthermore, they describe possible alternate routes for the relation between the comprehension and production systems:

1 spoken or written words activate their corresponding morpheme nodes at the morphological encoding level
2 spoken or written words activate their relevant phonological segment nodes
3 in auditory or visual word perception, syntactic properties might also be reachable which indicates activation of the related lemma node. Levelt et al.(1999) describes these properties as 'syntactic potential' of a word.

The authors do not make a conclusive decision on any of the three alternatives; nevertheless, they state that a combination of these three possibilities match with the priming effects obtained in the picture naming task. Besides, comprehension studies propose that a word activates both their lemma and word-form (Rayner & Pollatsek, 1989; Petersen and Savoy, 1998).

Figure-6 depicts distractor word and target picture manipulation in the PNP from the perspective of Levelt et al. (1999):

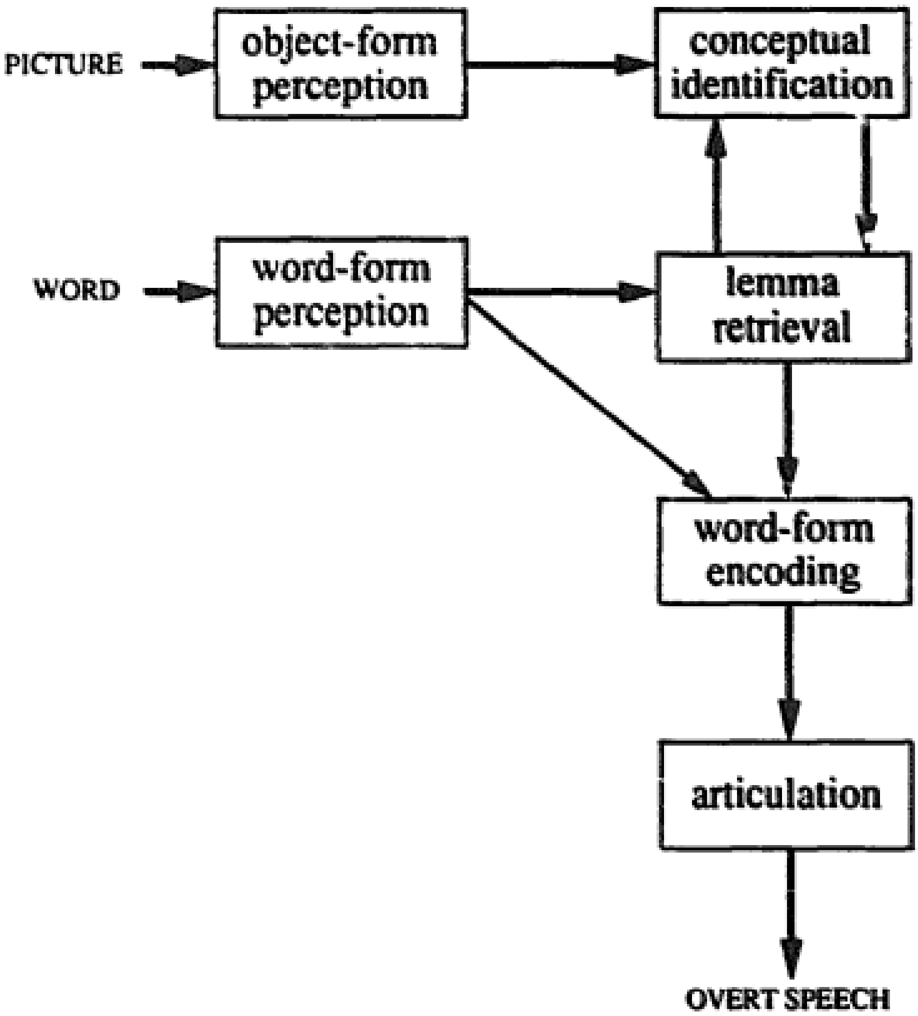


Figure 6 Mental processing stages in PNP. Boxes denote processes whereas arrows indicate the flow of information from one process to the other (taken from Roelofs (1992))

It is proposed that different word formation mechanisms, namely inflection, derivation and compounding, are handled separately in this architecture by means of different encodings.

1 The semantic relatedness of the words balık-'fish' (bare form), balık-çı-'fisherman' (derivation), balık adam-'diver' (compound) is coded in the conceptual domain.

2 As the lexical category is indicated at the lemma level, each word has a separate lemma.

3 Morphological similarity is obtained at the lexeme level where all three words share the same free morpheme <balık>. Thus, morphemes are denoted as planning units which are shared by discrete word formation mechanisms.

4 In that model, novel (and also possibly infrequent) compounds and derivations are not stored in their full form but constructed by combining the relevant lemmas, one lemma for each constituent. Their corresponding morphemes are handled at the form level as stated before. The figure below depicts a simplified version of Levelt et al.'s (1999) and Roelofs' (1996, 1998) model.

Even though details of the architecture or the architecture itself are still debated, there is evidence from daily life and experiments which tap into the processes of language production and comprehension.

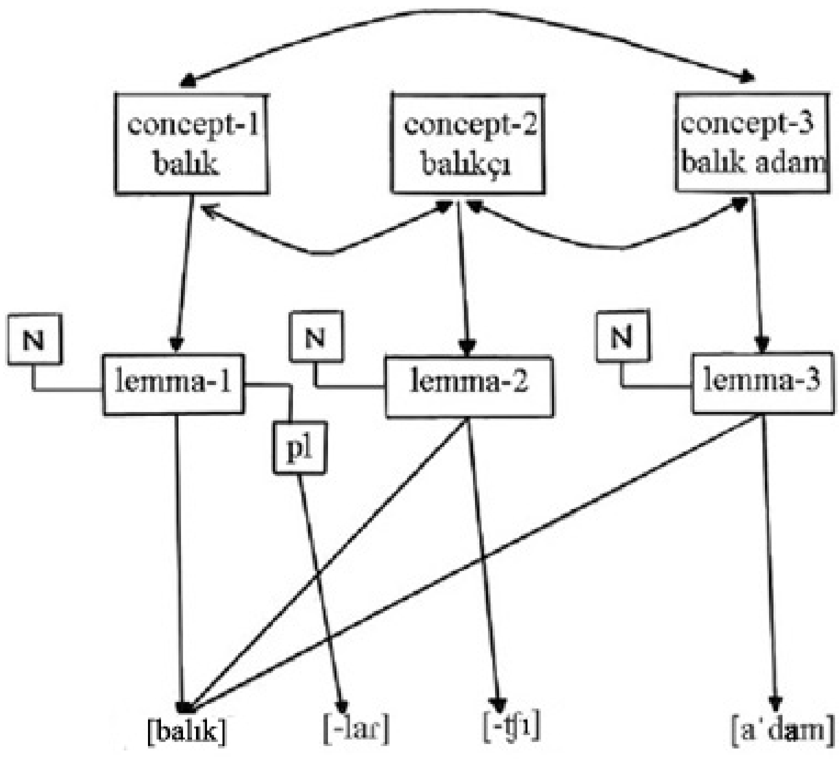


Figure 7 Spreading Activation Model of Language Production (Levelt et al., 1999).

Evidence in Support of the Model:

- Speech errors generally occur at morpheme boundaries, e,g., the production error *slicely thinned* (target phrase: *thinly sliced*) (Stemberger, 1985)
- The fact that word substitution errors occur either with a semantically or phonologically related variant, but not both, suggests that semantic and phonologic information are handled by separate units, e.g., nearly-barely (semantic error); equivalent-equivocal (form error) (Fay & Cutler 1977).
- Some aphasic patients, suffering from morphological paraphasias in particular, have problems with inflection only and make errors only on the morpheme level such as *newing* or *discussionly* (Badecker & Caramazza, 1991).
- As evidence to independent word formation mechanisms for inflectional, derivational and compounding, several patient studies were reported. The common conclusion reported from these studies is that while some patients had no problem in processing (reading, inflecting) simple, monomorphemic words (Delazer et al., 1998 and Luzzatti and De Bleser, 1996), they have a partial or total performance loss in compound words.
- Behavioral experiment results related to semantic, phonologic and especially morphological priming effects (these will be discussed in depth in the literature review part)

7 The Picture-Naming Paradigm

In the current study, as stated before, the picture naming paradigm (PNP)[18] was used as the psychological method in the investigation of priming effects for Turkish compounds.

[18] In the literature, an alternate name for the picture naming paradigm is picture–word interference (PWI) paradigm (Damian et al., 2003). However, as this study took Zwitserlood's (2000, 2002) and Koester et al.'s (2008) studies as model studies and they used "Picture Naming Paradigm" as the paradigm name, PNP was also preferred throughout this study.

Choice of paradigm and stimulus presentation modality is crucial. As stated before, different paradigms may yield different results (IPL, PNP and lexical decision task). Also, visual or auditory presentation of distractor words and target pictures may lead to different priming effects. When orthographic (phonologic), semantic or morphological similarity with the picture name is mediated in the initial segments (syllable for complex words, first constituent for compounds) of the distractor words, priming effects are consistent across different modalities and experimental paradigms. However, especially in the final segments (suffix for complex words, final constituents in the compounds) are sensitive to presentation modality in terms of priming effects. Particularly, previous research shows that visual presentation of the distractor words provide more salient effects in a paradigm that would enable parsing of the whole distractor word (Feldman et al., 1999). In this study, as one of the parameters evaluated was the priming location, it was essential to select the appropriate paradigm which taps into the processing of both constituents. Therefore, PNP with distractors presented in the visual modality was selected as the experimental paradigm.

One of the frequently employed behavioral methods in the psycholinguistics field to investigate lexical structure, speech processing and stages involved in language production, is the picture-naming paradigm. This paradigm depends on the interaction between language comprehension and production. The stimuli are composed of word and picture pairs. In this method, procedurally, words are presented to the subjects (language comprehension) and their effects are evaluated at the utterance level (language production) by means of a PNT. Thus, most of the experiments using this paradigm depend on the interaction between perception and production as morphological complexity is presented on the perception side by means of distractors, and their effect on the production system is evaluated due to shared representations with the picture name.

The stimulus set is composed of words which are presented either visually or auditorily. These words are traditionally labeled as “primes” in comprehension experiments while they are labeled as “distractors” in speech production studies. (Zwitserlood et al. (2000, 2002 and 2004) preferred to call these words distractors while Koester et al. (2008), Frost Grainger (2000) preferred to call them prime). In this study, naming conventions were kept similar to the Zwitserlood et al. (2000) study and pictures were called “targets” while prime words were called ‘distractors’.

In PNP, experimental conditions are manipulated by the researcher in terms of varying the relationship between distractor and target pictures (they may be morphologically, phonologically, or semantically related or unrelated) and/or the time interval between the onset of the picture and distractor word presentation (SOA[19]). Picture naming has several names such as ‘constituent priming’, ‘semantic priming’ etc., depending on the distractor-target relation or the effect in consideration. What is more, in different variants of picture naming, distractors and pictures may be presented in separate trials. Depending on the trial structure, two discrete types of PNP appear in the literature: immediate and lagged-picture naming.

In the first variant of the PNP, namely, the immediate one, a distractor word is presented to the subject, either immediately after or after a fixed (or varying) time interval (SOA). Even though there is a delay between word and picture presentation, they are presented one after the other, in the same trial. The subjects are instructed to ignore distractor words while naming the pictures aloud. In the second variant, the lagged paradigm, distractors and target pictures constitute separate trials, and subjects react to both, they are instructed to read the words aloud and name the pictures (also the filler pictures and words that intervene). Procedurally, in contrast to the immediate paradigm where the presentation of the distractor word is before, simultaneously or immediately after the picture, a number of other trials are inserted between the distractor and picture. For example, if the distractor word is presented on trial n, the target picture is presented on trial n+ x with x representing the intervening trial count. (Usually, 7-10 trials as is the case for Zwitserlood et al. (2000, 2002) and Koester at al. (2008)). In this variant, effects during picture naming are isolated from the immediate reading of the prime words.

In experiments using the immediate PNP, it was observed that distractors which are phonologically or morphologically related to picture names facilitate picture naming. Furthermore, morphologically related ones prime more than the phonologically related ones, whereas semantically related ones have inhibitory effects on naming. (Zwitserlood et al., 2000) However, in the delayed variant, it was revealed that neither phonological nor semantic effects are sustained in lags as long as 7-10 trials.

Both of the variants yielded results in support of the Levelt et al. (1999) model in which semantic, morphologic and phonologic information related to a word are handled on separate layers. As the PNP taps into processes on each of these levels, it yields facilitatory or inhibitory priming effects, respectively.

Some researchers state that in order to observe semantic interference and morphological and phonological facilitation effects, the response set (including distractor and target words) should be provided to the participants prior to the experiment. The underlying logic is that pre-activation of the stimulus material and thus faster and more accurate selection from all other words in the subjects' mental lexicon will take place (Levelt et al. 1999; Roelofs 1992). On the other hand, contrary to this procedure, some other researchers proved that interference and facilitatory effects could be obtained even if the distractor words were not provided in the response set (Caramazza et al., 2001). In this study, picture names (target words) were provided to the participants whereas distractor words were not, if one does not take into consideration the fact that one constituent of each distractor was the same as the target picture name.

The picture-word interference/naming paradigm provided valuable information on

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[19] SOA (stimulus onset asynchrony): the time interval between the presentations of picture and distractor.

the production of nouns. However, this is not the case for verbs except the study of Roelofs (1993) in which he showed semantic interference effects for Dutch verbs. In the psycholinguistics literature, it is conventionally accepted that meaning and the concept of a word match with each other. However, as this is not the case for action names, the PNP needs more research in that field.

CHAPTER 3

THEORETICAL BASIS of the CURRENT STUDY

1 Literature Review

Recently, many studies have been conducted to investigate compound processing (production and comprehension) by employing different tasks (priming, lexical decision[20]) in different modalities (visual, auditory) and with varying methods such as behavioral and neurological.. In that manner, the research on compounding is abundant; thus, to the point of this thesis, mainly, relevant past research in which morphological priming effects investigated via PNP will be described in detail.

One of the first studies on compounds was accomplished by Roelofs (1996). He investigated production latencies of two sets of words differing in homogeneity of the initial syllables in Dutch by using “preparation” or in other words, “(IPL)-priming paradigm”. In the procedural implementation of this paradigm, firstly, he provided prompt-response pairs (e.g.: prompt: religion, response: bible) to the subjects, and then instructed subjects to recall correct response words in presentation

[20] As the name indicates, in lexical decision paradigm, subjects are instructed to decide and respond as quickly and as accurately possible whether a string of letters presented either visually or auditoraly is a word or not in their language by pressing 'YES' or 'NO' response button. Reaction time is collected from the onset of the stimuli until button press. Two variants of lexical decision paradigm are used in the literature, simple or primed. In the primed version, prior to presentation of the target stimulus, a prime word is presented to the subjects. Prime word can be manipulated as it is in a picture naming task.(semantically, morphologically and/or phonologically related to target items). Similar to other behavioral studies such as picture naming, priming effects are calculated by comparing unrelated prime-target pair versus manipulated prime-target pair. (Libben et al.,2006 ,pg 47)

of the corresponding prompt word. While the words in homogeneous response set matched in the initial syllables (e.g. bijbel, bijna, bijster; ‘bible’, ‘almost’, ‘loss’), there was no match in the heterogeneous set(e.bijbel, hersens, nader; ‘bible’, ‘brain’, ‘further’). And he found out that the phonological overlap had a facilitative effect in homogenous sets such that in overall, they were recalled 30 ms faster compared to non-overlapping pairs. However, if there was a morphological overlap in addition to phonological overlap in the initial syllables (e.g. BIJ in bijvak, bijrol, bijnier; ‘subsidiary subject’, ‘supporting role’, ‘kidney’), the recall facilitation effect increased to 74 ms, thus became significantly larger. Furthermore, in contrast to initial syllables, overlap in the non-initial morphemes in homogeneous sets (e.g. BOOM in stamboom, spoorboom,hefboom; ‘pedigree’, ‘barrier’, ‘lever’) did not lead to a significant preparation, namely, priming effect.

Roelofs et al.(2002) also investigated priming effects using IPL, as well. This time, word in the response set differed in three dimensions: syllable overlap existence (homogeneous or heterogeneous), word type (simple or complex), semanticity of the word (transparent or opaque). For complex words(e.g.:in-put) in the homogeneous set, overlapping part was a morpheme while it merely consisted of a syllable for simple words(in-sect). Complex words also differed as being transparent(e.g.: in-put) or opaque (e.g.: in-voice). Replicating Roelofs’s (1996) results, Roelofs et al.(2002) found priming effects for the shared parts of the words in the homogeneous sets compared to words in the heterogeneous sets and facilitation effect was larger when the overlapping part was a morpheme. Furthermore, they found out that transparent and opaque complex words in the homogeneous sets led to identical preparation effects. Roelofs et al. (2002) concluded that morphemes are the basic planning units in speech production, regardless of their semantically relatedness and that language production proceeds by incremental selection of the morphemes, from left to right.

Depending on the procedural structure of the IPL, as the prompt-response pairs are presented prior to the experiment and response pairs are recalled after a while, it can be inferred that this implementation inserts a lag naturally, similar to the lagged variant of the PNP. Thus, considering Roelofs et al. (2002) study, absence of the phonological and semantic priming effects in comparison to morphological priming effects might be explained in that sense.

The most obvious advantage of using associated response-prompt pairs is that the researcher does not have to choose the items, particularly the response words out of the names of depictable entities, as this paradigm does not rely on picture presentation. And this provides more freedom to the experimenter in material preparation. Roelofs (1999) also states that implicit priming paradigm and picture naming yields similar results. As stated above, the procedure works similar to the lagged variant of the PNP. However, the weak points of the method are two-fold. The first one is that even though experimenter has many input alternatives compared to PNP, number of selectable items is limited with the participants' memory as they have to keep response sets in mind. The other point relates to the issue that results obtained in the IPL can also be dependent on episodic memory retrieval which is irrelevant and so not even tapping into the production processes (Santiago, 2000). Thus, a PNP would be a better choice in testing priming effects.

Zwitserlood et al. (2000,2002 and 2004) also investigated morphological effects in language production on German words by using immediate (standard) and delayed versions of the picture-word interference paradigm in a series of experiments. Zwitserlood et al. (2000) compared words varying in different degrees of semantic, phonologic or morphologic relatedness with the picture names. In the first set, they compared phonologically r (Bluse, blouse) and morphologically(Blumen, flowers) related words with an unrelated baseline condition (Drachen, dragons). They used both immediate and lagged version of the PNP with this set. In the second set, they compared semantically(Bluse, blouse) and morphologically(Blumen, flowers) related words with an unrelated baseline condition (Drachen, dragons). And again, they used both immediate and lagged version of the PNP with this set. In a third set, they compared words from different word formation mechanisms: words which were either inflected (Blumen, flowers), derived (blumig,flowery), compounded

(Blumentopf, flowerpot) or unrelated word (e.g., salzig, salty). They used only lagged version of the PNP with the final set. In the immediate paradigm, while facilitation effects were found for morphologically and phonologically related complex words, inhibitory effects were found out for semantically related primes. On the other hand, in the delayed PNP, only the facilitation effect of the morphologically related complex words which was about 30 ms was revealed. However, priming effects of the semantic or phonological primes, inhibition and facilitation effects, respectively, were not observed in the delayed variant in contrast to immediate variant. Also, in the final experiment they conducted, the distractor words from different morphological classes shared common morphemes; they found equal amounts of priming effects for all word types. Besides, by comparing the two variants of PNP in the first two experiment sets, Zwitserlood et al.(2000) revealed that morphological priming effects could be isolated from the semantic or phonologic overlap effects. They state that in the lagged variant, effects during picture naming are not contaminated with the reading of prime words and importantly, in contrast to morphological effects, semantic and phonological effects are much more short-lived and no longer effective after seven or more intervening trials

In another set of experiments, Zwitserlood et al., 2002 also investigated morphological priming effects with derivations and compound words by manipulating the syllable position/constituent overlapping with the name of the picture. A distractor word overlapped with the picture name either in the first morpheme (prefix for derivations, initial constituent for compounds, e.g., Topfblume, pot plant) or the second (suffix for derivations, head constituent for compounds, e.g., Topfblume, pot plant).Position of overlap was held constant across conditions. In the first set, they compared derivations, compounds and unrelated words. In a separate, second set, they compared compounds with unrelated words. They found out similar facilitation effects resulting from a morphological relation of the picture name and irrespective of the overlapping position with the picture name.

In another study with PNP, similar to Zwitserlood et al.(2002),Zwitserlood et al.(2004) investigated morphological priming effects in German compounds,this time, manipulating semantic relatedness, form similarity and position of overlap with the picture name. In the first set, they compared, semantically transparent compounds (e.g.,Wildente, wild duck), opaque compounds (e.g.,Zeitungsente,false report) and unrelated words(e.g., Windmühle, wind mill)(picture name:dente, duck). In a second set, they compared transparent compounds(e.g., Buschrose, bush rose),form-related words(e.g.,neurose ,neurosis) and unrelated words(e.g.,Dachluk,skylight)(picture name:rose, rose). In these two sets, overlap with the picture was provided in the final constituents (head)/parts. They conducted an experiment with these two sets by using both immediate and delayed versions of the PNP. In both immediate and delayed variants of the PNP,they found same amount of priming effect,that is facilitation in picture naming, for both the transparent and opaque compounds compared to unrelated condition.However, they found facilitative effect of words with mere-form overlap,which is less than the effect raised by the compound distractors, only in the experiment with immediate version of the PNP. Furthermore, morphological priming effects of the compounds obtained in the delayed version was reduced compared to effects obtained in the immediate variant. They depended lack of transparency effects (semantic effects) in the immediate variant due to competition between transparent compounds and picture names at the lemma level as they are represented by different lemmas .Therefore, they concluded that positive effect which was expected to emerge at the conceptual layer due to semantic transparency was suppressed at the lemma level.

In a third set, similar to the first set, they compared semantically transparent(e.g.,Löwenmahne, lion's mane) compounds, opaque compounds(Löwenzahn, dandelion) and unrelated words(e.g.,Tintenfass,ink pot)(picture name:Löwen, lion).They found a marginally significant difference between transparent and opaque compound sets, being transparent compounds caused less naming latencies, only in by-participant analysis(in which mean naming latencies were averaged across participants). They interpreted this small advantage for the transparent words as a lack of competition and thus much stronger transparency effect at the lemma level as in this set, the distractors overlapped with the picture names on their onsets (which was on the head position in the previous set).However, even this facilitatory effect of transparency is very small, they concluded that semantic transparency has little effect on morphological priming.

Findings by Zwitserlood et al. supports a decompositional parsing strategy in the processing of compounds such that facilitation effects are due to activation of shared morpheme representations at the level of word form despite the discrete representations in the semantic and lemma levels (Zwitserlood et al., 2000, 2002 and 2004).

Most of the investigations and findings on compound production depended on behavioral measures. However, neurocognitive aspects of compound production are under investigated compared to behavioral studies. Brain signal measures(electroencephalogram (EEG, as the basis for event-related potentials, ERPs), magnetoencephalogram (MEG), etc.) provided valuable data in testing and validating the findings of behavioral studies, in particular, decomposition in compound comprehension and production both in visual or auditory modalities (Koester et al., 2004; 2007, 2008). Koester et a.(2008) study employed the same paradigm as Zwitserlood et al. (2002) study in that they used a delayed PNP in combination with brain imaging methods, in a different language, Dutch. They compared transparent compounds(e.g.,jaszak, ‘coat pocket’), form-related monomorphemic words(e.g. jasmijn, ‘jasmine’) and unrelated words(e.g., otter ,‘otter’) (picture:coat; Dutch jas) in one set and in a second set they compared transparent compounds(e.g. eksternest, ‘magpie nest’) versus opaque compounds(e.g. eksteroog, lit. ‘magpie eye’,‘corn’)with unrelated words(e.e., gnoom, ‘hobgoblin’)(picture:magpie, Dutch ekster). They came up with similar results and also managed to extract the time-course of linguistic processing of compounds.

Koester at al. (2008) came up with important conclusions:

Behavioral:

1 A significant priming effect was observed meaning that picture naming latencies were shorter when the distractor was a morphologically related compound word.
2 Semantically transparent and opaque compounds caused identical facilitative priming effects.
3 Phonological relatedness (mere form overlap) did not lead to any significant priming effect. With second and third results, Koester et al.(2008) established the fact that semantic(inhibitory) or phonological(facilitatory) relatedness effects lost their impact in a lagged paradigm.
4 A significant main effect of block was found such that the more subjects were encountered with the picture, the faster they named them.(block effect was also observed by Zwitserlood et al. studies(2000,2002))
5 Those findings support decompositional models of (compound) word production. Priming effects caused by merely shared morphemes and not by shared meaning or form-relatedness led Koester at al(2008) to the conclusion that during processing, a compound word is parsed into its constituent morphemes and morphemes are the basic building units in that process.
6 As stated before, Zwitserlood et al. (2002) indicated that morphological priming effect was independent of the position of overlap. They had used a balanced set in terms of overlapping sets meaning that half of the distractor words matched with the picture name in the first constituent while the other half matched in the second. However, the Koester et al. study is unclear about that as for each condition; number of cases overlapping in the first and second constituents is not equal. Count of overlapping the number of they used mixed priming data in terms of matching constituent location where both types of matching conditions were used. The overlap between picture names and initial constituents and the latter constituents differed within the two sets they used. Thus, they do not make a

strict conclusion about effects of the priming constituent location. (This issue would be discussed in detail in the Discussion part.)

Neurophysiological:

1 In the set one in which they compared opaque versus transparent compounds, ERP amplitude did not differ.(see Figure 8 below)

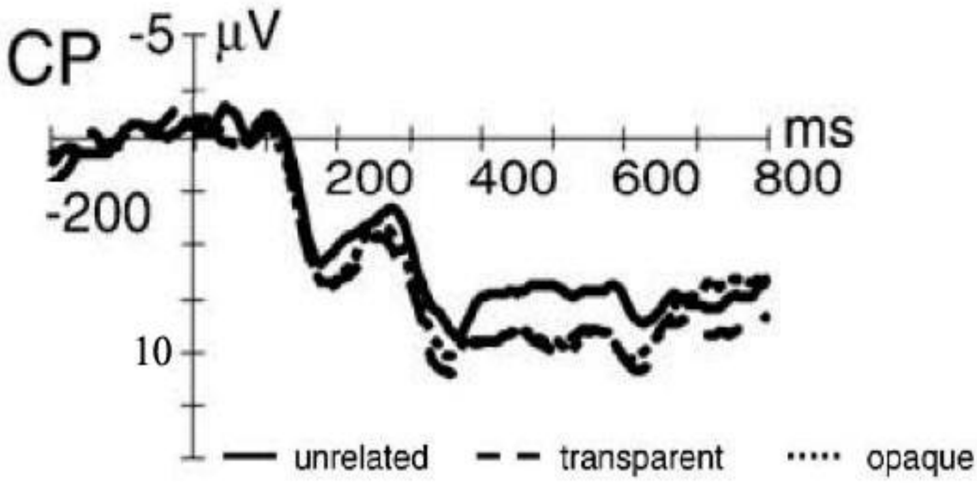

Figure 8 Grand Average ERPs for the transparent, opaque and unrelated conditions (Ordinate shows the ERP amplitude (mV) with the negative component represented upwards, the abscissa shows the time).

2 In the set two where they compared transparent compounds, form-related words and unrelated conditions, in the posterior(but not anterior or central) side(consistent for both Hemisphere) , a reduced, less negative ERP amplitude was identified for transparent compounds compared to form-related and unrelated conditions. However, form-related and unrelated conditions did not differ in terms of ERP measures. This difference in the ERP measure was obtained for the time interval 350-650 ms post stimulus onset. They interpreted this reduced negativity as N400 effect which signals morphological processing. As transparent compounds have more priming capability over long lags, shared morpheme facilitates picture naming and this reflects onto less negative N400 component (see Figure 9 below).

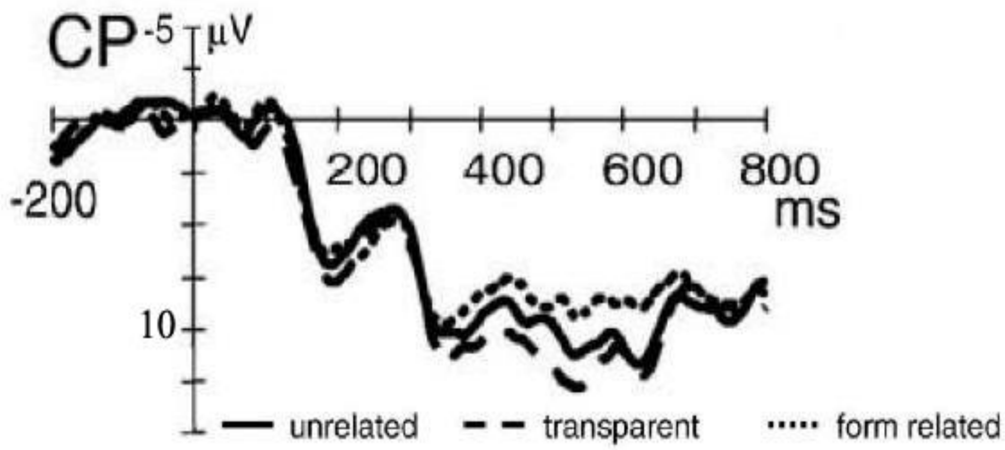

Figure 9 Grand Average ERPs for the transparent, form-related and unrelated conditions (Ordinate shows the ERP amplitude (mV) with the negative component represented upwards, the abscissa shows the time).

3 Furthermore, they checked if any significant ERP difference found after 350 ms post stimulus onset could also be observed between the time window starting from stimulus onset till 350 ms. However, no ERP difference was found during that time window.

Yagoubi et al.(2008) investigated neural correlates of Italian(in Italian, both left and right-headedness is supported) nominal compounds). They also used lexical decision task as the behavioral paradigm while they were recording electroencephalography (EEG) signals. They performed a lexical decision task and presented subjects with words and non-words with different compound-like characteristics and asked them to respond "yes" to words and "no" to non-words. Their stimulus set was composed of words with such following properties:

1 transparent left-headed NN compounds (e.g., capobanda, 'band leader');

transparent right-headed NN compounds (e.g., astronave, 'spaceship');

2 noncompound nouns with a real word embedded in either the first or secondary slots of a real word. (e.g., first slot:coccodrillo,'crocodile', where cocco is a real

word, meaning “coconut”, second slot: e.g., tartaruga, tortoise;where ruga is a real word meaning “wrinkle”);

3 filler words as simple words and non-words created from these simple filler words by letter exchanges.

Behavioral:

1 They found a significant effect of lexicality meaning that word identification was faster to words than non-words. Subjects also recognized non-compound words faster than they did compound words. Yagoubi et al.(2008) interpreted this result as a possible evidence for dual-route models in which compounds are processed both in full-form and in terms of their constituents separately.

2 Error rates and reaction times were higher for compounds which they depended on more cognitive load with respect to morphosyntactic processing in real compound words.(a finding which also reflected on ERP results with more negative ERP components)

3 They found no difference between left and right-headed compounds neither in reaction times nor in error rates.

ERP:

1 In their detailed analysis of the ERP data, they provided further information on the ERP components of morphosyntactic processing of words:

2 At around 270–370 ms non-words exhibited a more negative ERP pattern compared to words and also compounds had a more negative ERP trace compared to non-compounds only at the anterior sides. They interpreted this difference as a LAN (Left Anterior Negativity) which signals morphosyntactic processing.

3 At around 310–360 ms in the posterior side a more positive shift (P300) was found for right-headed compounds compared to left-headed compounds. They interpreted this component as a context update with respect to unexpected information. As right-headed compounds are not as widespread as left-headed compounds in Italian and thus whenever a native speaker of Italian meets a right-

headed compound, s/he has to update generic compound structure information in their mental lexicon.

4 At around 370–500 ms, non-words exhibited a more negative N400 component compared to words. Similarly, N400 was larger for non-compounds compared to compounds. They attributed N400 component to extra lexical search for nonwords and non-compounds.

5 Similarly, at around 500-800 ms, non-words compared to words and noncompounds in comparison to compounds exhibit a more positive ERP signal which was interpreted as P600 at around the posterior side. They interpreted this component as syntactic processing and ambiguity resolution due to uncommon structure of nonwords and noncompounds.

As seen from the last two ERP studies on compound processing, ERP results provide a detailed map of compound manipulation in the mental lexicon. While in PNP tasks, a reduced N400 component signals morphological priming effects, in contrast, in lexical decision tasks(Koester et al., 2008), increase in N400 and also in earlier components of LAN is attributed to online morphosyntactic manipulations(Yagoubi et al., 2008).

To the best of my knowledge, there are only two studies which investigated processing of morphologically complex words in Turkish. In the first study, in a lexical decision task, Gürel (1999) compared recognition rates of three word types:

1 nondecomposable items(e.g.,pencere, ‘‘window’’),

2 pseudomorphemic items(in pseudomorphemic word group, more than one parse was available for each word. It consisted of three types depending on the morpheme status of the available parses;

   a. pseudostem:dal-ga:"wave",the first syllable dal-"branch" is also a meaningful morpheme,

b. pseudostem-stem :bak-kal:"grocery" both syllables have also the single word status : bak (‘‘look’’)and kal (‘‘stay’’) and
c. pseudostem-affix:e.g., dil-im:‘‘slice’’, the first syllable is also a stem in Turkish, dil (‘‘tongue’’), whereas the second syllable is an acceptable suffix,-(i)m (the first person singular possessive)

3 multimorphemic items(these words were inflected with one or two of the inflectional suffixes:locative(case), ablative(case),plural(number),plural-locative or plural-ablative. E.g.:deprem-den (earthquake-ABL,‘‘from the earthquake’’,oda-lar-da (room-PL-LOC‘‘from the rooms’’)).

She found out that:

1 Not all morphologically complex words (emir-ler (‘orders’), resim-ler-de (‘in the pictures’)) with frequent suffixes (such as plural) are accessed by means of decomposition in Turkish. This study supports the idea that in morphologically rich languages in Turkish, for frequent multimorphemic words, full-form representations are preferred in order to provide process efficiency.
2 No difference was found between the recognition rate of nondecomposable and pseudomorphemic words. Therefore, she concluded that not all available parses are produced during word processing in contrast to what is stated in Libben et al. (1999,2002).
3 She also found out that word length and suffix count have a significant effect on word recognition that is, increase in the suffix count and word length leads to longer word-recognition times. However, she emphasizes that word length effect is modulated by the frequency factor meaning that for words inflected with more than one suffix; frequency of the suffixes determines the word recognition speed.

Gürel(1999)’s findings indicating that not all morphologically complex words are parsed into their constituent morphemes actually does not contradict with Libben et al. (1999,2002)’s findings. She conducted lexical decision task while Libben et al. (1999,2002) mainly used morphological priming paradigm and they do not deny the importance of frequency. In the opportunity-based model as Libben et al. (2006) suggested, frequency is one of the main considerations which affects the choice of a representation from a set of available parses.

The other study in which Turkish nominal compounds, particularly ICs were investigated belongs to Aslan and Altan (2006). They investigated the use of compound marker (CM) by the native speakers of Turkish by means of a survey. In this survey, they provided subjects incomplete ICs with either the modifier or the head constituent is absent and instructed them to complete the missing parts.(e.g.: …..pancarı(first constituent missing), çam….(second constituent missing) They found out that some of the compounds had a high-frequency of recall meaning that most of the subjects treated them as collocations. Therefore, Aslan et al.(2006) came up with the conclusion that some ICs had a frozen and lexicalized nature and compound marker in these words was merely used as a linking element rather than a suffix indicating a possessive relation. They also found out that subjects could recall compounds more easily when the head constituent was provided compared to modifier-part only condition, which shows the importance of the head constituent in the compound structures. However, this study was restricted to the role of the head, modifier, and the CM in ICs. To reveal compound processing, particularly, the role of CM in Turkish compounding, a comparison between other nominal compounds not using CM should be done. Therefore, besides indefinite izafet compounds, I will investigate also bare (JC) compounds and DC in this thesis.

Furthermore, by means of surveys on-line language production phenomena cannot be observed. However, surveys serve an important role as preliminary studies. For example, Koester et al. (2008) conducted a survey to find out the degree of semantic transparency of their stimulus data. Also in this study, two surveys were performed in order to identify novel DCs and to evaluate preliminary distractor word set in terms of transparency, composionality, concreteness and animacy.

To sum up, previous ERP and behavioral studies provided valuable information on the production and comprehension of compounds in various aspects such as transparency, headedness, frequency effects, etc. However, as stated before, they are limited to a number of languages such as English, Italian, German, Dutch and Chinese and different results as well as common ones resulted from these studies. To come up with universal and cross-linguistic rules, further research on compounding in structurally different languages is a must. As the lack of behavioral research on Turkish compounding system is considered, purpose of the current thesis is to contribute existing compounding literature in that manner.

2 Limitations of the Current Study

A reaction time study on the production of various types of compounds comparable to the ones discussed above has never been conducted in Turkish, as far as it is known. A first major difficulty rises in the selection of appropriate stimulus data. There is no available resource which could be applied in collecting written compound word frequencies. The Turkish Language Society's book on the frequency of words in written Turkish was taken as a guide here[21].(Göz, 2003) Furthermore, as the book was prepared in 2003 and represented a limited corpus (1000 words), frequency values provided do not reflect the recent usage of the compounds by native speakers of Turkish. To set an example, while 'gülbank' which is not known by many native speakers of Turkish consulted, was listed under frequency "1" with more frequent compounds such as 'diş ağrısı'. This situation prevented comparison of the average naming latencies by means of independent factors such as constituent, compound and morphological family (size)[22] frequencies.

What is more, in a purely behavioral study, time course of the compound processing cannot be traced as the word will be presented all at once and no ERP measure will

[21] As the distractor words in the experiment presented visually, written word frequencies were taken into consideration.
[22] Morphological family size is the type count of a morphological family.
Morphological family frequency (the summed frequencies of the family members, or token count of a morphological family) (Libben et al., 2006, pg. 52).
These two measures are considered important in investigating analogical factors in compound processing.

be taken during stimuli presentation similar to the Koester et al. study. . However, by manipulating the position of overlap between the priming compound constituent and the picture name, i.e., whether the overlap occurs in the initial (modifier) or final (head) position, will shed light on the time-course of the processing of the compound word.

3 Research Questions and Hypotheses

Basically, all research questions were centered on understanding nominal compound processing in Turkish by means of morphological priming effects. Studying compound formation in French and Bulgarian using an online visual recognition task, Libben et al.(1999) discovers several factors contributing to compound processing: compound structure, semantic transparency of the compounds, the position of the compound constituents in the word, i.e. initial or final, and headedness. Thus, in detail, research questions aim at clarifying these issues in the processing of the three types of Turkish nominal compounds (JC, IC and DC).

4 **Compound structure:** Will morphological priming effects be observable in the three types of Turkish compounds, namely, – (i) JC, (ii) IC and (iii) DC? If any such effects are found, will there be any significant priming effect difference between the three types?

5 **Compound transparency:** Regardless of the compound type, will there be a correlation between transparency and mean naming latency differences? If any interaction is found, what will be the direction of this relation?

6 **Constituent position and specifically headedness effect:** Do first and second constituents have different priming capability? Also, does headedness play an important role in morphological priming for Turkish in which compounds are generally right-headed?

7 **Compound morphology:** JCs have bare constituents. However, ICs have one constituent suffixed with CM and possessive compounds have both constituents suffixed (GEN and POSS).Even though compound words across three conditions

match in terms of stem syllable count however, this match could not be provided due to extra suffixation in the izafet groups. Do extra inflection and length effect naming latencies, thus, compound processing?

8 **Compound orthography:** Do orthographic conventions such as writing the compound as one or two words modulate morphological priming?

9 **Block-frequency effect:** Is frequency of presentation important in morphological priming? Will presentation of the pictures for the first, second, or third time successively effect naming latencies in a significant way similar to previous studies?

From these research questions, the following hypotheses are derived (H1-H6):

Hypothesis-1: In conformity with the previous studies, priming effect is expected to occur in all types of compounds compared to unrelated condition indicating decompositional process. As possessive compounds are novel constructions and possible candidates of IC and JC, they are fully transparent and do not yet have representations in the mental lexicon; thus less reaction time is expected for fully-transparent definite izafet. No reaction time difference is expected between JC and IC regardless of their transparency level as they are both lexicalized items.

Hypothesis-2: Relying on hypothesis #1, a facilitatory effect of transparency is expected.

Hypothesis-3: Due to the strict serial planning (Roelofs, 1996) in language production, larger priming effects are expected in conditions where the distractor compound matched with the picture name in the first constituent. Therefore, no privilege for the head constituent is expected.

Hypothesis-4: In a lexical decision task, Gürel(1999) found out that not all morphologically complex words (emir-ler (‘orders’), resim-ler-de (‘in the pictures’)) with frequent suffixes (such as plural) are accessed by means of decomposition in Turkish. As CM (POSS) and GEN suffixes are quite frequent, no main effect of distractor length is expected.

Hypothesis-5: In the pre-analyses of the experiment material, it was found that extra space between the compounds leads no significant eye-reading time difference for words. Thus, a significant difference between open and concatenated compounds is not expected.

Hypothesis-6: A decrease in the naming latencies by the second or third presentation of a picture is expected due to increased familiarity with the stimulus material.

CHAPTER 4

PILOT STUDY, EXPERIMENT AND INTERPRETATION

1 Participants

Prior to the real experiment, a pilot study was conducted to assess the experimental design and remove procedural bugs if any from the early stages. 3 native speakers of Turkish (Mean Age=32.67 yrs. SD=4.51 range 28-33 yrs., 3 male) from the employees of HAVELSAN A.Ş. (2 engineers from various domains) and one research assistant from METU attended the pilot sessions. Pilot study sessions revealed that some experimental target pictures had to be redrawn (this was also explained in the Pictures section). Apart from that, overall experiment procedure (time settings (distractor word and prime picture presentation durations), instructions, etc.) was found appropriate by the participants.

The real experiment was conducted with 29 native speakers of Turkish (Mean Age=28.62 yrs. SD=5.93 range 18-41 yrs., 10 female, 19 male) again from the employees of HAVELSAN A.Ş. (22 engineers from various domains), a software company in Ankara and also among Gazi University students. They attended the experiment on a voluntary basis. All participants had normal visual acuity and were monolingual. Five participants were excluded from the analysis due to high level of picture-naming errors. The remaining 24 participants (10 female, 14 male) were on average 29.54 years old.

2 Materials and Methods

2.1 Materials

2.1.1 Prime Words

In this study, morphological properties of the three Turkish nominal compound types (JC, IC and DC) were investigated. Preparation of distractor compound sets in order to produce valid and controlled prime words proceeded in several stages which are described in the following.

As is common in experimental psychology, the first characteristic of words that was considered is the “frequency” (Thorndike and Lorge, 1944). Prior to prime picture selection, available candidates of compound sets (JC and IC) with matching frequency according to the standard Turkish reference book named ‘Yazılı Türkçenin Kelime Sıklığı Sözlüğü’ ('Word Frequency Dictionary of the Written Turkish ; Göz, 2003) were selected. The majority of the JCs and ICs in that book had the frequency of “1”. As the DCs were to be created as novel item pairs, it was necessary to keep the frequency of JC and IC as low as possible. Thus, JC and IC pairs with the frequency of “1” were selected in a first step. From these two compound sets, the ones with matching constituents at either the first or second constituent location were selected.

The second criterion in the selection of the JC and IC pairs was that the matching constituents should represent depictable concrete objects. (see Table 2)

Table 2 Identifying JC and IC Candidates

Matching Constituent	Matching Constituent	JC	IC
First-constituent matching	dağ-‘mountain’	dağ bayır-‘ mountain hill ‘- ‘ field/slopy area	dağ havası - ‘mountain air+CM’-‘ mountain air’
Second-constituent matching	ağaç-‘tree’	kızıl ağaç-‘red tree’-‘ redwood’	meyve ağacı-- ‘fruit tree+CM’ - ‘fruit tree’

The third and the final criterion was matching syllable count and length within JC and IC pairs. As indefinite and DCs have extra suffixes - the genitive suffix (GEN) and possessive marker (3SG.POSS) for definite and the compound marker (CM) for indefinite - syllable count was matched at the stem level, ignoring the inflectional suffixes. This decision rested on the findings of the study conducted by Gürel (1999). In a lexical decision task, Gürel found out that not all morphologically complex words (emir-ler (‘orders’), resim-ler-de (‘in the pictures’)) with frequent suffixes (such as plural) are accessed by means of decomposition in Turkish. She proposed that a whole-word access procedure takes places in processing some inflected words. She based her study on the frequency values stated by Pierce (1960) in which highest frequency belongs to the plural morpheme. Pierce (1960) also noted that the annexation suffix which is also known as compound marker (-I) is the 6th most frequently used suffix in speaking and the most frequently used suffix in writing. Furthermore, the genitive suffix (-In) which is employed to construct definitive izafet compounds is the 4th most frequently used suffix in writing. Relying on Gürel’s conclusion, it was decided that inflectional morphemes should be ignored and syllable match was provided in the total stem syllable count of each constituent of the JCs and ICs.

From this pre-analysis, 29 JC and IC pairs were selected, 11 of which matched in the first while the rest matched in the second constituent). In the next step, a survey was performed to select DCs which would match to the established list of JC and IC pairs. In the next section, details of this survey are described.

DC Selection

To construct the third group of compounds, namely, DCs (and also DCs that would form part of the unrelated item set), Baroni et al.'s (2007) study on Italian compounds was taken as a model. Baroni et al. (2007) searched for prototypical compounds with relational or attributive properties, tried to find out which ones tended to occur more in which position, head or modifier depending on the statistical frequency values. They proposed a skeleton for relational and attributive compounds in which head information is important in the first type whereas the modifier is crucial in the latter. Based on this skeleton, they produced novel compounds and had their acceptability rated by native Italian speakers. Their results were in line with their head-modifier assumptions, in which relational compounds preserving the head constituent of an existing compound and attributive compounds preserving the modifier constituent of an existing one, were rated more as possible, acceptable compound candidates than the ones produced violating that rule.

Simulating the same method, in order to create a novel DC set which reflects tendencies of native speakers of Turkish better, a questionnaire in the form of a cloze test was administered to a group of 33 subjects (18 female, 15 male) who are native Turkish speakers and varying in age (Mean: 30.46 yrs, SD: 4.671) and educational background. This questionnaire was composed of 31 nominal compounds, out of which, 11 compounds had blank in the head part while 20 of them lacked the modifier. Subjects were asked to complete the missing constituents with appropriate words to compose DCs. This survey was similar to the survey(section A) used in Aslan et al. study(2006) in terms the instructions. A sample of the original test form is attached in the Appendix B All of the answers of the subjects were also included in the appendix (section A)

Subjects' responses were filtered according to the following criteria:

1 Even though the subjects were asked to produce a DC, some of them had a tendency to produce ICs which are already in the dictionary. All such answers were eliminated from the result set. E.g.: Çam ağacı, dil balığı, oymak başı, etc.
2 If the produced novel compound is already a definite variant of a lexicalized IC, it was also eliminated. E.g. meyvanın ağacı (meyva ağacı), dağın başı (dağ başı), koçun boynuzu (koç boynuzu), etc.
3 Similarly, if the produced compound is already a lexicalized JC, it was eliminated, too. E.g.: doğrunun çizgisi (doğru çizgi)
4 If the produced compound is part of an idiomatic expression, it was eliminated. As other JCs and ICs have the frequency of one and idiomatic expressions are quite frequent, such productions were not included. E.g.: taşın altı (elini **taşın altı**na koymak: 'to take responsibility in a particular subject'), çıbanın başı (**çıbanın başı**nı koparmak: 'to cause a bigger problem to appear'), **ananın gözü** ('crafty')
5 If the produced compound included a proper name, this compound was also eliminated from the list: Ali'nin balığı ('Ali's fish').
6 If the resulting compound contains extra inflectional morphemes such as a plural suffix (insanların dünyası: human+PL+GEN world+3SG.POSS ('world of the people')), or a possessive pronoun suffix (annemin çayı: my mother+GEN tea+3SG.POSS ('my mother's tea')) other than the compounding markers, they were also eliminated.
7 If the constituent of the DC is also a constituent of another main experimental compound, it was also eliminated. Eg: "boyanın rengi" collides with the experimental IC "gül rengi" due to the shared constituent renk ('color').

After these criteria were applied, 501(token count) valid compounds (with the type count being 179) were retained. Table 3 presents the type and token counts of the valid DCs (bahçenin ağacı- 'tree of the garden'), false production derived from

already existing ICs(meyvanın ağacı- 'tree of the fruit') and ICs (çam ağacı- 'pine tree’). As the figures in the table also depicted, the head parts gave more flexibility to the subjects and they could make up compounds when the base constituent, the head was already provided. This might be depended on the fact that there were more items in the head-missing group. However, on the other hand, they recalled existing ICs (even if they were asked to produce a definite construction) only when the head part was provided. This result also matches with the finding of Aslan et al. (2006) in that head is the most essential part of a compound.

From these valid novel DCs, the ones whose stem syllable counts match with the relevant JC and IC compounds were selected. (Table 4) Furthermore, any semantic relevancy with any of the existing items or picture names was carefully avoided. For example, for göz, “eşeğin gözü: donkey+GEN eye+3SG.POSS (‘donkey’s eye’) was not selected as the experimental set contained “kedigözü: cat+eye (‘rear lamp’). On the other hand, as the picture of the mother depicted a mother hugging and showing affection to her child, “annenin sevgisi: mother+GEN love+3SG.POSS (‘mother’s love’), which is a DC, was not selected. Likewise, as the belt picture depicted the belt of a karate man, “karatecinin kuşağı: karate man+GEN belt+3SG.POSS (‘belt of a karate man’), this item was not selected, either.

Table 3 Type (Token) Counts of the Valid, DCs Derived from ICs and ICs by the Constituent Provided

Constituent Provided	**Valid DCs (type/token)**	**Derived from Existing ICs (type/token)**	**ICs (type/token)**
Modifier	112(227)	27(62)	-
Head	167 (274)	35 (76)	120 (165)

Table 4 depicts the selected DCs in terms of token count by total valid token count ratio. For example, 18 valid DCs for the word ‘ana- mother’ were produced by the participants and one of them was ‘ananın emeği’. Thus, token ratio value for that particular compound was (1/18)*100= 0. 56 %

Table 4 Selected Compounds and Their Token Percentage in the Total Set of Types

Novel Compound	Compound Token Count/Total Valid Token Ratio(%)	Novel Compound	Compound Token Count/Total Valid Token Ratio(%)
ananın emeği	5,56	sorunun başı	7,69
ayağın sahibi	9,1	banyonun borusu	15,38
boyanın kıvamı	8,3	ustanın çayı	8,33
dağın zirvesi	21,42	defterin çizgisi	46,15
delinin sopası	3,125	zalimin dünyası	0
dişin yapısı	11,11	türlünün eti	0
gülün adı	17,24	fotoğrafçının filmi	7,69
koçun fiyatı	7,14	donanmanın gemisi	12,5
şekerin kilosu	6,9	dolabın gözü	5,88
taşın yüzeyi	8,7	misafirin kahvesi	0
yazının tarihi	4	şehrin kapısı	0

Table 4 (continued)

Novel Compound	Compound Token Count/Total Valid Token Ratio(%)	Novel Compound	Compound Token Count/Total Valid Token Ratio(%)
yolun bitimi	4,76	ağanın kuşağı	6,25
yüzün aydınlığı	4,76	konağın saati	0
bahçenin ağacı	36,84	çiftliğin tavuğu	9,1
gölün balığı	12,5	çekirdeğin yağı	25

As can be seen from the table, no match could be found for the following four items: et, film, kahve and kapı. Relying on the other DCs, similar ones were produced for these. The preliminary distractor word set and the survey form can been found in the appendix (section A).

Evaluation of the Initial Compound Set in Terms of Transparency, Composionality, Animacy and Concreteness

In order to evaluate the selected compound sets (125 compound words in total, presented in the appendix section A in terms of transparency, the first and second constituents' semantic contribution to the whole compound's meaning (compositionality), animacy and concreteness degrees of the whole compound, a group of 18 native speakers of Turkish (6 male, mean Age=33 yrs, SD=5,73, range=29-50 yrs) was selected to rate each of the compounds in the preliminary set in terms of the criteria mentioned above on a 5-point scale (from 1—unrelated to 4—strongly related; 5—no comment). (A sample of the survey instructions is provided in the appendix section, part Section A).

[23]The statistical analysis was merely conducted on JC, IC and DC ignoring the unrelated compounds as they are totally irrelevant to the main compound types under consideration. Each prime picture was taken as a single subject and a repeated Measures ANOVA was conducted for the four criteria (transparency, first constituent's relatedness to the whole compound meaning, second constituent's relatedness to the whole compound meaning, animacy and concreteness) on three levels (JC, IC and DC) as within subject variables and priming location as between subject variable.

Prior to the statistical analyses, the mean differences of the transparency values of all levels (JC, IC and DC) were computed. Two primes, namely diş ('tooth') and ayak ('foot') yielded maximal differences between transparency levels (JC-IC, IC-DC, JC-DC). Thus, they were eliminated. After the experiment had been conducted, it was found out that baş ('head') yielded picture-naming errors more than 15%, thus, it was also eliminated. As unrelated prime word pairings for these prime pictures were also eliminated, to provide a balance in the unrelated set (1/3 should be JC, 1/3 should be IC and the rest should be DC), the DC beneğin sayısı ('count of the spot') had to be replaced with an IC. Thus, a secondary small survey of six compounds (attached in Appendix Section B) was conducted similar to the first survey with the same participants to complete the unrelated set. Nevertheless, as mentioned before, the unrelated compound set was not included in the survey analysis.

1 Transparency Degree Evaluation:

- Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (2) = 8.128, $p < .05$); therefore, degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($e < 0.75$, $e = .85$). The results show that the transparency degree is rated significantly different within the different compound types (JC, IC and DC)(F (1.7, 43) = 11.131, $p < .01$, η^2[24] = .308)

[23] In all statistical analysis, SPSS 15.0 for Windows Evaluation version, Release 15.0.0(6 Sep 2006) statistical tool was used.

24 Several standardized measures of effect sizes are used within the context of ANOVA. Effect sizes describe the relationship between a predictor (or a set of

- This result was actually expected as DCs in the current thesis are novel entities and do not have a lexical, thus a semantic representation in the minds of native speakers. Libben et al. (2006, 11) suggest that as soon as they gain the status of a lexical item, lexicalized compound words lose their semantic transparency, i.e., the whole compound meaning is not merely a composition of the meanings of the constituents of that compound anymore.
- Using Helmert contrasts, it was found that DCs (Mean=3,636, SE=0,061) such as boyanın kıvamı ('density of the paint') were significantly more transparent than their respective indefinite counterparts (Mean=3,362, SE=0,96) such as boya kutusu ('paintbox') and their JC counterparts (Mean=3,157, SE=0,115) such as boyahane ('dyehouse') ($F(1,25) = 40.167$, $p < .001$, $\eta^2 = .616$). No significant difference was found between JC and their respective IC counterparts ($F(1,25)=2.360, p=0.137$, $\eta^2 = .086$)(see Figure 10).
- The main effect for the between-subject variable 'priming location' was not significant ($F(1, 25) = 0$, $p > .05$, $\eta^2 = 0$). Also, the interaction between compound type and priming location was not significant ($F(1.7, 43) = 1.115$, $p > .05$, $\eta^2 = .043$). That means that the transparency of compounds whose first consitutent was the prime word such as boya kutusu ('paintbox') and constituents whose second constituent was the prime word such as akbalık ('dace') do not differ with respect to compound type (JC, IC and DC).

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predictors) and the dependent variable. Partial eta-squared is one of the most commonly used effect size measures. It stands for the proportion of total variation attributable to the independent factor, partialing out (excluding) other factors from the total nonerror variation. (Pierce, Block & Aguinis, 2004, p. 918). In this thesis, partial eta-squared values produced by SPSS were reported for the effect sizes.

$$\text{Partial } \eta^2 = \frac{SS_{\text{treatment}}}{SS_{\text{treatment}} + SS_{\text{error}}}$$

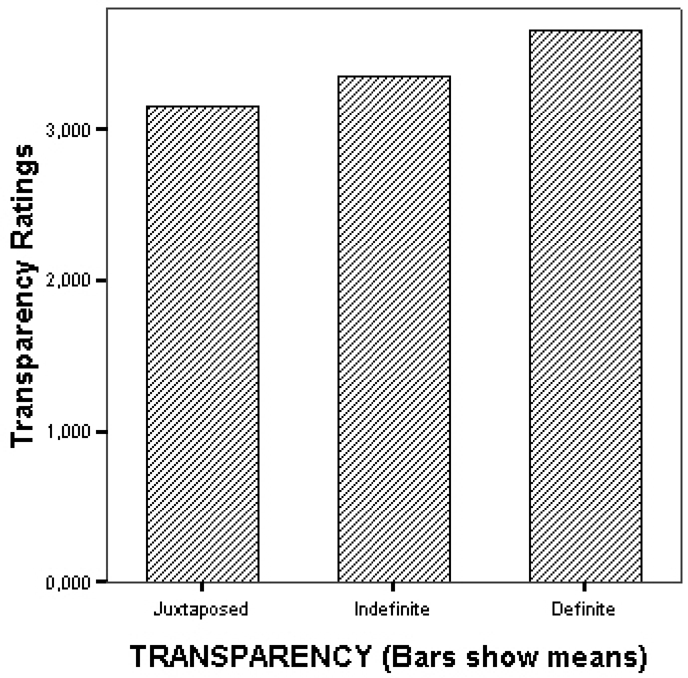

Figure 10 Transparency Levels of Compounds

2 Degree of Relatedness of First Constituent-Second Constituent to the Whole Compound Meaning

In order to statistically analyze the composionality of the compounds in terms of constituent meanings a repeated measures ANOVA was conducted again by taking picture names as individual subjects. This time two different within subjects variables were analyzed: compound type (3 levels for JC, IC and DC) and constituents' semantic relatedness (2 levels for first and second constituents) with the whole compound. Besides, priming location was taken as between subjects variable. The results are as follows:

- Mauchly's test indicated that the assumption of sphericity had been violated for compound type (χ^2 (2) = 6.54, p < .05); therefore, degrees of freedom were corrected using Huynh-Feldt estimates of sphericity (e <0.75, e = .89). This test also failed for the compound type and constituent transparency interaction (χ^2 (2)

= 8.30, $p < .05$), therefore, degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($e < 0.75$, $e = .85$).

- There was no significant difference between the semantic contribution of the first and second constituents ($F(1, 25) = 0.273$, $p > .05$, $\eta^2 = 0.011$.).
- The semantic contribution of the first and second constituent also did not change with priming location of the compound, i.e., there is no interaction ($F(1,25) = 0.447$, $p > .05$, $\eta^2 = 0.018$).
- No interaction was found between first and second constituents' contribution, priming location and compound type ($F(1.696,42.405) = 0.153$, $p > .05$, $\eta^2 = 0.006$).
- In conformity with the transparency analysis, compound type was found to be significant. The degree of relatedness of the compounds constituents with the overall compound changes with compound type($F(1.779,44.474) = 12.643$, $p < .01$, $\eta^2 = 0.336$).
- Helmert contrasts revealed that in terms of average semantic relatedness of the constituents, DCs (Mean=3,675, SE=0,057) were rated significantly more transparent than their respective indefinite (Mean=3,414, SE=0,085) and JC (Mean=3,174, SE=0,114) counterparts ($F(1,25) = 36.134$, $p < .001$, $\eta^2 = .591$), whereas only a marginal significant difference was found between JC and their respective IC counterparts ($F(1,25)=3.996$, $p=0.057$, $\eta^2 = .138$).
- No interaction was found between compound type and priming location. Overall, the semantic relatedness of the constituents does not change with compound type and different locations of priming ($F(1.779,44.474) = 0.831$, $p > .05$, $\eta^2 = 0.032$).
- The interaction with compound type and constituent relatedness was found to be marginally significant ($F(1.696,42.405) = 3.701$, $p < .05$, $\eta^2 = 0.129$)
- First constituents of DCs were rated more related to the whole compound meaning (Mean=3.751, SE=0.041) than first constituents of the ICs (Mean=3.394, SE=0.118) and JC (Mean=3.063, SE=0.125). What is more, second constituents of DCs were rated more related to the whole compound meaning (Mean=3,598, SE=0,081) than IC (Mean=3,435, SE=0,102) and JC (Mean=3,284, SE=0,124). Simple contrasts revealed that the difference between

DCs and JCs is significant in terms of first and second constituents separately ($F(1,25) = 13.366$, $p < .01$, $\eta^2 = 0.348$) while the difference between the first and second constituents contrasting definite and ICs is not significant ($F(1,25) = 2,070$, $p > .05$, $\eta^2 = 0.076$). Pair wise comparisons revealed that IC and JC do not differ.

What is interesting here is that, second constituents of the DC were rated less related than the first constituents to the whole compound meaning while the situation was reverse for the other two compound types where the relatedness increased in the second constituent. This result can be explained as follows: As constituents of the possessive compounds bear the semantic relation " possessor(specifier) and the possessed(the head)" , the subject might have rated the modifier part as more related to the compound as the semantic relation in the compound shifts to the active part which is the modifier. Also as the specifier has more information, maybe one can speak of an "information structure" in compounds parallel to sentences. The first position is maybe a topic position (a specially emphasized position) for the structural compounds (definite).

In the other two lexicalized compounds, however, as the head is the second-constituent, the emphasis might be on that constituent. In any case there is an asymmetry in the structural compound (possessive) that is absent in the two others (JC, IC). Also, the superiority of DCs over JC in terms of transparency might be due to more frozen, thus lexicalized nature of JC. This is more evidence that only the possessive one's are really syntactic (and decomposed) whereas the others are lexical units and nondecomposed (even though the indefinite is in the middle, but JC and IC go together on the one hand and contrast with the possessives on the other hand. Transparency levels of JC and IC are not significantly different and this justifies the inclusion of JC in the main experiment.). To sum up, semantic transparency goes along with syntactic compositionality. (see Figure 11)

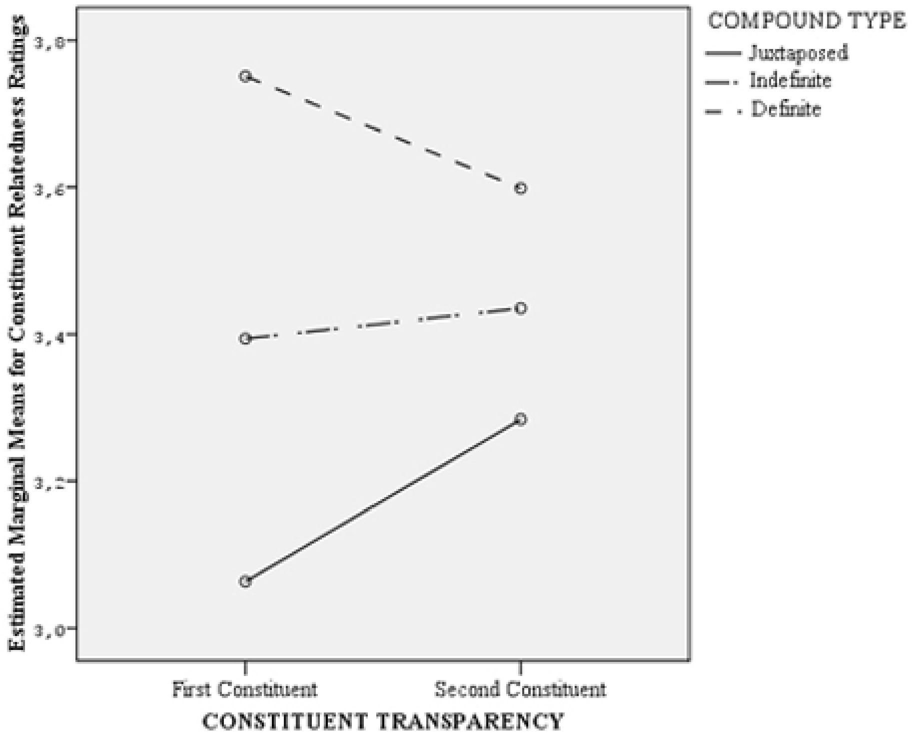

Figure 11 Constituent Transparency and Compound Type

3 Animacy Rating Evaluation of Compounds

A repeated measures ANOVA was conducted for the animacy ratings with the three compound types as within subject variable and priming location as between subjects variable.

Mauchley's test was insignificant for the within-subject variable (compound type). Thus, uncorrected F-values were used.

- There is no main effect of animacy between the different types of compounds; they were rated indifferently in terms of animacy ($F(2,50) = 1.246$, $p > .05$ $\eta^2 = 0.047$).
- No significant animacy difference was found between the first constituent primed and second constituent primed compounds. The effect of priming location was insignificant ($F(1,25) = 0.769$, $p > .05$, $\eta^2 = 0.030$).

- The interaction between different compound types and priming location with respect to animacy rating was also insignificant ($F(1,50) = 1.246$, $p > .05$, $\eta^2 = 0.047$).
- All compound types were rated inanimate mostly (DCs (Mean=1.441, SE:0.099), ICs (Mean=1.510, SE:0.099) and JC (Mean:1,584, SE:0.115)).

4 Concreteness Rating of Compounds

A Repeated measures ANOVA was conducted for the concreteness ratings of the three compound types as within subject variable and priming location as between subjects variable.

Mauchley's test was insignificant for the within-subject variable (compound type). Thus, uncorrected F-values were used.

- There was no main effect of concreteness between the different types of compounds; they were rated indifferently in terms of concreteness ($F(2,50) = 0.565$, $p > .05$, $\eta^2 = 0.022$).A significant concreteness difference was found between compounds whose first *vs*. whose second constituent was the prime word, irrespective of the compound type ($F(1,25) = 5,941$, $p < .05$, $\eta^2 = 0.192$). Compounds whose second constituent was the prime word were rated as more concrete (Mean=2.652, SE=0.115) than those whose first constituent was the prime word (Mean=2.212, SE=0.139). This result was expected because the priming constituents of the compound were concrete objects which can be depicted as tree, fish, etc., and which had to be named in the naming task. And, the majority of the compounds (almost 2/3) in the experimental set are those whose second constituent is the prime word.
- The interaction of the concreteness ratings and priming location is marginally significant ($F(2, 50) = 3,283$, $p = 0.046$, 0.116). However, simple contrasts between the three compound types in terms of concreteness ratings yielded no significant differences (DCs (Mean=2,406, SE=0.096), ICs (Mean=2,509, SE=0.127) and JC (Mean=2,381, SE=0.124).

After prime word selection, prime pictures used in this study were prepared.

2.1.2 Pictures

Black and white line drawings of 113 common concrete objects were used as experimental pictures. 18 pictures were used as practice trials, 67 pictures were used as fillers, and 28 pictures were used as targets (see Appendix, section B).

The majority of the pictures was chosen from Snodgrass and Vanderwart's picture set. ("LexicALL" web site and Rossion et al.(2004)). Several agreement criteria which are of central importance to cognitive processing and memory functioning was validated for these pictures: name agreement, concept agreement, familiarity, visual complexity and image agreement. The remaining pictures were drawn by two graphic artists (one of them having graduated from Hacettepe University, Faculty of Fine Arts, Painting Department and the other studying graphics in a technical school) and finally, by the researcher. Adobe Photoshop CS4, version 11.0 was used in image re-productions and modifications. Some transformations (colored pictures were converted to gray-scale and scaling-orientation modifications) were applied to some of the pre-existing pictures if it was found necessary. For the newly produced pictures, several criteria were taken into consideration:

- Images should be realistic
- They should include no emotion[25]
- Images should be line-drawings and include sufficient amount of details, i.e., they should be as simple as possible
- Orientation of the objects should reflect their daily usage and generally acceptable perspective
- Pictures should depict only a single object

[25] Only the picture of "deli" (crazy person) (Figure 20), and "ana" (mother) (Figure 18), included emotion due to their semantic content. There was no other way to express them concretely unless emotion was included.

Image sizes were adjusted so that spectators could grasp them in one glance (4,5 * 4,5 cm on average).

After 4 pilot sessions, three pictures were redrawn: Koç ('ram')(Figure 21), taş ('stone') (Figure 23), and kuşak ('belt') (Figure 22). In addition to that, it appeared that four pictures posed difficulty for subjects: yüz ('face') (Figure 25), baş ('head') (Figure 19), deli ('crazy person') (Figure 20), and yağ ('oil') (Figure 24). For this reason, these pictures were presented twice (in random order) during the booklet session preceding the experiment, during which subjects were familiarized with the pictures and their names.

2.1.3 Merging Prime Pictures with Distractor Words

Target pictures, e.g., ağaç ('tree') were combined with three Turkish noun–noun compound words, namely JC, IC and DC as primes. These words were selected from the set of pre-selected compound words. Distractors from all three compound types matched with the picture name in either the first or second constituents meaning that all compounds are morphologically and phonologically related to the picture name. Semantic relatedness of the compounds with the picture names was not measured independently. However, transparency ratings found previously indicate that DCs are much more semantically related to picture names.

As a fourth block, target pictures in each set were also matched with morphologically, phonologically and semantically unrelated control words which were also composed of Turkish noun–noun compounds (9 JC, 10 IC and 9 DC). These unrelated compounds were distributed across four blocks as much equally in terms of compound types as possible, (see Table 5). The unrelated condition served as a baseline to evaluate the size and direction of any priming effect.

Table 5 Distribution of Unrelated Compound Types Over Blocks

	JC	IC	DC
Block IC	**# of unrelated Compounds**		
1	2	3	2
2	2	3	2
3	2	2	3
4	3	2	2

2.1.4 Filler Distractors and Pictures

Another 72 comparable pictures were matched with four phonologically and semantically unrelated words each and used as filler items to reduce the relatedness percentage of the stimuli to 0,28%. (Filler pictures and the matching filler words are presented in the Appendix Section A). To establish reasonable numbers for experimental settings such as filler item pairs and practice trial counts, previous studies in the literature were consulted, see Table 7. The criteria used in the present study were tried to match the ones in these reference studies as closely as possible.

2.2 Methods

2.2.1 Design

In terms of experimental design and procedure, the current experiment closely resembles the previous studies of Zwitserlood et al. (2000, 2002) and Koester et al. (2008).

As explained before, the four priming conditions (JC, IC and DC; unrelated compounds) in all sets were almost identical in terms of frequency, count of syllables, and count of phonemes[26] (see Table 6).

Table 6 Stimulus characteristics for the stimuli set

	Mean Frequency	**Mean No. of syllables**	**Mean No. Of phonemes**	**Mean No. Of stem syllables(first constituent stem syllable count + second constituent stem syllable count)**	**Mean No. Of stem phonemes(first constituent stem phoneme count + second constituent stem phoneme count)**	**Begin of overlap in syllable position**
Targets	378,44	1,59	3,81	1,59	1,59	n/a[27]
JC	1	3,74	9,52	3,74	8,78	2,33
IC	1	4,74	11,48	3,78	9,33	2,33
DC	n/a	5,7	13,78	3,74	9,07	2,89
Unrelated	1 (JC an IC), n/a (DC)	4,81	11,89	3,81	9,3	n/a

[26] Phoneme number was taken equal to the grapheme number as they converge in the orthography of Turkish.
[27] not available

Prime-target pairs were presented in four blocks, using a Latin-square design.[28] Each picture was presented once per block and each block contained 28 prime-target pairs belonging to each condition, 112 pairs in total. For example, the target picture for ağaç ('tree') matched with a DC distractor word in block one (bahçenin ağacı ('tree of the garden')), with a JC distractor word (kızıl ağaç ('redwood')) in block two, with an unrelated compound distractor word (formanın eteği ('skirt of the uniform')) in block three and finally with an IC distractor word in block four (meyve ağacı ('fruit tree')). Target pictures were matched with a specific unrelated compound for all subjects, nevertheless, presented in a random fashion (in one of 4 blocks).

The 72 filler pictures were also presented once in each block; however, paired with a different word in each presentation. Filler picture-word pairings were distributed in four blocks and prior to the experiment, each real prime-distractor word block was matched with a filler picture-word block in a random fashion. Also, via a visual basic script code, 72 filler pairs were distributed with the following programming logic: there should be two filler pairs at least between each experimental picture-word pair. The remaining picture-filler pairs were distributed randomly across the experimental picture-word pairs. Thus, following some experimental prime-picture pairs, more than 2 filler pairs might have appeared. For each block, there were two trial sequences, and participants saw the four blocks in one of four orders (1-2-3-4, 2-3-4-1, 3-4-1-2, 4-1-2-3).

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[28] In a experiment with Latin square design, if a set of p objects would be tested across n conditions, a matrix design is formulated such that column count of the matrix refers to condition type and row number refers to target object count. In this way, in this matrix, each object and condition are represented once in each row and column set whereas each condition-target pair occurs only once in the whole matrix (Kirk, 2010).
For example: target objects:T1, T2 and T3
Condition type: C1,C2,C3 and C4

Latin-Squared Design would be as follows:

T1C1	T2C3	T3C2
T2C2	T3C1	T1C3
T3C3	T1C2	T2C1

2.2.2 Procedure

After having given written, informed consent (Appendix Section A), participants were tested individually in a dimly lit, quiet room. They were located in front of a computer screen (15.6" Diagonal High Definition HP Brightview Display (1366 x 768 pixels)). Naming latencies were measured by the aid of a voice-key (SciencePlus PST Serial Response Box™[29]). To check participants' picture-naming replies after the experiment session with the session records, SONY ICD-B500 Digital Voice Recorder was used. Participants were instructed to name the target picture as quickly, loudly and accurately as possible. After participants received the instructions, each picture together with its name was presented once[30] on the computer screen for 3.5 sec, and participants were required to name the pictures even during the booklet session. Aim of presenting target pictures beforehand was to provide familiarity of the participants with the stimulus material and reduce naming errors. After completion of the booklet, subjects were asked if they needed to see the pictures once more and for the last time, in case they might have not paid enough attention and missed some pictures.[31] Next, participants received 18 word-picture pairs as practice trials. Practice trials provided subjects familiarization with the experimental procedure (Appendix A) as practice trials were procedurally organized identical to the trials in the experimental blocks.

[29] The microphone provided with the voice-key was a unidirectional audio-technica low impedance dynamic microphone (ATR20C). Sensitivity and impedance informed by the company was, respectively, -59dBm-3dB and 500 ohm±30%. However, the technical specifications document of the voice-key stated that the voice-key microphone input requires specifically a unidirectional microphone with the impedance level of 600 ohm. Even though small differences in impedance may not have a considerable effect as (50-1,000 ohms) microphones are all classified as low impedance products, nevertheless, to match the impedance and increase the sensitivity level, a Shure C606N low impedance dynamic and unrectional microphone was used (Sensitivity: -52 dBV/Pa and Impedance:600 ohm).

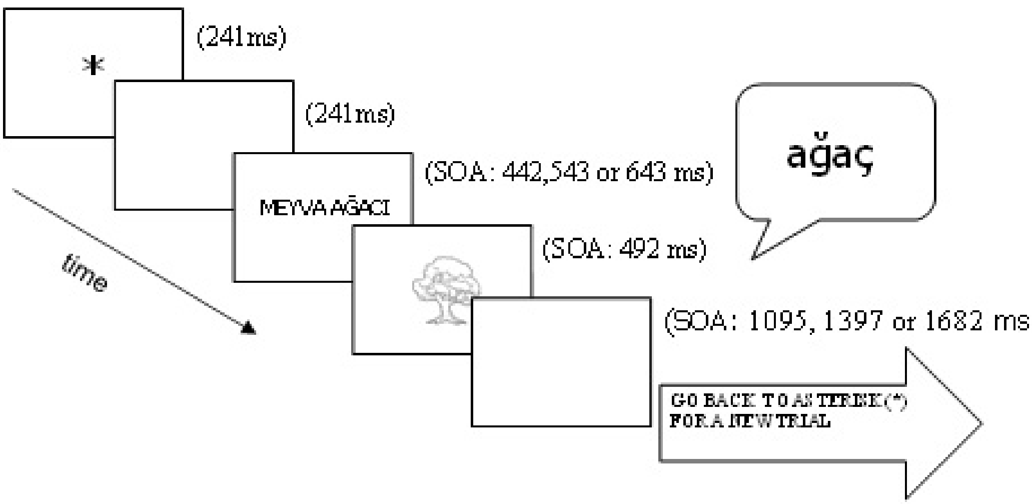
[30] As mentioned before, pictures which posed difficulties in the pilot session were presented twice to the subjects.

[31] None of the subjects required to see the booklet twice.

Table 7 Experimental Settings of Previous Studies on Morphological Priming

Reference Study	Study Name	Subject Count	Item Count Per Block	Block Count	Relatedness Proportion(Total Related Item Count/Total Unrelated Item Count)	Filler İtem Count	Warm-Up İtem Count
Zwitserlood et al. (2000)	Phonological And Morphological Distractors In The Immediate Picture-Word Paradigm	45	42	3	0,40	56	32
Zwitserlood et al. (2000)	Semantic And Morphological Distractors In The Immediate Picture-Word Paradigm	30	39	3	0,20	117	32
Zwitserlood et al. (2000)	Morphological Variants In The Delayed Picture-Word Paradigm	40	32	4	0,50	40	32
Zwitserlood et al. (2002)	Morphological Priming With Compounds Sharing Their First Or Second Constituent With The Picture Name	32	42	3	0,50	42	26
Koester et al. (2008)	Morphological Priming In Overt Language Production: Electrophysiological Evidence From Dutch	23	36	3	0,29	72	20
Current Study		**29**	**28**	**4**	**0,28**	**67**	**18**

The phases involved in each trial were as follows: At first, participants saw a warning signal (an asterisk) for 241 ms indicating the start of a new trial. Next, the screen was cleared for 241 ms, it was followed by the display of the distractor word for varying durations of 442,543 or 643 ms, centered on the screen and in capital letters. Immediately following the distractor word(Interstimulus Interval=0), the picture was presented in the center for a duration of 492 ms (SOA[32] is same as the duration of distractor word presentation as there is no interstimulus interval between the distractor word and the picture, 442,543 or 643 ms). Reaction time was measured from the onset of the picture. Time-out (showing a blank screen) was set to varying durations of 1095, 1397 or 1682 ms since stimulus names varied considerably in their count of syllables (time-out depended on the count of syllables) (Figure 12 depicts the experimental procedure)(The next section provides more detailed information on the object duration identification procedure). The experiment lasted about 25 minutes.



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[32] In Zwitserlood et al. (2000)study, they used a SOA of 106 ms. They had used fixed distractor presentation time and did not present the pictures to the subjects prior to experiment. However, in this study, as the pictures were presented to the subjects in a booklet before hand and the distractor word presentation varied depending on their length, an extra SOA time was not considered.

Figure 12 Experimental Procedure(PNP)

Each participant received a different randomization of the distractor word-picture name pairs in each block and session. Subsequently, all experimental stimuli were presented in four blocks with short breaks of 2 minutes in between. Taking breaks or cutting a break shorter was left to the subject's own will. No feedback was provided to the participants during the experiment. Stimulus presentation, reaction time collection and all measurements related to the experiment design were controlled by E-Prime software (version 2.0, www.pstnet.com).

2.2.3 Object Durations in the E-Prime Software

To choose suitable timings for the objects, the previous studies were consulted. In these studies, the following durations were used for the experiments:

Zwitserlood et al.(2000)

Fixation Point	252 ms
Blank Screen After Fixation Point	252 ms
Distractor Word	398 ms
Picture	0 ms(SOA),398 ms
Time-out for response	1500 ms

Koester et al.(2008)

Fixation Point	250 ms
Blank Screen After Fixation Point	250 ms
Distractor Word	400 ms
Picture	400 ms
Time-out for response	1100 ms (monosyllabic and disyllabic picture names),1400 ms (trisyllabic picture names),1700 ms(pictures names with more than three syllables)

Fixation point and blank screen after fixation were made similar to the ones in the previous studies. However, for distractor words, same duration time could not be used due to orthographic differences between German, Dutch and Turkish.

In German and Dutch, all compound words are written as single word which is not the case for Turkish. Especially, the third compound type in this study, namely, possessive compounds, are written with all constituents separated. So, it should be investigated if the extra space between words would affect reading time either in a facilitatory or inhibitory manner. Secondly, in Turkish, there is an almost perfect grapheme-to-phoneme correspondence, meaning that all letters are fully pronounced in a transparent way. Therefore, reading Turkish words would require more time compared to the other two languages.

As far as it is known, there is no study on measuring the average amount of time to read Turkish words silently. For this reason, a sub-test on reading Turkish words by eye trace was conducted. In the original experiment, 398 words were used in total. However, presenting and asking subjects to read all these words consecutively would be exhausting for the subjects. For this reason, a small subset of the original experiment words was used. 53 words were selected. They were listed in the Appendix A. 28 of the words did not contain blanks (single word or JC) while the rest was composed of two words. The 53 words were also varied in terms of syllable count (3 to 7 syllables). Most Turkish compounds are composed of three syllables at least; therefore, the minimum syllable count was kept at the level of 3. The words were presented to 9 subjects (3 female, 6 male, (mean age=33.4 yrs, SD=3.6). In each trial, the experimental procedure was as follows: a fixation point (*) appeared in the middle of the screen for 250 ms, then the screen was cleared for 250 ms and a word was presented immediately. The subjects were asked to press space bar as soon as they read the word silently. The approximate reading time was calculated from word onset to subject input of space bar. The results are as follows (Table 8):

Table 8 Silent Reading Times (ms) by Syllable Count and Word Types

	One-word Group	Two-word Group
Syllable count	Mean Reaction Time	
3	447,859	429,433
4	489,161	430,308
5	626,301	489,165
6	630,12	492,050
7	650,821	668,667

A univariate ANOVA was conducted on reaction time results with syllable count (3-7), compound type (compound *versus* simple word) and word type (single word *versus* two words) as independent between subject variables. The results showed that there was a significant effect of syllable count on silent word reading duration. Word reading times increased as syllable count increased (F (4, 42) = 5.234, p = .002, η^2=.333).

The results also revealed that the extra space between the two constituents did not have any significant effect on compound reading duration meaning that morpheme boundary is not identified depending on the blank location. This is also in line with the literature. In morpheme recall experiments by Libben et al. (1999), they presented subjects first a stimulus word (pen) presented at the top of the screen, a focus word (clamprod-a compound word) presented in the middle of the screen and finally a response word (house) presented at the bottom of the screen. All words presented were unrelated with each other. After stimulus presentation they also presented one of four arrows showing the left-right-up and down directions. And participants were asked to recall the stimulus word when encountered with the arrow pointing up and the response word when they were presented a downward pointing arrow. In the left and right directed arrow presented conditions, they were asked to recall the first or the second constituent of the compound word, respectively. Half of the compounds were composed of compounds with ambiguous interpretations (clamprod: clam-prod or clamp-rod). They found out that all possible compound constituents were recalled equally (clam versus clamp and prod versus rod) by the participants. Later on they changed the design and used semantic associates of the possible compound constituents for the stimulus and response words and also used unrelated items for baseline condition.(i.e., sea for clam ; hold for clamp and shell for prod; hold for rod).They presented semantically related primes either priming only the first or second part of the complex word or both parts in a conflicting fashion(e.g., sea-clamprod-hold) or non-conflicting fashion(e.g., sea-clamprod-shell) . They found significant priming effect for both conflicting and non-conflicting conditions. In further studies with semantic priming, Libben et al(2002) found priming effects also for the constituents which could not be extracted depending on the whole-word representation(for example, in the word ‘barking’, bark is related to dog and tree. However, as a whole word, it is only related to dog). Depending on the results, Libben et. Al (1999 and also 2002) suggests that a left to right processing strategy is mandatorily applied for English compounds and processing is not performed merely on single constituent extraction and producing a single representation of the compound at hand, all possible candidates of morpheme representations are produced for a single compound in a recursive fashion by the pre-lexical parser. They emphasize that morphological parser also does not depend on the space to identify constituent boundaries and multiple representations may emerge due to ambiguity within the compound.(For example, for busheater, two representations are possible: bus-heater and bush-eater(English),for bakkal, two representations are also possible: bakkal(‘grocery’) and bak-kal(‘look’-‘stay’)). However, in this experiment, such an ambiguity is not the case for the experiment set; so, ambiguity effect was not checked. (for example, for açıkgöz:açık-göz(open-eye:’shrewd’), yüznumara:yüz-numara(hundred-number:’resting room’) only one representation is available for both of these compounds as it is the case for the rest of the concatenated compounds in the experiment set).

Additionally, no significant interaction was found between syllable count and word type.

According to the results found and also by taking the fact that pressing space bar would also contribute to the resulting reading time durations into consideration, the final word reading time durations were determined as follows, (see Table 9)

Table 9 Final Distractor Word Durations Varying in Syllable Count

Syllable Count	**Duration (ms)**
1-2-3	450
4-5-6	550
>=7	650

Prime picture presentation was determined as 500 ms and time-outs were kept similar to the Koester et al. (2008) study such that for monosyllabic and disyllabic distractor words, time-out was set to 1100 ms whereas it was arranged as 1400 ms for trisyllabic words. Rest of the stimulus names longer than three syllables, the time-out criterion was set to 1700 ms. since all target picture names were composed of one or two syllables, time-out was identical for all target picture names.

The durations mentioned so far could be used directly only when an ideal machine was used in which all processes of the operating system could be controlled. However, as this was not the case, durations had to be tuned in order to match an ideal machine performance as much as possible. In the next session, the tuning procedure is described in detail.

2.2.4 Tuning Presentation Durations

Due to technical reasons such as file load delays, extra operating system processes and missing computer clock refresh cycles; the durations determined above may severely deviate from the specified durations (E-prime User Guide, pg. 75). For this reason, several precautions should be taken such as starting the computer with safe mode prior to the experiment and leaving as few as possible software applications running, except E-prime, the software program used in this thesis.

An additional and more important solution is calibrating presentation durations in multiples of the computer refresh cycle. As the computer refreshes the screen cycle by cycle, any duration falling between one refresh cycle may either cause lengthening or shortening of the presentation duration of the object. The below table shows the calculated durations of the experiment objects prior to timing refinement had been done. In this test run of the experiment, no voice input was provided to the program to measure total durations of the objects. The errors were calculated by subtracting pre-specified and expected duration time from calculated object presentation duration. (Table 10)

Table 10 Deviations in the Object Presentation Times (ms) Prior to Time Calibration

Object Name / Presentation Duration	Fixation Point	Blank Screen	Distractor Word	Prime Picture	Time-out for Response
Pre-specified	250	250	450-550 or 650	500	1100-1400 or 1700
Calculated Mean Duration Error	1,201005	17,98995	21,41457	2,505025	20,43467

After the durations were calibrated, the final errors calculated can be seen from the table below (Table 11). In this way, a much more precise approximation to pre-specified durations could be provided. Last row in the table below depicts the error differences before and after the time-adjustment. It can be noticed that error levels of the critical objects (distractor word, prime picture and time-out for response) decreased considerably after time-refinement. (Details of the mathematical calculations on object durations and further information on critical timing adjustments in E-prime are provided in the Appendix, part B).

Table 11 Deviations in the Object Presentation Times (ms) After Time Calibration

Object Name / Presentation Duration	Fixation Point	Blank Screen	Distractor Word	Prime Picture	Time-out for Response
Calibrated Pre-specified Duration(Pre-specified)	241(250)	241(250)	442(450)-543(550) or 643(650)	492(500)	1095(1100)-1397(1400) or 1682 (1700)
Pre-Release	18	18	18	150	18
Calculated Mean Duration Error	1,256281	1,251256	2,947236	2,492462	8,663317
Calculated Mean Duration Error (prior to time-adjustment, taken from Table-7)	1,201005	17,98995	21,41457	2,505025	20,43467
∆ Mean Error	-0,05528	16,73869	18,46733	0,012563	11,77135

3 Results and Discussion

3.1 Results

3.1.1 Filtering Subject Response Data

In accordance with the other previous studies on morphological priming (Zwitserlood et al. (2000,2002) and Koester et al.(2008)), data obtained from the experiment was filtered according to some pre-determined criteria list before the main statistical analysis to investigate the morphological priming effect was run.

1 Pictures which were named falsely more than 30% were excluded. For this purpose, an analysis on naming accuracy of each picture was carried out. Most of the prime items belonged to the filler and practice item set. Besides, only one item in the real experiment set, which was baş ('head'), had an inaccurate naming percentage of 34%. Thus it was eliminated from the main analysis. (Picture naming results are presented in the Appendix-section C.)

2 Reaction time measures collected during invalid picture namings, disfluencies or incomplete answers, triggering of the voice-key by non-speech sounds were discarded. What is more, time-outs and reaction times less than 200 ms were also eliminated.

3 Data from participants with more than 22% fallacious answers were not included into statistical analyses. In the previous studies, 15% had been taken as a boundary. Each subject had 108 experimental trials in total (as baş ('head') was excluded, 4 prime word-picture pairs belonging to this item had been discarded also). In that manner, the subjects should name correctly at least 84 items. 29 subjects' responses were analyzed and only 5 subjects failed the 22% criterion whereas 11 subjects failed the 15% criteria. As applying the 15% criterion would cause a substantive loss of subject data, the criterion was increased to 22%. (The subject score list along with subjects' gender and age information is provided in the Appendix-section C).

4 No transformation (logarithmic, inverse, etc.) was applied to the final data set to handle outliers; rather, an outlier analysis was conducted on the remaining RT data of the 24 subjects who had passed the above criteria. The outlier analysis procedure was as follows:

i. a z-value transformation was made for each RT[33]

ii. the z-transformed RT data which were outside the boundaries of ± 2 standard deviations (1, 96 from the mean) were identified

5 Naming latencies of 2307 trials had been screened for outliers. As a result, 125 of these trials were identified as outliers. (The overall result of the outlier analysis is provided in the Appendix-section C)

Table 12 lists the mean reaction times and error percentages as a function of distractor type (JC, IC, DC and unrelated) and block (first, second, third and the forth occurrence of the same picture). Overall, 3248 (112 (experimental trials) * 29(subjects)) trials were evaluated depending on the above criteria set. After elimination of invalid trials, 2182 trials were retained for the final statistical analysis (67.18 %).

[33]A z-transformation accommodates data to a normal distribution with a mean of 0 and a SD of 1.

Table 12 Immediate picture-word paradigm: Mean naming latencies (ms), Standard errors, count of valid data and invalid trial percentages across conditions and blocks

Condition	**Block1**	**Block2**	**Block3**	**Block4**	**Total Mean RT**	**Total Invalid Trial Count Percentages**	**Total Valid Trial Count**	**Total Trial Count**
JC Mean RT	738,37	678,63	655,62	644,59	677,97			
SE(ΔRT)	13,662	10,032	10,988	11,225	5,87			
Valid Trial Count	131	136	146	142			555	812
Invalid Trial Count Percentages	35,47	33	28,08	30,05		31,65		
IC Mean RT	753,54	690,76	645,25	619,04	675,64			
SE(ΔRT)	14,007	12,778	11,239	10,668	6,444			
Valid Trial Count	129	144	136	143			552	812
Invalid Trial Count Percentages	36,45	29,06	33	29,56		32,02		

Table 12 (continued)

Condition	Block1	Block2	Block3	Block4	Total Mean RT	Total Invalid Trial Count Percentages	Total Valid Trial Count	Total Trial Count
DC Mean RT	754,62	686,01	663,44	642,84	683,48			
SE(ΔRT)	13,896	13,254	12,032	11,987	6,589			
Valid Trial Count	118	135	142	145			540	812
Invalid Trial Count Percentages	41,87	33,5	30,05	28,57		33,5		
Unrelated Mean RT	782,35	720,44	701,34	692,19	721,84			
SE(ΔRT)	13,662	10,032	10,988	11,225	5,87			
Valid Trial Count	118	141	136	140			535	812
Invalid Trial Count Percentages	41,87	30,54	33	31,03		34,11		
Total	496	556	560	570	496		2182	3248

3.2 Statistical Analysis[34]

Mean latencies were submitted to separate three repeated measurement analyses of variance, with participants *(F_1)*, pictures *(F_2)* and distractors *(F_3)* as fixed variables. In the previous researches, analyses were done only with participants and pictures. Even though, three statistical models yielded similar results, testing the contribution of some variables (ex. gender and age were tested with the participant-based model, syllable count, stem syllable count etc. were tested with distractor-based model) could be possible via such specialized groupings of the mean naming latencies. Nevertheless, for main results, the most prominent model is the item (picture)-wised one as it reflects the experimental procedure better than the other two. (The main independent variables are the pictures and mean naming latencies were collected for each picture in repeated measures by condition and block). All effects reported to be significant were reliable at least at the .05 level. In the following two sections, details of these two analyses will be presented.

3.2.1 Subject-wise Analysis

First, picture naming latencies were arranged in a subject-wise manner. Each set of subject data was grouped by blocks and distractor type. (Also, subjects' total experiment duration, gender and age information (organized in 3 groups) were included in the analysis for an initial check.)(The subject-wise RT data table is provided in the Appendix Section C)

A repeated measures ANOVA on subjects' picture naming latencies was conducted by using two factors (within-subjects variables), the first being block (1,2,3 and 4) and the second being distractor type (JC, IC, DC and unrelated). Gender (female, male) and age (3 age groups) were used as between subjects variables.

[34] Followingly, in the footnotes, only significant results of the Mauchly's Test of Sphericity test were reported. Error corrections were done for the variables and interactions which yielded significant results, otherwise, no correction was made for the particular variable or interaction and uncorrected F-ratios produced by SPSS were used.

Distractor Type and Block Analysis[35]

- The results show that the distractor type (JC, IC, DC and unrelated) had a significant main effect on picture naming latencies. (F (2.005, 36.094) = 7.170, $p < .01$ $\eta^2 = .285$)

  Helmert contrasts revealed that naming latencies were significantly longer in the unrelated condition (Mean=726.238, SE=18.267) compared to three priming conditions (F (1, 18) = 11.176, $p < .01$, $\eta^2 = .383$)

  No naming latency difference was found between JC (Mean=684.519, SE=19.828) and ICs (Mean=686.100, SE=20.367). Also the difference between JC and DC (Mean=694.208, SE=21.559) is insignificant. (F (1, 18) = 2.820, $p > .05$, $\eta^2 = .135$) Furthermore, no significant latency difference between ICs and DCs was found. (F (1, 18) = 1.010, $p > .05$, $\eta^2 = .053$)

- The results show that "block" had a significant main effect on naming latencies such that naming latencies decreased with more exposure to the prime picture (F (1.561, 28.101) = 28.980, $p < .01$, $\eta^2 = .617$)
- Repeated contrasts revealed that the first production (Mean=762.127, SE=24.111) of a picture name was significantly slower than the second production (Mean=698.488, SE=20.174) (F (1, 18) = 54.561, $p < .01$, η2 = .752). Also, the second production was significantly slower than the third production (Mean=664.724, SE=17.395) (F (1, 18) = 9.052, $p < .01$, η2 = .335) However, the third and the fourth productions (Mean=665.725, SE=18.930) did not differ from each other. (F (1, 18) = 0.202, $p > .05$, η2 = .011)

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[35] Mauchly's Test of Sphericity

Mauchly's test indicated that the assumption of sphericity had been violated for the dependent variable distractor type (χ2 (5) = 17.840, $p < .01$); therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (e <0.75, e = .67).

Mauchly's test indicated that the assumption of sphericity had been violated for the dependent variable block (χ2 (5) = 27.269, $p < .01$); therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (e <0.75, e = .52).

- The results show that there was no interaction of distractor type and block (F (9, 162) = 0.956, $p > .05$, $\eta^2 = .050$).

Figure 13 summarizes the statistical findings above.

Gender Analysis

A main effect of gender was found. Male subjects (Mean= 675.375, SE=24.538) performed faster than female subjects (Mean= 731.353, SE=30.794) in the PNT (F (1, 18) = 4.631, $p = .045$, $\eta^2 = .205$) (Figure-4). However, gender did not interact with distractor type (F (2.005, 36.094) = 0.886, $p > .05$, $\eta^2 = .047$) or block (F (1.561, 28.101) = 0.585, $p > .05$, $\eta^2 = .031$) nor was there any three-way interaction gender*distractor type*block (F (9,162) = 1.034, $p > .05$ $\eta^2 = .054$).

Figure 14 summarizes the statistical findings above.

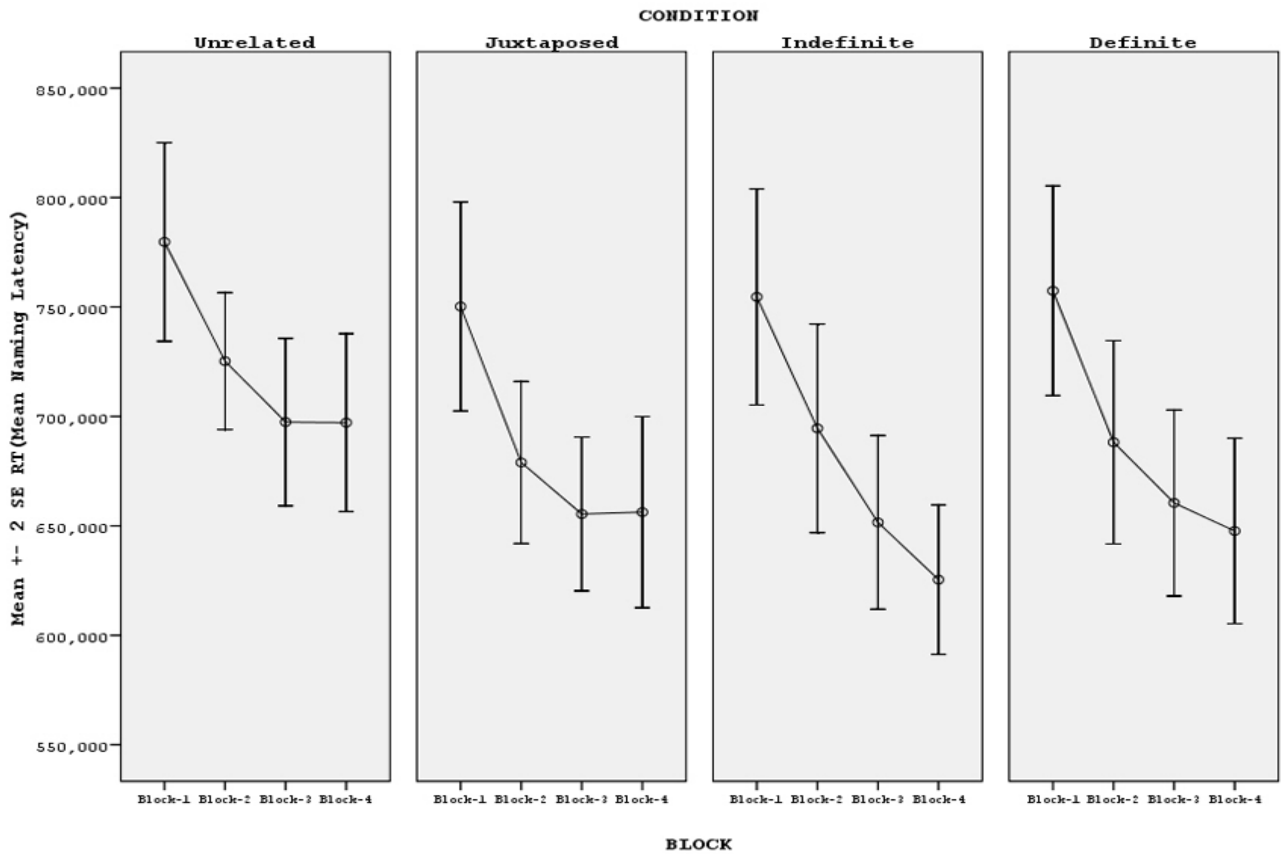

Figure 13 Naming Latency Change by Distractor Type and Presentation Time(Block)

Age Analysis

Subjects' age varied between 18-49 years. In order to include age as an independent between-subjects variable, it was converted into a categorical variable. For that purpose, subjects' ages were classified into three age groups:

18 – 28: 1st group (coded as 1) (Mean = 21.17, SE= 1.22)

29 – 39: 2nd group (coded as 2) (Mean = 31.31, SE= 0.44)

40 – 49: 3rd group (coded as 3) (Mean = 40.50, SE= 0.5)

No main effect of age was found. Naming latencies did not differ significantly between the first (Mean=684.759, SE=33.733), the second (Mean=693.376, SE=20.160) and the third (Mean=732.560, SE= 55.087) age group even though a slight linear increase of RT with age was observed (Figure 14). (F (2, 18) = 1.021, $p > .05$ $\eta^2 = .102$). Besides, age did not interact with any of the within-subject variables, block (F (3.122, 28.101) = 0.538, $p > .05$, $\eta^2 = .056$) and distractor (F (4.010, 36.094) = 0.422, $p > .05$ $\eta^2 = .045$) nor with the between-subjects variable gender (F (1, 18) = 1. 761, $p > .05$, $\eta^2 = .089$). Furthermore, none of the three-way interactions, block* distractor*age (F (18,162) = 1.374, $p > .05$, $\eta^2 = .132$), block*gender*age (F (1.561, 28.101) = 0.397, $p > .05$, η2 = .022) and distractor *gender*age (F (2.005, 36.094) = 0.386, $p > .05$ η2 = 0.021). Lastly, the 4-way interaction distractor*block*gender*age was insignificant (F (9,162) = 1.395, $p > .05$. $\eta^2 = .072$).

Figure 15 summarizes the above findings.

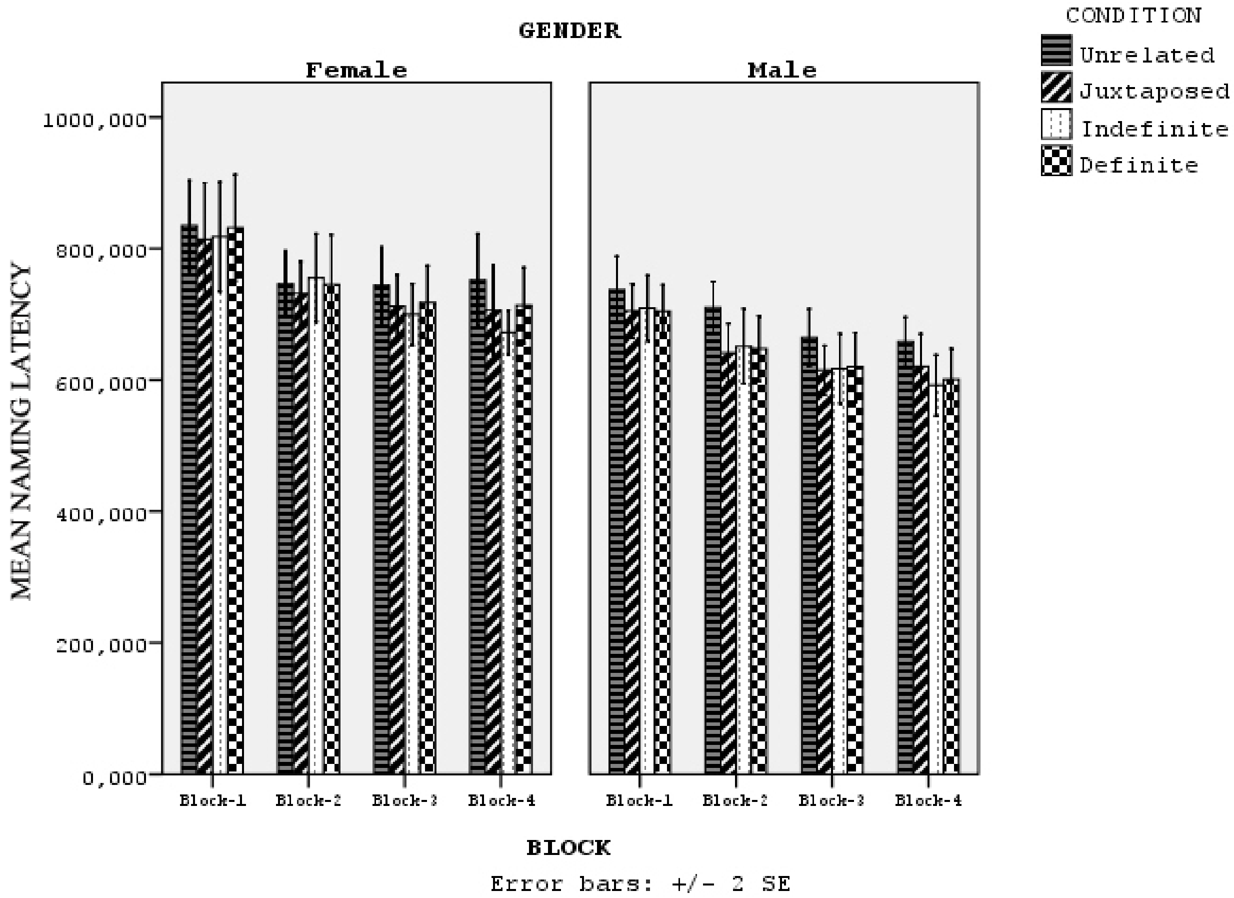

Figure 14 Picture Naming Latencies of the Male and Female Subjects by Distractor Type and Display (Block)

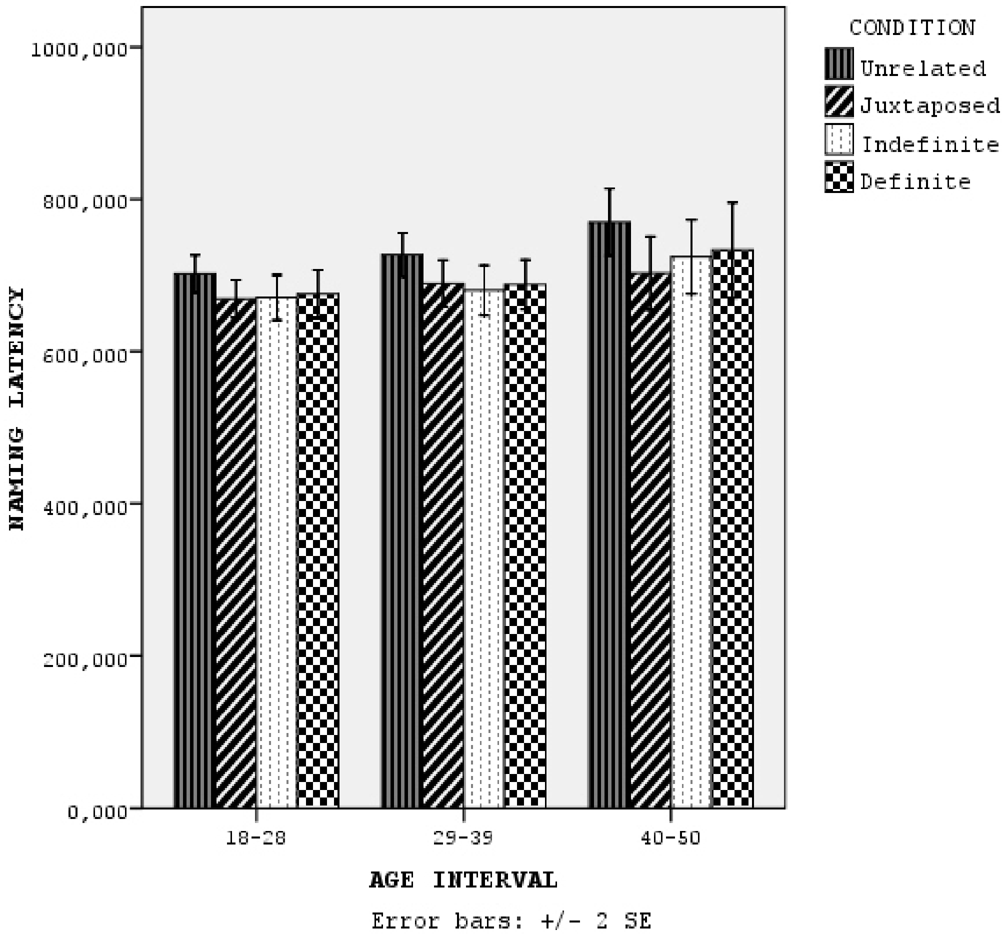

Figure 15 Picture Naming Latencies of the Three Age Groups by Distractor Type

Experiment Duration and Gender Analysis

Separate from the analysis above, a Univariate Analysis of Variance was performed on the dependent variable "experiment total duration". Gender was taken as the independent fixed factor. This analysis was conducted in order to follow up on the previously found gender effect that was manifest at the level of single trial duration, i.e., RT's.

Levene's test of equality of variances was found to be non-significant, meaning that mean experiment durations of the female and male subjects did not have different variances.

The result of the ANOVA revealed that even though male subjects (Mean=832427.1, SE=26129.274) complete the experiment faster than female subjects (Mean=833805.9, SE=30916.573, the difference is not significant ($F (1, 22) = 0.001$, $p > .05$, $\eta^2 = .000$). Thus, gender effect which was found on the single trial level did not reflect on the overall performance of the female and male subjects.

3.2.2 Prime-Picture-wise Analysis

First, picture naming latencies were re-arranged in an item-wise manner. Each target picture's naming latency data was grouped by blocks and distractor types. Each prime item also varied in terms of priming location. For example, the target picture ağaç ('tree') was matched with the distractor which contained the prime word in the second constituent whereas in yüz ('face') the prime word was located in the first constituent. Priming location information was also added to the statistical data table for analysis. (Item-wise RT data table is provided in the Appendix, section C)

First, a repeated measures ANOVA on the naming latencies of each target picture was conducted by using two factors (within subjects variables), the first being block (1, 2, 3 and 4) and the second being distractor type (JC, IC , DC and unrelated).Secondly, the same analysis was replicated ignoring the fourth distractor condition (unrelated) to assess the size and direction of the effect of the priming location, if any. Second analysis was conducted without unrelated condition as unrelated compounds did not contain any overlapping constituent with the target picture names.

Distractor Type (Unrelated condition included) and Block Analysis

- The results revealed that mean naming latencies differed significantly by distractor type (JC,IC ,DC and unrelated) ($F (3, 78) = 14.874$, $p < .01$, $\eta^2 = .364$).

  Helmert contrasts revealed that naming latencies were significantly longer in the unrelated condition (Mean=726.734, SE=10.569) as compared to the other three priming conditions ($F (1, 26) = 55.637$, $p < .01$, $\eta^2 = .682$). No naming latency difference was found between JC (Mean=680.170, SE=6.607) and ICs (Mean=683.059, SE=8.676). Also the difference between JC and DC

(Mean=690.273, SE=9.9) was insignificant ($F (1, 26) = 0.78$, $p > .05$, $\eta^2 = .029$). Furthermore, no significant latency difference between ICs and DCs was found ($F (1, 26) = 0.777$, $p > .05$, $\eta^2 = .029$).

- The results show that block had a significant effect on naming latencies such that naming latencies decrease with more exposure to the target picture ($F (3, 78) = 88.717$, $p < .01$, $\eta^2 = .773$)

  Repeated contrasts revealed that the first production (Mean=764.393, SE=10.326) of a picture name was significantly slower than the second production (Mean=695.619, SE=8.386) ($F (1, 26) = 80.698$, $p < .01$, $\eta^2 = .756$). The second production was also significantly slower than the third production (Mean=666.593, SE=8.106) ($F (1, 26) = 21.846$, $p < .01$ $\eta^2 = .457$). However, no significant difference was found between the third and fourth productions (Mean=653.632, SE=8.664) ($F (1, 26) = 3.424$, $p >.05$ $\eta^2 = .116$).

- The results show that the interaction between distractor type and presentation was not significant ($F (9, 234) = 0.889$, $p > .05$, $\eta^2 = .033$),

Figure 16 summarizes the statistical findings above.

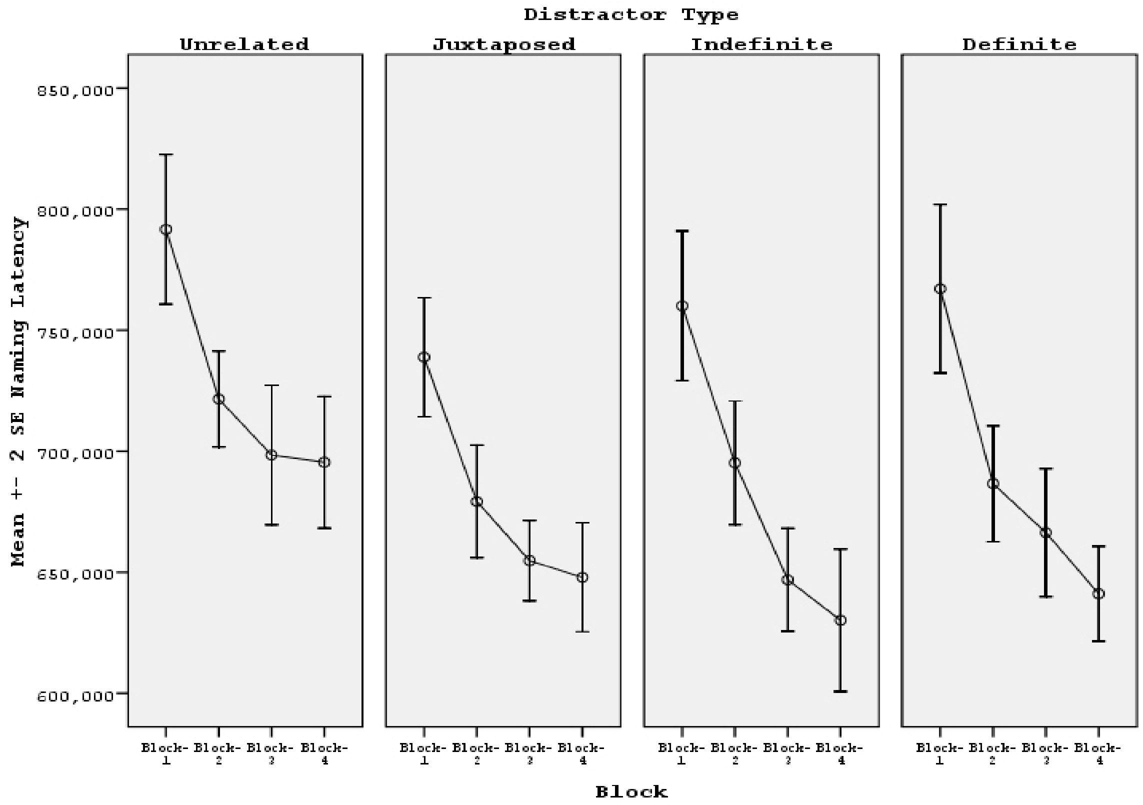

Figure 16 Naming Latencies by Distractor Type and Block

Distractor Type (Unrelated condition discarded), Block and Priming Location Analysis

The statistical model above was changed by excluding the unrelated condition and including the priming location (first or second constituents) as independent between subjects variable. Finally, the same repeated measures ANOVA was conducted on this new model.

Distractor Type (only compounds) and Block Results

- The results revealed that JC, IC and DC distractors did not differ in terms of naming latency; thus an equal priming effect was observed for the three different compound types ($F (2,50) = 0.457$, $p > .05$, $\eta^2 = .018$).

  Helmert contrasts also supported that finding. No naming latency difference was found between JC (Mean=682.914, SE=6.183) and IC (Mean=684.947, SE=8.770). Also the difference between JC and DC (Mean=690.718, SE=10.262) was insignificant ($F (1, 25) = 0.437$, $p > .05$, $\eta^2 = .017$). Furthermore, no significant latency difference between ICs and DCs was found ($F (1, 25) = 0.478$, $p > .05$ $\eta^2 = .019$).

- The results showed that block had a significant main effect on naming latencies such that naming latencies decrease with more exposure to the target picture ($F (3, 75) = 61.020$, $p < .01$, $\eta^2 = .709$)

  Repeated contrasts revealed that the first production (Mean=757.497, SE=10.502) of a picture name was significantly slower than the second production (Mean=687.464, SE=9.416) ($F (1, 25) = 64.701$, $p < .01$, $\eta^2 = .721$). The second production was also significantly slower than the third production (Mean=658.343, SE=7.576) ($F (1, 25) = 10.893$, $p < .01$, $\eta^2 = .303$). However, no significant difference was found between the third and fourth productions (Mean=641.468, SE=8.413) ($F (1, 25) = 4.194$, $p > .05$, $\eta^2 = .144$).

- The results revealed that there was no interaction between distractor type and block ($F(6,150) = 0.885$ $p > .05$, $\eta^2 = .034$)

Figure 17 summarizes the statistical findings above.

Priming Location Results

No main effect of priming location was found ($F(1, 25) = 1.685$, $p > .05$ $\eta^2 = .063$). Naming latencies did not differ significantly between the first constituent (Mean=695.332, SE=10.840) and the second (Mean=677.054, SE=8.988) (Figure-18). Besides, priming location did not interact with any of the within-subject variables, block ($F(3, 75) = 0.485$, $p >.05$ $\eta^2 = .019$), distractor ($F(2, 50) = 1.098$, $p >.05$ $\eta^2 = .042$) nor was the three-way interaction priming location*block*distractor significant ($F(6,150) = 1.240$, $p >.05$ $\eta^2 = .047$) (Figure 18).

3.2.3 Distractor-word-wise Analysis

First, picture naming latencies were re-arranged in a distractor-wise manner. Different from the participant and item based analysis; mean naming latencies were grouped across distractors. Thus, distractor type which was taken as an independent within subject variable in the previous two analysis were taken as a between subjects variable into the statistical model. This analysis was particularly run to check the possible side-effects of the distractors such as syllable count, stem syllable count, etc. As stated before, due to extra suffixation in the indefinite and DCs, distractors were not matched in issues related to their structure. Depending on the study by Gürel (1999), it was assumed that extra suffixes in the distractors were not essential to compound processing. Nevertheless, it was crucial to check that assumption.

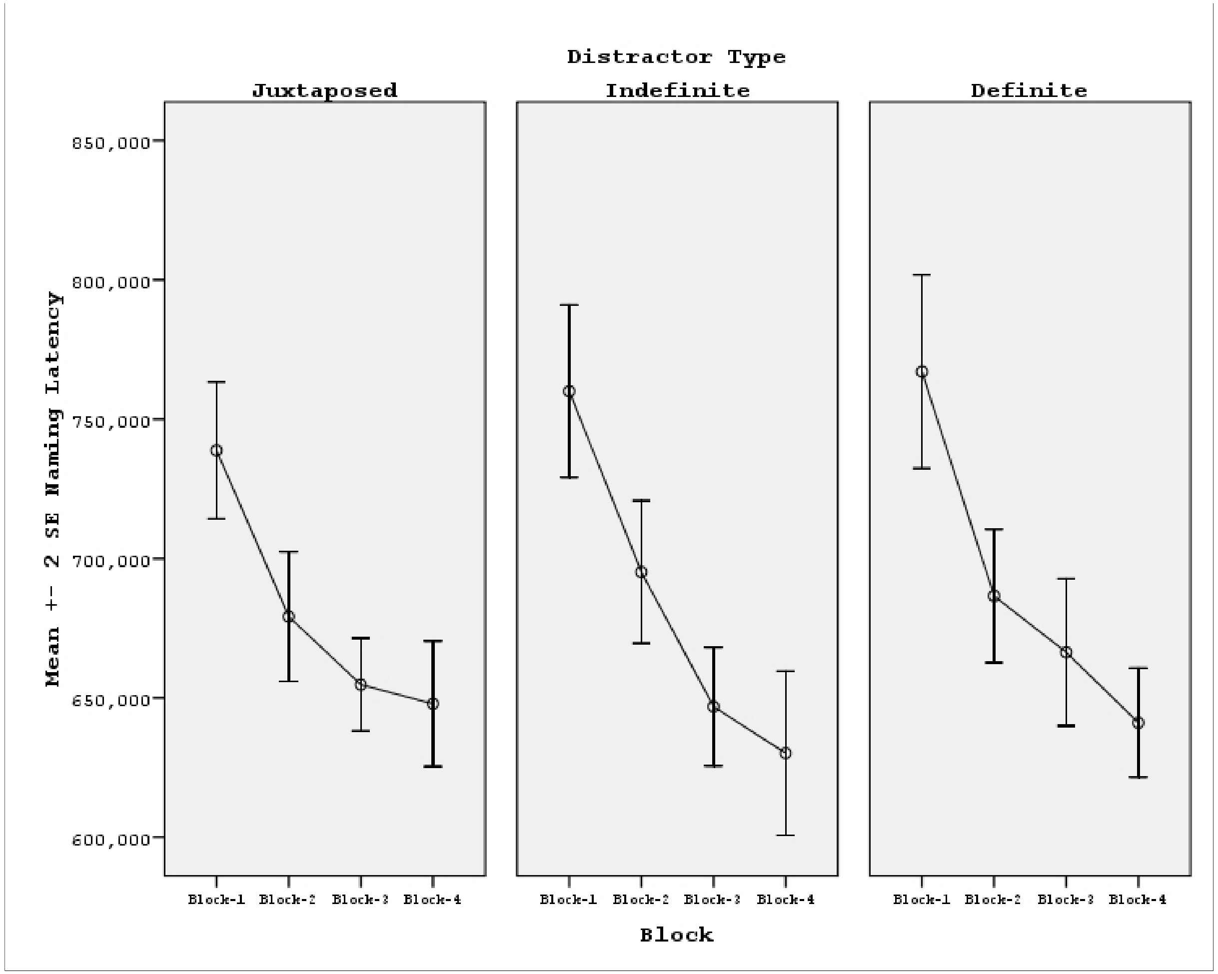

Figure 17 Naming Latencies by Distractor Type and Block

In this analysis, as stated above, the following variables were measured:

- Condition (this variable was a between subjects variable for this analysis due to design differences with the subject-based and item-based analyses),
- one-word [36](this variable indicated if the compound word was written with a space between the constituents or not),
- priming condition (each distractor word was used in either one of the condition types being unrelated, juxtaposed, indefinite and definite),
- priming location (this variable encoded the overlapping constituent location of the prime word in the distractor word and the target picture's name),
- syllable count of the distractor word,
- phoneme count of the distractor word,
    - stem syllable count of the distractor word, (ex. ‘boya kutusu (paint box+CM:paint box)’ has two constituents ‘boya’ and ‘kutu’ each of which has the stem syllable count of 2. Thus, stem syllable count sum is 4. Thus, this measure ignores the extra syllable added by CM for ICs and also GEN case and possessive marker (3SG.POSS)for DCs.)

- stem phoneme count of the distractor word, (ex. ‘boya kutusu (paint box+CM:paint box)’ has two constituents ‘boya’ and ‘kutu’ each of which has the stem phoneme count of 4. Thus, sum of the stem phoneme count is 8. Thus, this measure ignores the extra phoneme added by CM and possessive marker (if the second constituent ends with a vowel, CM and possessive markers are attached to the second part with the buffer letter ‘-s’. Thus, for some ICs, this adds 2 extra phonemes to the compound) for ICs and also GEN case (-nın: 3 phonemes) and possessive marker (3SG.POSS) for DCs.)
- overlapping-syllable position (this variable indicated at which position the compound word matched with the target picture name. For example, while the

[36] Authors name English compounds with a space between the constituents as being ‘open compounds’. (Libben et al., 2006, pg. 52). As most of the compounds used in this study are open compounds, two-words was used to differantiate them from one-word compounds.

prime picture name göz- “eye” overlapped with the distractor word “a-çık-göz” at syllable count 3, dağ-“mountain” matched with “dağ-ba-yır” in the first syllable. Note that words in the unrelated condition have no value for that variable.)

- morphology change[37] (this variable shows if there is any morphological change in the primed constituent of the compound due to attachment of the –CM and possessive (3SG.POSS) markers and thus, it is meaningful only for the second-constituent primed indefinite and DCs as some of the second constituents underwent a morphological change and JC were not suffixed, they were not included in the analysis)
- Transparency degree (the rating calculated from the previous survey study)
- Composionality degree: first and second constituent's relatedness degrees (the rating calculated from the previous survey study)
- Animacy degree (the rating calculated from the previous survey study)
- Concreteness degree (the rating calculated from the previous survey study)

[37] Voiceless consonants, ‘p’, ‘t’, ‘k’ and ‘ç’, at the end of some stems change into their voiced variant(listed below), if the stem is inflected with a suffix starting with a vowel.
‘p’ is replaced by ‘b’
‘t’ is replaced by ‘d’
‘(n)k’ is replaced by ‘(n)g’
‘ç’ is replaced by ‘c’
‘k’ is replaced by ‘ğ’

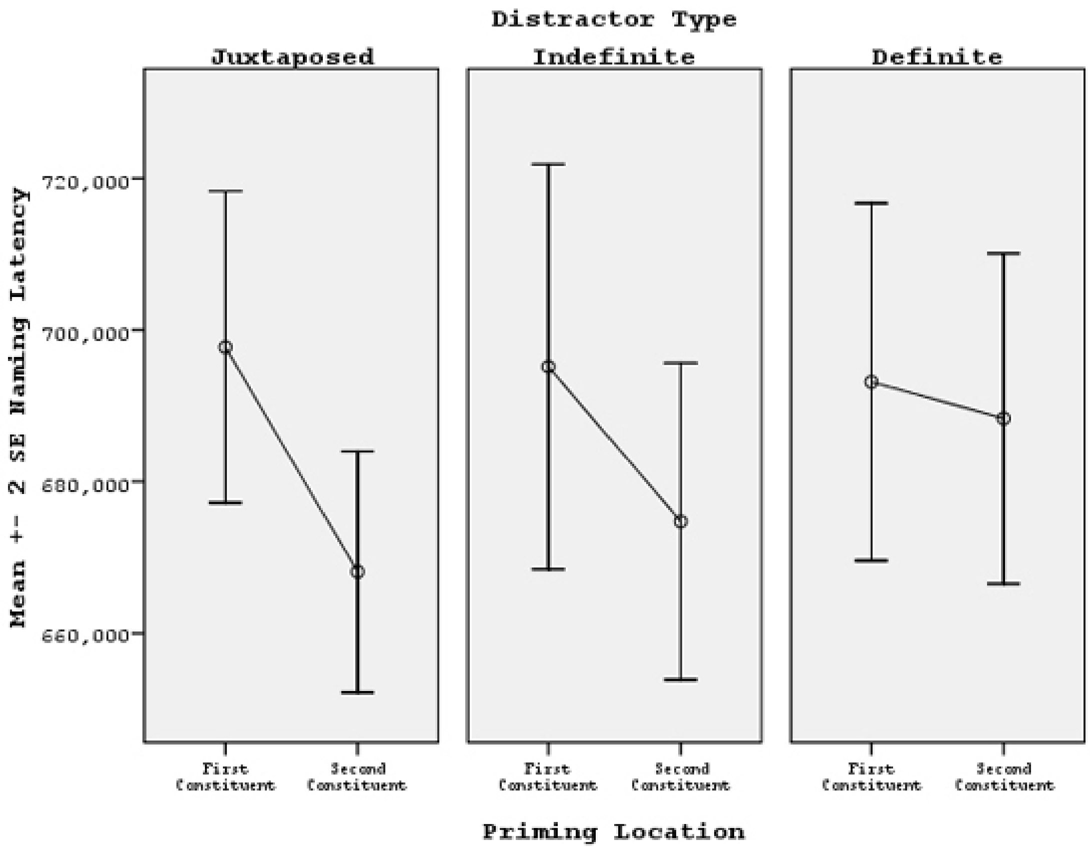

Figure 18 Naming Latencies by Distractor Type and Priming Location

Distractor Type (Unrelated condition included) and Block Analysis

- The results revealed that distractor type had a significant main effect on mean naming latencies ($F(3, 104) = 5.647$, $p < .01$, $\eta^2 = .140$).

  Helmert contrasts revealed that naming latencies were significantly longer in the unrelated condition (Mean=726.734, SE=9.064) as compared to other three priming conditions.

  No naming latency difference was found between JC (Mean=680.170, SE=9.064) and IC (Mean=683.059, SE=9.064). Also the difference between JC and DC (Mean=690.273, SE=9.064) was insignificant. Furthermore, no significant latency difference between ICs and DCs was found, either.

- The results revealed that block had a significant main effect on the naming latencies such that naming latencies decreased with more exposure to the target picture ($F(3, 312) = 87.219$, $p < .01$, $\eta^2 = .456$).

  Repeated contrasts revealed that the first production (Mean=764.393, SE=7.637) of a picture name was significantly slower than the second production (Mean=695.619, SE=5.804) ($F(1, 104) = 71.737$, $p < .01$, $\eta2 = .408$). The second production is also significantly slower than the third production (Mean=666.593, SE=5.939) ($F(1, 104) = 17.063$, $p < .01$, $\eta2 = .141$). However, no significant difference was found between the third and fourth productions (Mean=653.632, SE=6.242) ($F(1, 104) = 3.738$, $p >.05$, $\eta^2 = .035$).

- The results showed that the interaction between distractor type and block was not significant ($F(9,312) = 0.894$, $p > .05$, $\eta^2 = .025$).

Figure 19 summarizes the statistical findings above.

Distractor Type (Unrelated condition excluded), Block and Priming Location Analysis

The statistical model above was now changed by excluding the unrelated condition and including the priming location (first and second constituents) as the second independent between subjects variable. Otherwise, the same repeated measures ANOVA was conducted on this new model.

Distractor Type and Block Results

- The results revealed that JC, IC and DC distractor types did not differ in terms of naming latency; thus equal amounts of priming was observed for the three compound types ($F (2,75) = 0.223$, $p > .05$, $\eta^2 = .006$).

  Helmert contrasts also supported that conclusion. No naming latency difference was found between JC (Mean=682.914, SE=8.572) and ICs (Mean=684.947, SE=8.572). Also the difference between JC and DC (Mean=690.718, SE=8.572) was insignificant. Furthermore, no significant latency difference between ICs and DCs was found, either.

- The results revealed that block had a significant main effect on the naming latencies such that naming latencies decreased with more exposure to the target picture ($F (3, 225)=64.354$, $p < .01$, $\eta^2 = .462$).

  Repeated contrasts revealed that the first production (Mean=757.497, SE=8.966) of a picture name was significantly slower than the second production (Mean=687.464, SE=7.094) ($F (1, 75)=51.343$, $p < .01$, $\eta^2 = .406$).

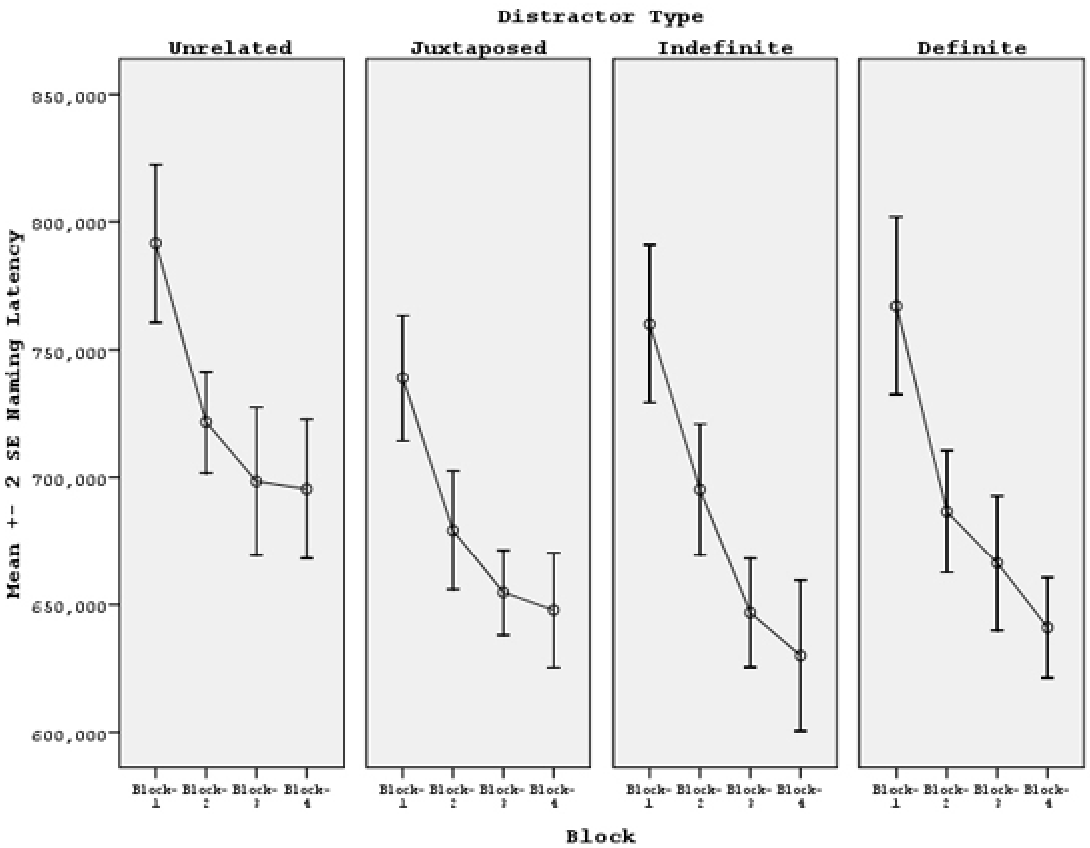

Figure 19 Naming Latencies by Distractor Type and Block

The second production was significantly slower than the third production (Mean=658.343, SE=6.358) ($F(1, 75) = 12.551$, $p < .01$, $\eta^2 = .143$). The third production was also found to be significantly slower than the fourth (Mean=641.468, SE=7.001) ($F(1, 75) = 4.645$, $p = 0.034$, $\eta^2 = .058$).

- The results showed that there was no interaction between distractor type and block ($F(6,225) = 0.861$, $p > .05$, $\eta^2 = .022$).

Figure 20 summarizes the statistical findings above.

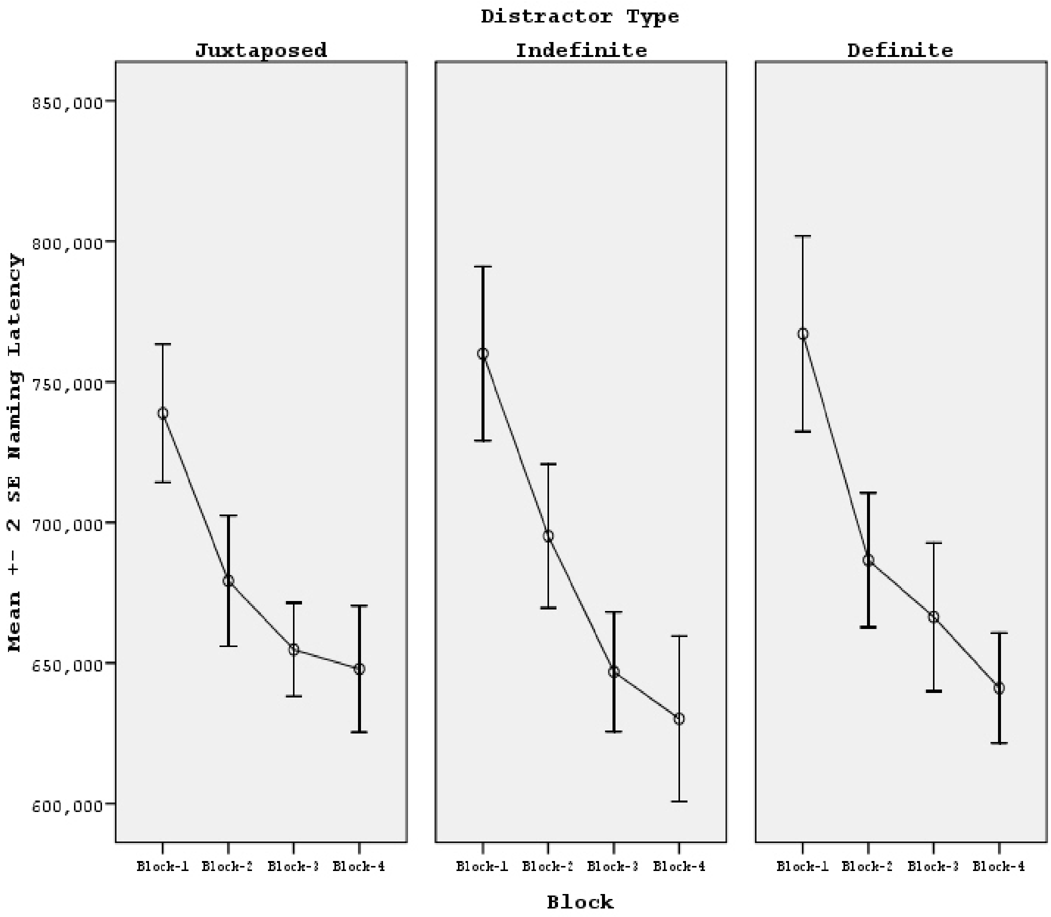

Figure 20 Naming Latencies by Distractor Type and Block

Priming Location Results

No main effect was found for the priming location ($F\ (1, 75) = 3.410$, $p > .05$ $\eta^2 = .043$). Naming latencies did not differ significantly between the first constituent (Mean=695.332, SE=7.620) and the second (Mean=677.054, SE=6.318) (Figure-21). Besides, priming location did not interact with the within-subject variable block ($F\ (3, 225) = 0.512$, $p > .05$, $\eta^2 = .007$) or with the other between-subject variable distractor type ($F\ (2, 75) = 0.536$, $p > .05$, $\eta^2 = .014$). There was no three-way-interaction priming location*block*distractor either and also with their interaction ($F\ (6,225) = 1.206$, $p > .05$, $\eta^2 = .031$) Figure 21 summarizes the above findings.

Analysis of Covariances (ANCOVAs) Related to Distractor Words:

For all of the following analyses, mean naming latencies of the distractor words across the four blocks were calculated and then the possible effects of the covariates on that measure were tested. Distractor type was taken as a between subjects variable. Distractor words belonging to the unrelated condition were eliminated as there was no constituent match for these distractors. Therefore, including them into the model would not produce interpretable results.

Syllable count, phoneme count, stem syllable count, stem phoneme count, overlapping syllable position, transparency degree, composionality degree, animacy and concreteness degree were taken as covariates[38] and were fed into the analysis individually, one by one. Besides, the variable "space-between-words" was used as an additional fixed factor as it had only two levels (one-word or two-words).

[38] A covariate is a continuous variable that may covary with the dependent variable. An analysis of covariance (ANCOVA) seeks to understand whether there is any such secondary effect that may impair the primary effect of the independent variable on the dependent variable.

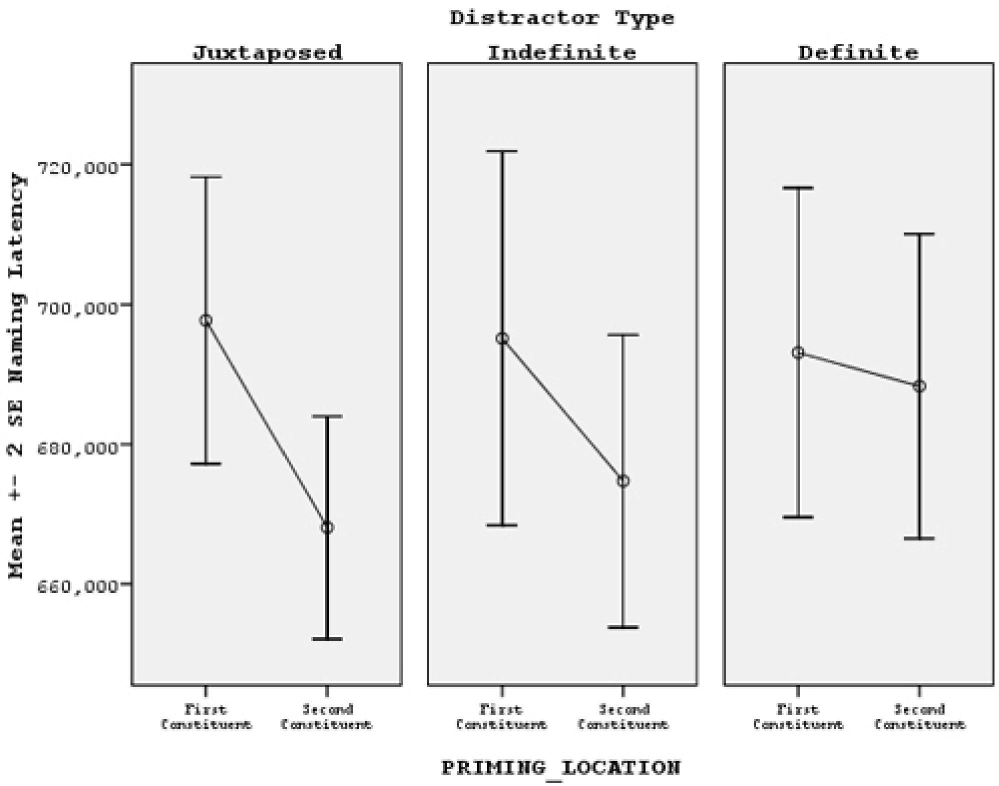

Figure 21 Naming Latencies by Distractor Type and Priming Location

Syllable Count

A univariate analysis of co-variance (ANCOVA) was conducted. Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Syllable count was added as a covariate. Levene's test of equality of variances was non-significant meaning that naming latency differences were distributed equally in the data set. Firstly, no significant naming latency difference between different priming conditions was found ($F(2, 77) = 0.184$, $p > .05$, $\eta^2 = .005$), which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate syllable count of the distractor word meaning that there was no correlation between picture naming latency and the syllable count of the distractor word for that condition ($F(1, 77) = 1.033$, $p > .05$, $\eta^2 = .013$).

Phoneme Count

A univariate analysis of co-variance was conducted. Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Phoneme count was added as a covariate. Levene's test of equality of variances was non-significant meaning that naming lateny differencies were distributed equally in the data set. Firstly, no significant naming latency difference between different priming conditions was found ($F(2, 77) = 0.168$, $p > .05$, $\eta^2 = .004$), which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate phoneme count of the distractor word meaning that there was no correlation between picture naming latency and the length of the distractor word for that condition ($F(1, 77) = 1.473$, $p > .05$, $\eta^2 = .019$).

Stem Syllable Count

A univariate analysis of co-variance was conducted. Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Stem syllable count was added as a covariate. Levene’s test of equality of variances was non-significant meaning that naming latency differences distributed equally in the data set. Firstly, no significant naming latency difference between different priming conditions ($F(2, 77) = 0.197$, $p > .05$, $\eta^2 = .005$) was found, which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate stem syllable count of the distractor word meaning that there was no correlation between picture naming latency and the count of stem syllables of the distractor word for that condition ($F(1, 77) = 0.883$, $p > .05$, $\eta^2 = .011$).

Stem Phoneme Count

A univariate analysis of co-variance was conducted. Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Stem phoneme count was added as a covariate. Levene’s test of equality of variances was non-significant meaning that naming latency differences distributed equally in the data set. Firstly, no significant naming latency difference between different priming conditions ($F(2, 77) = 0.200$, $p > .05$, $\eta^2 = .005$) was found, which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate stem phoneme count meaning that there was no correlation between picture naming latency and count of phonemes in the stem of the distractor word for that condition ($F(1, 77) = 0.733$, $p > .05$, $\eta^2 = .009$).

Overlapping Syllable Position

For that analysis, as syllable overlap for the first constituent of the prime compounds and the target picture's name was necessarily the case, this analysis was performed only with those compounds whose second constituent was the prime word. A univariate analysis of variance was conducted. Mean naming latency for the target word was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Overlapping syllable position was identified as a covariate ranging from 2 to 6 Levene's test of equality of variances was non-significant meaning that naming latency differences were distributed equally in the data set. No significant naming latency difference between different priming conditions ($F(2, 44) = 0.175$, $p > .05$, $\eta^2 = .008$) was found, which was also in accord with the previous repeated measures ANOVA results.

A main affect of overlapping syllable position was found ($F(1, 44) = 5.371$, $p < .05$, $\eta^2 = .109$). As overlapping syllable position was measured on an ordinal scale, a Spearman correlation coefficient was computed to assess the relationship between the overlapping syllable positions and mean naming latency. There was a positive correlation between the syllable position and naming latency, $r = 0.380$, $n = 48$, $p = 0.008$. Increases in overlapping syllable position were correlated with increases in picture naming latencies meaning that the later the priming constituent appears in the compound the longer the naming latency is (Figure 22)

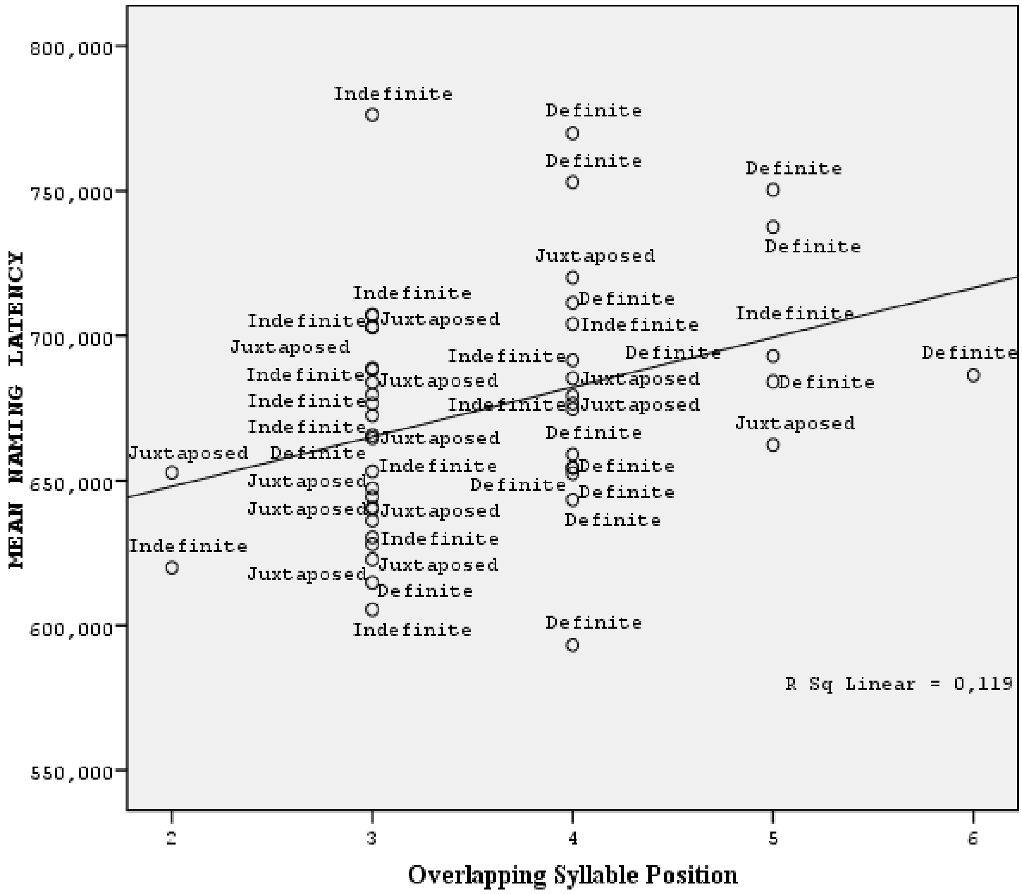

Figure 22 Scatter-plot Depicting the Correlation Between Overlapping Syllable Position and Mean Naming Latency

One-word versus Two-words Compounds

The distractor word set was filtered for this analysis, including JC only. The reason was that out of the 81 distractor compounds (JC, IC and DC), only 8 compounds were orthographically single words and 7 of them were JC.

An independent t-test was performed to compare mean naming latencies of the one-word versus two-word JCs.[39] Numerically, two-word JCs (*M*=678.738, *SE* = 7.257) led to shorter naming latencies compared to one-word JCs (*M* = 683.194, *SE*

[39] As Kolmogorov-Smirnov and Shapiro-Wilk's test of normality revealed, the data in both groups were normally distributed (p>0.05). Their variances were equal also, according to Levene's Test for Equality of Variances (p>0.05).

=12.901), however, this difference was not significant ($t(25) = 0.309$, $p>.05$, $r= .062$[40]). Figure 23 shows the error bars for the mean of the two compound categories. As also visually noticeable, the two error bars overlap meaning that the means of the two types of compounds do not differ and hence are from the same population.

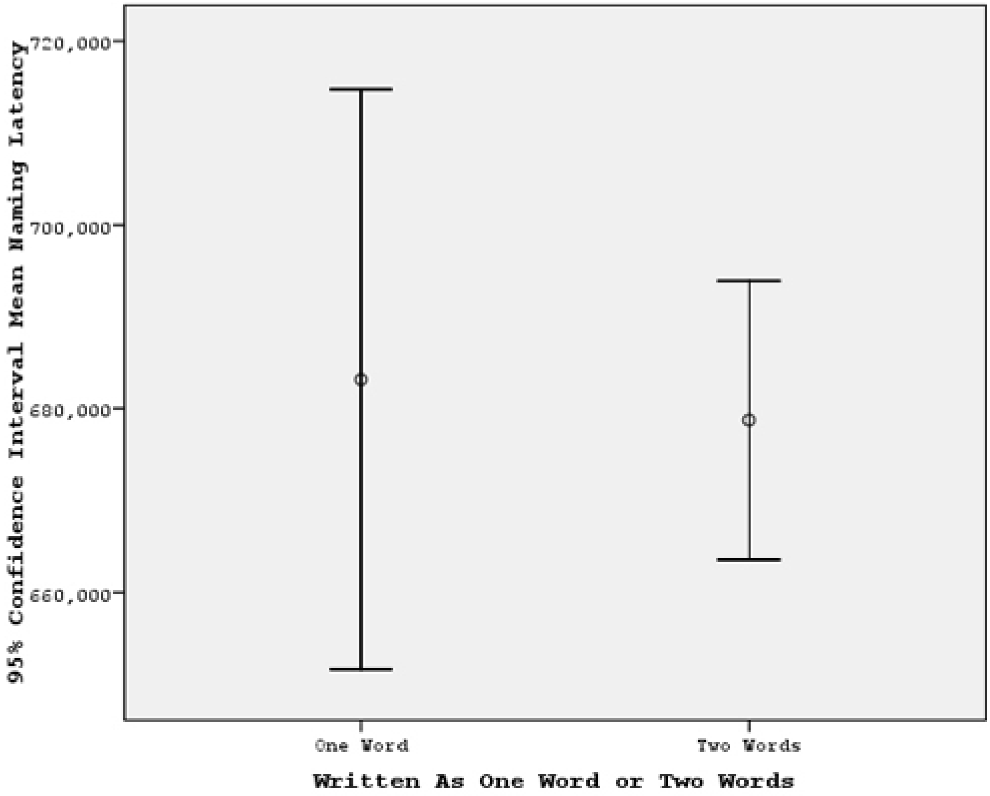

Figure 23 Error Bars Depicting the One-word and Two-word Compounds and Mean Naming Latency

Morphological Change Effect

The distractor word set was filtered for this analysis, including second-constituent primed indefinite and DCs only. The reason was that morphology change could be observed only in the second constituents of the indefinite (4 compounds) and definite (4 compounds)

[40] In a t-test, the correlation coefficient *r* denotes the effect size. It is very small here.

A non-parametric t-test for 2 independent samples (Mann Whitney) was performed to compare mean naming latencies of the form-change versus unchanged compounds.41

Form-changed compounds (*Mdn*=641.44) seemed to differ marginally in mean naming latencies from form-unchanged compounds (*Mdn*=684.73), *U*=63, ns, *r*=-0.25 (note that it is medium). (Exact Sig. (1-tailed) =0.08)

Transparency Effect

In the previous analysis, it had been found that transparency was rated significantly different between JC, IC and DC. DCs were rated more transparent than the other two and no difference had been found between JCs and ICs. This time, a univariate analysis of co-variance was conducted. Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Transparency was entered as a covariate. Levene's test of equality of variances was non-significant meaning that naming latency differences distributed equally in the data set. No significant naming latency difference between different priming conditions ($F(2, 77) = 0.056$, $p > .05$, $\eta^2 = .001$) was found, which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate transparency meaning that there was no correlation between picture naming latency and the degree of transparency of the distractor word for that condition ($F(1, 77) = 0.930$, $p > .05$, $\eta^2 = .012$). Even though DCs had been rated as more transparent, this difference did not interfere with the naming latency results.

Composionality Effect

In this analysis, we assess whether naming latencies of the target picture's name are

[41] As Kolmogorov-Smirnov and Shapiro-Wilk's test of normality revealed, while the data in unchanged group was normally distributed (p>0.05), data in the changed group was not.(p<0.05). Their variances were not equal also, according to Levene's Test for Equality of Variances (p<0.05).

modulated by the relatedness of the first and the second constituent to the whole compound meaning.

In the previous analysis, no main effect of the first and second constituents' relatedness with the whole compound meaning had been found.

For this analysis, the data set was split into two. The first set comprised the compounds whose first constituent primed the target picture's name and the second set the compounds whose second constituent primed the target picture's name. Main effects for the first and second constituents' relatedness were investigated in these two sets with two univariate analysis of variances separately.

a First Constituent Relatedness:

Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. The first constituent's relatedness was entered as a covariate. Levene's test of equality of variances was non-significant meaning for the two sets that naming latency differences were distributed equally in the data sets.

No significant naming latency difference between different priming conditions was found for the first constituent ($F (2, 29) = 0.127$, $p >.05$, $\eta^2 = .009$) and second constituent ($F (2, 44) = 0.027$, $p >.05$ $\eta^2 = .001$), which was also in conformity with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate "first constituent's relatedness" on compounds whose first constituent priming the target picture's name ($F (1, 29) = 0.011$, $p >.05$, $\eta^2 = .000$) and whose second constituent primed the target picture's name ($F (1, 44) = 1.767$, $p >.05$ $\eta^2 = .039$).

b Second Constituent Relatedness:

Mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. The second constituent's relatedness was entered as a covariate. Levene’s test of equality of variances was non-significant meaning for the two sets that naming latency differences were distributed equally in the data sets. No significant naming latency difference between different priming conditions was found for the first constituent (F (2, 29) = 0.425, p >.05 η^2 = .028) and second constituent (F (2, 44) = 0.328, p >.05 η^2 = .015), which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect was found for the covariate “second constituent's relatedness” on f on compounds whose first constituent priming the target picture's name (F (1, 29) = 1.394, p >.05, η^2 = .046) and whose second constituent primed the target picture's name (F (1, 44) = 0.307, p >.05, η^2 = .007).

Animacy Effect

In the previous analysis, no significant animacy effect had been found between the compound types, first and second constituent primed compounds irrespective of the compound type in each trial.

For this analysis, mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Subjects' rating of animacy rating was entered as a covariate. Levene’s test of equality of variances was non-significant meaning that naming latency differences distributed equally in the data set. No significant naming latency difference between different priming conditions (F (2, 77) = 0.121, p >.05, η^2 = .003) was found, which was also in accord with the previous repeated measures ANOVA results.

A main effect of the degree of animacy was found (F (1, 77) = 5.682, p <.05, η^2 = .069). As animacy was measured on an interval scale, a Pearson product-moment correlation coefficient was computed to assess the relationship between the degree of animacy and mean naming latency. There was a significant negative correlation between the animacy degree and naming latency, r = -0.265, n = 81, p = 0.017. As animacy decreases picture naming latencies increase.(Figure 24) Secondly, this correlation was investigated for each compound type and priming location;

Two-tailed significant values are as follows:

- JC -first constituent(r = 0.119, n = 11, p = 0.727),non-significant
- JC -second constituent(r = -0.114, n = 16, p = 0.674), non-significant,
- IC -first constituent(r = -0.044, n = 11, p = 0.897), non-significant,
- IC -second constituent(r = -0.451, n = 16, p = 0.080), **marginally significant,**
- DC -first constituent(r = 0.430, n = 11, p = 0.187), non-significant,
- DC -second constituent(r = -0.442, n = 16, p = 0.087), **marginally significant.**

Thus, especially, in the second-constituent primed cases of IC and DC, there is a negative relation between the animacy ratings and mean naming latencies,i.e.,decrease in picture naming latency can be explained by increase in animacy degree.

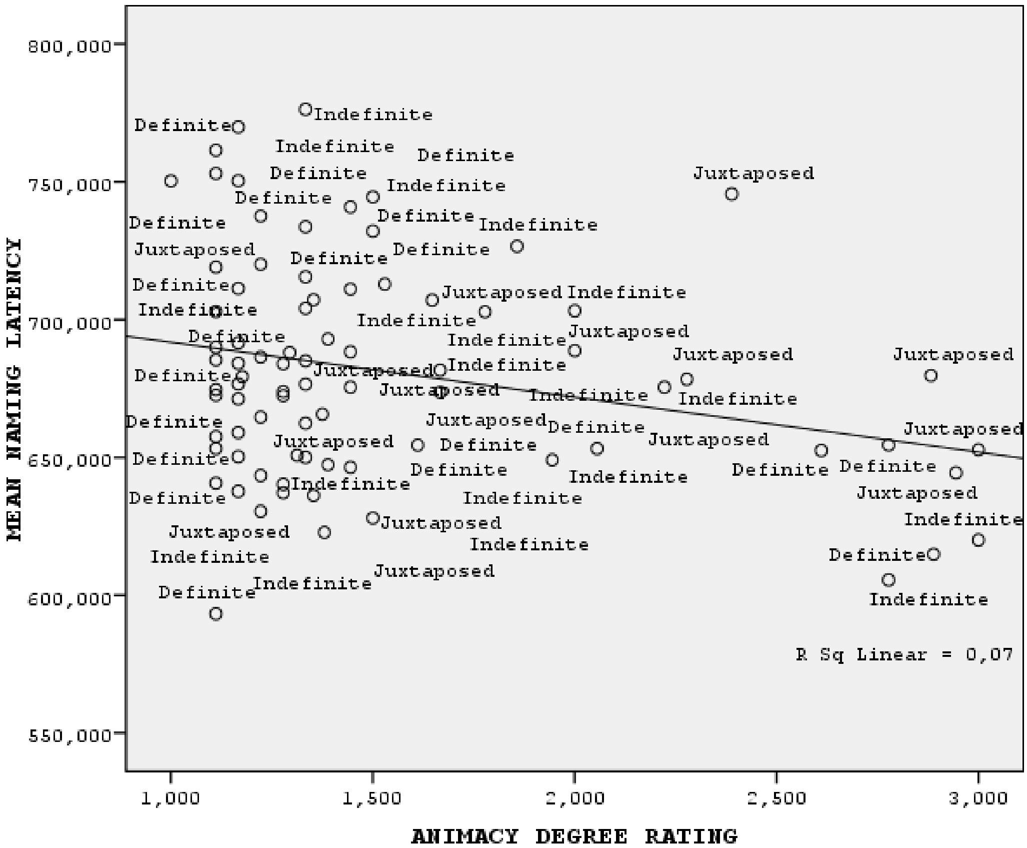

Figure 24 Scatter-plot Depicting the Correlation Between Degree of Animacy and Mean Naming Latency

Animacy Rating Evaluation by Compound Type and Priming Location

As “animacy” is a significant covariate, followingly, with a univariate analysis of variance was conducted to measure animacy rating difference within compound types and also priming locations. Previously, in the repeated measures ANOVA, no main effect had been found neither for compound type nor the priming location. Nevertheless, in the new between subject design of the distractors, effect of this covariate and distribution of it should be tested. In this model, animacy ratings were taken as dependent variable while distractor type and priming location were taken as predictor variables.

The results show that Levene’s test of equality of variances was significant meaning that naming latency differences were not distributed equally in the data set. Thus, effect of the animacy should be interpreted with caution. No main effect was found for condition ($F(2,75) = 0.467$, $p > .05$, $\eta 2 = .012$), priming location ($F(1,75) = 1.735$, $p > .05$, $\eta 2 = .023$) and the condition*priming location interaction ($F(2,75) = 0.467$, $p > .05$, $\eta 2 = .012$). Nevertheless, numerically JCs were rated more animate then ICs and DCs; and also second constituent primed compounds were rated as more animate than first constituent primed compounds irrespective of the compound type. (Table 13)

Table 13 Mean and Standard Error of the Animacy Ratings Across Compound Type and Priming Location

Compound Type	Priming Location	Mean	Std. Error
JC	First Constituent	1,424242	0,160939
	Second Constituent	1,744083	0,133444
IC	First Constituent	1,487013	0,160939
	Second Constituent	1,533701	0,133444
DC	First Constituent	1,386104	0,160939
	Second Constituent	1,496528	0,133444

A significant difference could not be found between animacy ratings of the different compound types and animacy was rated for the whole compound word irrespective of the constituents. However, individual contribution of the constituents to the animacy of a compound could not be measured directly as constituent animacy distribution is not homogeneous in the distractor set and any significant effect found for a constituent animacy pattern such as animate-inanimate or inanimate-inanimate, etc. may lead to false conclusions.

Concreteness Effect

In the previous analysis, no significant difference in the degree of concreteness had been found between the compound types in each trial.

For this analysis, mean naming latency for the distractor words was used as a dependent variable. Distractor type (JC, IC and DC) was taken as fixed factor. Levene's test of equality of variances was non-significant meaning that naming latency differences were distributed equally in the data set.

No significant naming latency difference between different priming conditions was found ($F (2, 77) = 0.196$, $p >.05$, $\eta^2 = .005$), which was also in accord with the previous repeated measures ANOVA results.

Secondly, no main effect of the degree of the concreteness degree rating was found on naming latencies. ($F (1, 77) = 0.687$, $p >.05$, $\eta^2 = .009$).

Building a Composite Statistical Model of Compound Processing in Terms of Distractor Words

Previous repeated measurements analysis of variance with three compound types revealed that block, priming location, overlapping syllable position and animacy are significant variables. Especially, it could be proposed that these variables might be interacting and there might be a composite effect on picture naming latencies. Thus, this section was devoted to building a more complex and composite statistical model which was built on the initial model of distractor words. In this part, naming latencies were submitted into a repeated measurements ANOVA with the within subjects variable block, between subjects variable distractor type (unrelated condition excluded) and priming location. To sum up the results, block had been found significant

Compound word syllable, phoneme, stem syllable and stem phoneme counts are similar metrics considering the compound length. These covariates are "access-sensitive" as they are related to serial processing (left-to-right) of the compound and "extent-sensitive" as they represent the extent (amount of phonological material) of the compound. Significant main effect of the overlapping syllable position that is the latest a compound is matched with the picture name, the longer it takes naming the target picture. Thus, longer syllable counts depicted an inhibitory effect. However, syllable position was tested only with second-constituent compounds. As it was found that second-constituent compounds had more priming effect than the first-constituent primed ones. As the table below (Table 14) shows second-constituent compounds have more syllable counts compared to the first-constituent ones; thus, facilitatory effect of priming location might be somehow masked by the structure-wise properties of the compounds. Besides, as priming-location relates to the left-right processing of the overall material of the compounds also, it makes sense to include priming location in the model, too.

Table 14 Mean and Standard Error of Compound Word and Stem Syllable and Phoneme Counts by Compound Type and Priming Location

Dependent Variable	Compound	Priming Location	Mean	Std.
WORD_SYLLABLE_COUNT	JC	First Constituent	3,45	0,21
		Second	3,94	0,17
	IC	First Constituent	4,45	0,21
		Second	4,94	0,17
	DC	First Constituent	5,45	0,21
		Second	5,88	0,17
WORD_PHONEME_COUNT	JC	First Constituent	8,36	0,52
		Second	9,06	0,43
	IC	First Constituent	9,82	0,52
		Second	11	0,43
	DC	First Constituent	11,82	0,52
		Second	13,44	0,43

Table 14 (continued)

Dependent Variable	Compound	Priming Location	Mean	Std.
STEM_SYLLABLE	JC	First Constituent	3,45	0,21
		Second	3,94	0,17
	IC	First Constituent	3,45	0,21
		Second	3,94	0,17
	DC	First Constituent	3,45	0,21
		Second	3,94	0,17
STEM_PHONEME	JC	First Constituent	8,36	0,49
		Second	9,06	0,41
	IC	First Constituent	8,64	0,49
		Second	9,63	0,41
	DC	First Constituent	8,18	0,49
		Second	9,69	0,41

Distractor Type (Unrelated condition excluded), Block, Priming Location and Distractor Word Phoneme Count Analysis

As explained in the statements above, the composite statistical model was built including the 'word phoneme count' covariate into the initial model of distractor wise analysis and a repeated measurements ANOVA was conducted as before, this time defining the word phoneme count as covariate.

Distractor Type and Block Results

- The results revealed that JC, IC and DC distractor types did not differ in terms of naming latency; thus equal amounts of priming was observed for the three compound types ($F(2, 74)=0.114$, $p > .05$, $\eta 2 = .003$).

  Helmert contrasts also supported that conclusion. No naming latency difference was found between JCs (Mean=690.758, SE=10.278) and ICs (Mean=686.066, SE=8.563). Also the difference between JC and DCs (Mean=683.040, SE=10.211) was insignificant. Furthermore, no significant latency difference between ICs and DCs was found, either.

- The results revealed that block had a significant main effect on the naming latencies such that naming latencies decreased with more exposure to the target picture ($F(3,222) = 5.144$, $p < .05$, $\eta 2 = .065$).

  Repeated contrasts revealed that the first production (Mean=757.364, SE=9.041) of a picture name was significantly slower than the second production (Mean=687.963, SE=7.098) ($F(1, 74) = 4.562$, $p < .05$, $\eta 2 = .058$). There is no significant difference between the second and the third productions (Mean=659.401, SE=6.115) ($F(1, 74) = 2.606$, $p > .05$, $\eta 2 = .034$). Also, the third production and the fourth (Mean=641.757, SE=7.043) did not differ significantly. ($F(1, 74) = 1.420$, $p > .05$, $\eta 2 = .019$).

- The results showed that there was no interaction between distractor type and block ($F(6,222) = 1.123$, $p > .05$, $\eta 2 = .029$).

Priming Location Results

A main effect was found for the priming location ($F(1, 74) = 4.842$, $p < .05$, $\eta 2 = .061$). Naming latencies differed significantly between the first constituent (Mean=698.073, SE=7.838) and the second (Mean=675.169, SE=6.432) being that second-constituent primed compounds had shorter naming latencies. Besides, priming location did not interact with the within-subject variable block ($F(3,222) = 0.636$, $p > .05$, $\eta 2 = .009$) or with the other between-subject variable distractor type ($F(2, 74) = 0.394$, $p > .05$, $\eta 2 = .011$). There was no three-way-interaction priming location*block*distractor either and also with their interaction ($F(6,222) = 1.276$, $p > .05$, $\eta 2 = .033$).

Compound Word Phoneme Count Results

No main effect was found for the covariate word phoneme count ($F(1, 74) = 1.865$, $p > .05$, $\eta 2 = 0.025$) and also with its interaction with the within subjects variable block. ($F(3,222) = 1.493$, $p > .05$, $\eta 2 = .020$).

Distractor Type (Unrelated condition excluded), Block, Priming Location, Distractor Word Phoneme Count and Animacy Analysis

Now, the model above was changed including the 'animacy' covariate and a repeated measurements ANOVA was conducted as before.

Distractor Type and Block Results

- The results revealed that JC, IC and DC distractor types did not differ in terms of naming latency; thus equal amounts of priming was observed for the three compound types ($F(2, 73)=0.096$, $p > .05$, $\eta 2 = .003$).

  Helmert contrasts also supported that conclusion. No naming latency difference was found between JCs (Mean=690.096, SE=10.153) and JCs (Mean=685.575, SE=8.457). Also the difference between JC and DC (Mean=683.218, SE=10.079) was insignificant. Furthermore, no significant latency difference between ICs and DCs was found, either. However, note that with the isolation of the animacy effect, mean latency distribution over the compounds types was reversed meaning that DC < IC < JC in terms of naming latencies.

- The results revealed that block had a significant main effect on the naming latencies such that naming latencies decreased with more exposure to the target picture ($F(3,219) = 3.399$, $p < .05$, $\eta 2 = .044$).

  Repeated contrasts revealed that the first production (Mean=757.252, SE=9.104) of a picture name was not significantly slower than the second production (Mean=687.405, SE=6.951) ($F(1, 73)=1.427$, $p < .05$, $\eta 2 = .019$).The only significant naming latency difference was found between the second and the third productions (Mean=659.248, SE=6.144) ($F(1, 73)=4.199$, $p < .05$, $\eta 2 = .054$).The third production and the fourth (Mean=641.280, SE=6.949) did not differ significantly, either. ($F(1, 73)=0.118$, $p > .05$, $\eta 2 = .033$).

- The results showed that there was no interaction between distractor type and block ($F(6,219) = 1.104$, $p > .05$, $\eta 2 = .029$).

Priming Location Results

A marginally main effect was found for the priming location ($F(1, 73)=3.427$, $p = 0.068$, $\eta 2 = .045$). Naming latencies did not differ significantly between the first constituent (Mean=695.992, SE=7.831) and the second (Mean=676.600, SE=6.403) being that second-constituent primed compounds have shorter naming latencies. Besides, priming location did not interact with the within-subject variable block ($F(3,219) = 0.841$, $p > .05$, $\eta 2 = .011$) or with the other between-subject variable distractor type ($F(2, 73) =0.341$, $p > .05$, $\eta 2 = .009$). There was no three-way-interaction priming location*block*distractor either and also with their interaction ($F(6,219) = 1.219$, $p > .05$, $\eta 2 = .032$).

Compound Word Phoneme Count Results

No main effect was found for the covariate word phoneme count ($F(1, 73)=1.184$, $p > .05$, $\eta 2 = .016$) and also with its interaction with the within subjects variable block. ($F(3,219) = 1.466$, $p > .05$, $\eta 2 = .020$).

Animacy Results

A marginal main effect was found for the covariate animacy ($F(1, 73)=2.951$, $p =0.090$, $\eta 2 = .039$). However, its interaction with the within subjects variable block was found insignificant. ($F(3,219) = 0.824$, $p > .05$, $\eta 2 = .011$).

Evaluation of the Three Statistical Models

Three composite statistical models on the mean naming latencies of the distractor words were built step by step. The following table depicts the unexplained error variances for each model.

As the table shows, the error variance (unexplained variation) decreased step by step which indicates improvement in the models(see Table 15)

Table 15 Error Variance Change

Statistical Model	Within Subject Variable (Block) Error	Between Subject Error Variance
Block*Distractor Type*Priming Location	716710,32	143703,2
Block*Distractor Type*Priming Location*Word Phoneme Count	702537,9	140170,88
Block*Distractor Type*Priming Location*Word Phoneme Count*Animacy	694692,16	134724,25

3.2 Discussion

3.2.1 Priming Effect

A significant priming effect was found for all compound types compared to unrelated condition. The results suggest encoding of the morphological relations at the word form level, which is also in accordance with the previous findings of Zwitserlood et al.(2000,2002 and 2004) and Koester et al(2008). Even though, this finding does not depict a unique structure used at both comprehension and production sides, it implies that they share representations which are morphemes in this case. Therefore, hypothesis one is partially validated.

Even though a lagged paradigm in which phonological and semantic effects could be isolated, was not used, priming effects obtained for the three compounds types are proposed to be related with morphological processes and not due to semantic and phonological overlap between the distractor words and target picture name.

If priming effects had been due to semantic relatedness, DCs should have had less naming latencies due to their novel and transparent nature (they were rated more transparent than JC and IC). However, numerically, JC and IC had shorter naming latencies.

Also the effects could not be explained with mere form and phonological overlap. Because, neither a blank between compound elements nor morphological changes due to inflection did affect priming. The speculation was clarified by investigating mean naming latencies of the second-constituent primed ICs and DCs in which in some compounds (4 cases for both ICs and DCs second constituents underwent a form change due to being inflected with the compound marker.

Ex. ‘meyva ağacı’ (last consonant changed from ‘ç’ to ‘c’)

The sample sizes for form changed (8 compounds) and unchanged (46 compounds) conditions were not equal. However, not significantly but numerically, it was found that compounds with a form change had less naming latencies than the other. This indicates pure phonological overlap does not create a significant facilitation difference.

The third evidence is also related to the compound structure. Comparison within the JC group in terms of the blank between the constituents revealed that naming latencies were not significantly affected by the existence of the blank. The blank marks the boundary between the constituents of the compounds in all conditions (JC, IC and DC). Especially in the JC set, as the constituents are not inflected with GEN or CM suffixes, the overlap between the picture name is formally more apparent. If a significant difference between open and concatenated compound cases in the JC set had been found, it could be stated that priming effects are mostly due to exact formal match between the picture name and the compound constituent. However, this visual advantage for the open compounds did not lead to any significant naming latency difference in comparison to compounds written as one word. Therefore, it could be stated that compounds are decomposed at the morpheme boundary, not necessarily depending on the available formal information. Therefore, hypothesis five related to extra blank between compound constituents was validated.

Final evidence comes from the content of subject responses. During the experiment, some of the subjects' naming responses deserve to be discussed. There are some clues from subject responses that subjects parse the compound constituents in terms of its constituents whereas preserving the whole structure. Below table shows some picture naming responses[42] along with the distractor word and true picture name for the corresponding trial:

Distractor Word	Prime Picture	Subject's Naming Response
taşın yüzeyi(stone+GEN surface +3SG.POSS :surface of the stone)	taş-'stone'	yüzey-'surface'
dağın zirvesi(mountain+GEN peak+3SG.POSS :peak of the mountain)	dağ- 'mountain'	zirve-'peak'
bahçenin ağacı(garden+GEN tree+3SG.POSS :tree of the garden)	ağaç-'tree'	bahçe/ağaç(garden/tree)
fotoğrafçının filmi(photographer+GEN film+3SG.POSS :photographer's film)	film-'film'	[43]fotoğraf filmi(photograph film+CM:photograph film)
gölün balığı(göl+GEN balık+3SG.POSS :fish of the lake)	balık-'fish'	göl/balık(lake/fish)

Morphological priming effect observed in the three compound types is in support of the decompositional models of compound production. Priming effect due to shared representations by compound constituents and picture names in terms of overlapping morphemes suggests that morphemes are the planning units which are available to

[42] All of these responses were accepted as false. Only exact target responses were accepted.

the parser. It may also be assumed that only full forms are listed in the mental lexicon and without considering the morphological decomposition, interconnected nodes might have produced priming effects. As stated in the introductory part, in this full-form view of compound processing, decomposition -only optionally- takes place after the activation of the whole-word representation. However, if it had been the case, DCs should have larger effects as they were rated more transparent and novel (have no representation, thus activate their constituents in any way to build a representation) and due to their frozen nature, JCs should have had less priming capabilities. However, the reverse was observed.

Gürel study (1999) suggests a direct route for lexical access in Turkish for words inflected with frequent suffixes whereas decompositional path for words inflected with less frequent suffixes. In this study, in contrary to Gürel's(1999) finding, the decompositional approach was fully supported. However, for Gürel study (1999), full storage does not refute a parallel parsing pathway, meaning morphologically complex words with frequently used suffixes might also be parsed into their constituents. As frequently used suffixes like plural or locative marker have more salience (due to their high frequency) compared to ablative marker, they might be processed more easily by the parser. Also the experimental paradigm is crucial. Gürel (1999) used lexical decision paradigm whereas picture naming with constituent priming was used in this study. Obviously, constituent priming fosters decompositional pathway. Thus, it is suggested that Gürel's study should be replicated with PNP.

Also the idea that morphologically complex words are processed incrementally, from left to right also reflected on the results that even though a significant effect for parameters related to compound length (syllable number, stem syllable number, phoneme number, stem phoneme number and overlapping syllable position) could not be found, numerical naming latency differences suggest that they have a delaying effect on compound processing. Increased length of a complex word led to longer word processing times/naming latencies in terms of single constituents. On the other

[43] Only in this condition, the subject named the picture of film-as 'film',as stated.

hand, as second constituents led to shorter naming latencies, this effect may be due to their closeness to the target picture name in terms of temporal vicinity, i.e., the prime that the subjects silently read was closer to the picture name that they uttered if it was the second constituent of the prime word. In conclusion, hypothesis four which suggests an insignificant effect of distractor length was also validated.

3.2.2 Distractor/Compound Type

Different nominal compound types (JC, IC and DC) did not differ in terms of priming effects. It could be stated that novel compounds (all DCs in this experiment) and existing compounds (JCs and ICs) are processed similarly by means of decomposition. This finding falsifies the hypothesis one partly in which more priming effects were expected for the DCs.

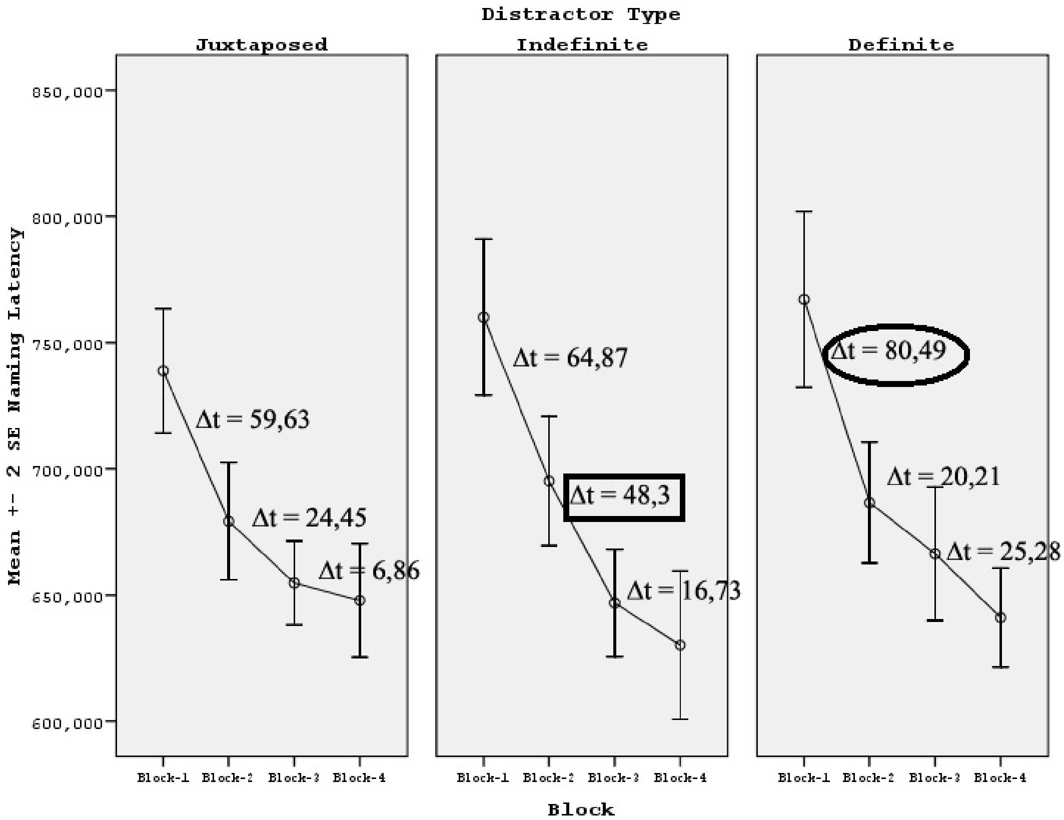

Figure 25 Mean Naming Latency Facilitation by Compound Type Across Block

On the other hand, there are several points which should be taken into consideration. The figure above (Figure 25) depicts naming latency distribution across condition and block. As it is plotted with an ellipsis on the figure, not significantly but numerically, DCs gain more benefit from first presentation to the subjects as their naming latency differences between first and second presentation depicts a sharper decrease compared to other compound types. This might be interpreted such that DCs were perceived as more compound-like units after the first presentation. Furthermore, it is also notable that ICs still provided benefit from second presentation as their average naming latency difference between third and second presentation is higher than of the JCs and DCs(48,3 ms, plotted with a rectangle). As described in the introductory part related to Turkish nominal compounds, indefinite and definite compounds have formal and semantic similarities. Basically, ICs and DCs share similar relation types (attributive and possessive, respectively). Gagne et al.(2006) states that recent exposure to a relation type facilitates compound processing. As ICs are more lexicalized constructions compared to DCs, exposure to a specific kind of relation facilitated access to ICs in the mental lexicon. Nevertheless, this result does not depend on significant values and more focused experiments should be conducted in particular.

3.2.3 Animacy

A significant main effect was found for the covariate 'animacy'. Actually, animacy effect was not taken into account previously and thus not included into research questions and hypothesis. Different from the other covariates such as syllable count, phoneme count, etc. which are access and extent-sensitive and thus related to the compound structure, animacy is a covariate related to conceptual representation of the whole compound, i.e., animacy increases the salience and accessibility of the prime word. Bock et al. (1985) indicates animacy as one of the major factors that facilitates of conceptual representation retrieval, in other words, ‘conceptual accessibility’. Branigan et al. (2007) extends the idea to the accessibility of lexical concepts and syntactic structures, lemmas in particular, referring to the Levelt et al. (1999)’s model of language production. Then, it may also be proposed that animacy accelerates the initiation of the compound processing at the conceptual stratum and so the following layers in the Levelt's (1999) model of language production.

A significant animacy effect also proposes the existence of a direct access path to the compound which works in parallel to the parsing route. Because, a main effect of animacy proposes a full form representation of a compound whereas priming effects can be attributed to decomposed representation of the compound.

Animacy effect on naming latencies was found to be much more related to second constituent primed ICs and DCs. (Animacy and mean naming latency relation was found to be marginally significant whereas a significant relation in JCs was not found) This finding partially implies a head effect as ICs and DCs in this experiment are all right-headed even though exocentric types also co-exist in JC set (e.g. dağ bayır- 'mountain sloppy area', neither constituent is head in this compound).

A study which investigates the effect of animacy on compound processing has not been conducted as far as it has been known. Thus, a cross-linguistic comparison could not be done. However, in the literature, there are many studies on the prominent preference of animate entities over inanimate ones in some syntactic structures. Eg: subjects preferred to construct active sentences rather than a passive one when an animate entity or human is the patient of the action (for English: Bock et al., 1992; and for Spanish:Prat-Sala, 1997). In the study conducted by Tanaka et al.(2005), when the subject of a sentence with OSV order is animate , Japanese speakers showed a tendency to remember these sentences as SOV sentences compared to sentences with inanimate objects. Finally, Rosenbach (2005) study showed that in English, s-genitive was preferred more for animate entities whereas of-genitive was preferred for inanimate ones. To sum up, it was proposed that as language production is an incremental and considerably fast process, utterances of language users show a bias towards animate entities which are more accessible in the way to handle language production in an efficient way.

Furthermore, animacy effect result also reflects a parallelism with the finding in the compound acquisition literature. Krott et al (2005) emphasizes that if describing the meaning of a compound poses difficulty for the child, she/he tends to mention a ‘salient feature’ or function of the entity represented by the compound, which also implies the importance of animacy in compound processing.

3.2.4 Priming Location and Head Effect

To review the literature in terms of constituent effects, Roelofs (1996) found significant priming effect only if the match was located in the first syllables. As IPL taps into the serial selection of morphemes, but not parallel integration of them, lack of second syllable effects might be attributed to this fact. When stimulus set was balanced in the number of first and second constituent primed compounds (50% initial vs. 50% second and same word was primed in both constituents) as it is the case for Zwitserlood et al.(2002) study, also no difference was found which is suggestive of an equal amount of priming. In Zwitserlood et al. (2004) study, transparency effect was found to be more effective in first constituent priming condition compared to second constituent priming which was interpreted as lemma competition with the picture name was more active in second constituent priming conditions. In Koester et al(2008) study, priming location was heterogeneously spread over their distractor word sets. In the first set which they compared transparent versus opaque compounds, the overlap between picture names in the initial constituents was 33% and 39% for transparent and opaque compounds, respectively. On the other hand, in the second set which was used to compare transparent versus form-related monomorphemic words, more transparent compounds matched in the first constituent compared to the first set(53% for transparent compounds). They obtained larger priming effects in Set1 and thus less priming effects in Set2 which is suggestive of a head constituent effect as more compounds matched in the second-constituent location in Set1. Due to the fact that priming location parameter was not handled equally over their stimuli sets, Koester et al. neither exclude the priming location effect nor comes up with an exact conclusion on the matter.

In this study, priming location effect was found only in the distractor-wise analysis, particularly, in the composite model[44] with word phoneme count and animacy predictors. In the distractor-wise analysis, the mean naming latencies were averaged across distractor words, with block (4 levels) as the within subjects variable, condition (3 levels:JC, IC and DC) and priming location(2 levels:first and second constituent) as between subject variables. The composite model was developed in three steps. Initially, with the declared within and between subjects variables, a repeated measures ANOVA was conducted. Followingly, phoneme number was added as a covariate to this model. Finally, this model was changed with the addition of the animacy covariate. Priming location which was marginally significant in the initial model ($p=0.069$), became significant with the addition of the phoneme number covariate (which means separating the inhibitory effect of the syllable number) ($p=0.031$). Also, as animacy was found to be a significant covariate, it was added to the model and in this way, it was realized that part of the priming effect signaled by animacy was actually raised by the priming location effect. (p value for priming location=0.68 and p value for the animacy=0.090). Depending on these results, the reason why this effect could not be observed in the item-wise and subject-wise analyses could be explained as follows. As the effect becomes active with isolation of the phoneme count effect (which is inhibitory) and it is not possible to isolate this effect in the two analyses mentioned, reverse effect of phoneme count might overwrite the priming location effect in the subject and item-wise analyses.

The below table (Table 16) shows mean naming latency change of all conditions by manipulations on the composite model. This table also depicts naming latencies for both constituent priming locations, their difference with the unrelated condition (referring to the amount of facilitation obtained compared to unrelated condition) and the difference between them.

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[44] With composite model an Analysis of Covariance (ANCOVA) is meant, here. In an ANCOVA, the effect of a covariate (here: animacy, number of phonemes) on the dependent variable (here: naming latencies, i.e., reaction times for picture naming) is determined before the effects of the independent variables (here: compound type, priming location) are determined. Thus, one can find out whether any statistically significant effects are due to the independent variable, to the covariate, or both.

Table 16 Mean Latency Difference of Compound Types (JC, IC and DC) by Priming Constituent Location in Each Stage of the Composite Model

	Block(4)* Distractor(3)* PrimingLocation(2)		**Block* CompoundType *PrimingLocation *SyllableNumber**		**Block *CompoundType *PrimingLocation *SyllableNumber *Animacy**	
Compound Type	**First Constituent**	**Second Constituent**	**First Constituent**	**Second Constituent**	**First Constituent**	**Second Constituent**
Juxtaposed	697,73	668,09	706,96	674,55	703,43	676,76
Δt (baseline: unrelated)	29	58,64	19,77	52,18	23,3	49,97
Δt (first const.- second const.)	29,64		32,41		26,67	
Indefinite	695,14	674,75	698,61	673,53	697,26	673,89
Δt (baseline: unrelated)	31,59	51,98	28,13	53,21	29,47	52,84
Δt (first const.- second const.)	20,39		25,08		23,37	
Definite	693,12	688,32	688,65	677,43	687,28	679,15
Δt (baseline: unrelated)	33,62	38,42	38,08	49,31	39,45	47,58
Δt (first const.- second const.)	4,8		11,22		8,13	

Depending on the presented results in the table (Table 16) and statistical results presented in the Results section, several possible conclusions can be extracted:

- Advantage for the second constituent location might be suggested to be related to fact that there were more cases in which priming took place in the second-constituent location. In the stimulus set used for this study, among the 28 distractor words, 11 of them matched in the first constituent whereas 17 of them matched in the second. However, as they were inter-mixed with filler items in the whole set, one cannot assume that subjects were biased towards the second-constituent location. Average values of the naming latencies of 11 versus 17 cases used in the analysis and no interaction for the priming location was found. If subjects had developed a strategy or gained more familiarity with the procedure depending on the priming location, an interaction with the block variable should have been found, which not the case was.
- While total extent of a compound does not affect processing time considerably, access time to the initial syllable, which was identified in terms of overlapping syllable position in this study, is essential in the processing of compound constituents. Overlapping syllable position has an adverse effect on constituent priming effect meaning that the later it matches with the picture, the longer the naming latency becomes. Taft et al(1976) states that initial syllables and first constituents of the words are important in lexical access. Also, study by Damian et al.(2010) found no effect of word-length in single word production on English and Dutch using picture naming. They also found a facilitatory effect for the first syllable. This led them to the conclusion that prior to picture naming, whole distractor word is phonologically encoded, however, only the initial syllables are placed in the articulatory buffer. Overlapping syllable position effect is also consistent with Roelofs' suggestion that the language production is a serial process.

  Also, if Table 16 is investigated for first constituent and second constituent priming differences, in the second composite model, it can be seen that priming effects were increased compared to the initial model after the syllable effect was separated from the distractor type effect. This means that extent of a compound has an inhibitory effect (even though, not significant in this study) in compound processing.

- When priming effect of the first constituent was investigated across different compound types and in all stages of the composite model(Table 16), it could be seen that numerically DC type distractors have more priming effect compared to other types when they matched with the picture name in the first constituent. In his opportunistic compound representation, Libben et al (1999, 2002 and 2006) suggests in visual word-recognition, pre-lexical parsing is an obligatory and recursive process. In DCs, existence of the GEN suffix in the first constituent may enhance recognition of the first constituent as it is an inflectional suffix and inflection has a blocking facility (as stated in the introductory part). The parser may be sensitive to syntactic properties of the language and coming across an inflectional suffix, it may divide the first morpheme at that point. For the other two compound types(JC and IC), as morphological parser faces with no blockage, the parser may still be trying to resolve the compound word and this may cause longer reaction times in these two conditions, compared to DC compounds. Initial constituents of the DC set may be recognized faster.

  In parallel to the above explanation, as depicted in table 16, in all three variants of the composite model, priming effect difference is less in DCs compared to JCs and ICs. It might be proposed that as DCs are novel and thus do not have a representation in the mental lexicon, each constituent might be handled individually as if they were separate words. Therefore, they might lead to equal priming effects. Small numerical differences might be due to seriality effect only. However, in JC and IC groups, as the second constituent is the head and temporally more closer to the picture name(head and serial position effects together), they might have more priming effect in the second constituent priming cases compared to DCs.

  In conclusion, in contrast to hypothesis three in which predicts an advantage for the first constituent was marginally found for the second constituent, falsifying the hypothesis. In right-headed languages like Turkish, it is difficult to explain the origin of priming effects posited by second constituents as it is also difficult to separate seriality effect from head effect.

3.2.5 Transparency

As stated before, a significant effect for transparency on naming latencies could not be found. Constituent transparency was not investigated, because not distributed equally and the task was picture-naming, thus transparency as a whole word was considered. There is also not a consensus in the literature on the effect of transparency.

Sandra (1990) conducted an experiment on fully transparent and opaque compounds in Dutch using the semantic priming paradigm in a lexical decision task (Transparent – Prime: death, Target: birthday, Opaque – Prime: moon, Target: Sunday) and found that only semantically transparent compounds showed the priming effect. Therefore, he concluded that only semantically transparent compounds are processed through decomposition.

Zwitserlood(1994) investigated transparency in Dutch compounds, as well. She graded compound transparency in three levels: fully opaque (hogwash), partially opaque compounds (Sunday), and transparent (doorbell). When she used constituent priming paradigm, she primed semantically transparent (e.g., kerkorgel, church organ) and opaque (e.g., drankorgel, drunkard) compounds with one of their morphological constituents (e.g., orgel) and found priming effects for both transparent and opaque compounds. In another experiment, Zwitserlood employed a semantic priming paradigm, primed transparent(e.g., kerkorgel, church organ) and opaque (e.g., drankorgel, drunkard) compounds with a word which was semantically related to one of the constituents(e.g., muziek, music) and found priming effects for transparent as well as for partially transparent compounds, but not for fully opaque ones. This led her to the conclusion that transparency is an important factor in decomposition.

Zwitserlood et al. (2004) (described in the literature review part) also compared morphological priming effects in transparent and opaque compound words in German in two different sets where the location of priming was manipulated(head constituent in the first set whereas modifier in the second set). They could find only a marginally significant advantage for the transparent compounds when the location of priming was the first constituent (modifier in this study). They depended the absence of transparency effects in the second constituent priming condition due to lemma competition between the distractor word and picture name.

Koester et al.(2008)(also described in the literature review part) investigated morphological priming effects in transparent and opaque compounds in Dutch by using PNP with ERP measures. However, they could not find a significant difference neither in behavioral nor in ERP results.

Libben et al. (2003) also investigated English compounds, again varying in terms of transparency degree starting from fully transparent(transparent-transparent) to fully opaque(opaque-opaque) (fully transparent,; partially opaque(transparent-opaque and opaque-transparent); fully opaque) and found constituent priming effects in all compounds and concluded that both constituents of a compound is activated regardless of the transparency degree. They also depended priming effects on two discrete sources: For first-constituent priming, an initial substring effect (Taft and Forster,1976), and a constituent activation and headedness effect for second-constituent priming conditions(compounds with transparent heads were processed more easily than compounds with opaque heads). The results in this study are also in line with this proposal.

Transparency degree was evaluated depending on the native speakers' ratings in this study(see Transparency Rating section). DCs were rated significantly more transparent than JCs and ICs. JCs and ICs only numerically differed with ICs rated more transparent. As Dressler (in Libben et al,2006, pg 40) also stated lexicalization and transparency are in a negative relation meaning increase in transparency signals less lexicalization. This is exactly the case for JCs, ICs and DCs. More transparent compounds which are definite compounds are the only novel, thus less lexicalized items in the distractor set. Prior to experiment, it was hypothesized that DCs would lead to more priming effects as they were rated more transparent and more easily decomposed into their constituent morphemes. However, insignificant difference found between compounds types falsified this assumption. Several explanations may be proposed for this result.

The first explanation relates to experimental paradigm used. The previous findings and also the results obtained in this study, suggest that at the word form level, all compounds regardless of their semantic status are morphologically decomposed into their constituents whereas at the conceptual level, opaque compounds have a meaning representation which is different from and not connected to the meanings of their constituents. (This is the essence of Libben's (1998) model for compound constituent activation). Thus, the experimental paradigm employed and processing of which layer in Levelt et al.(1999)'s language production model is tapped into gains importance. In all experiments mentioned above that used semantic priming or lexical decision, transparency becomes an important factor in priming effects whereas in constituent priming experiments, in other words, naming tasks, transparency differences create no effect. Zwitserlood et al (2000) also describes picture naming as being a shallower task than lexical decision and thus she states that semantic effects are less observed in naming tasks compared to the latter.

Second explanation is related to SOA time used in PNP. Even though, Zwitserlood et al. (2004) used PNP, they had found a marginally significant advantage for transparent compounds compared to opaque ones when the priming location was first constituent. They had depended lack of transparency effects in second constituents due to lemma competition with the picture name. In this study, both priming locations was used and a marginally significant advantage for the second constituents was found in contrast to Zwitserlood et al. (2004) study. Also, the priming location difference had no relation to transparency. The reason might be the different SOA time used in both experiments. Zwitserlood et. al. (2004) used a fixed SOA time of 100 ms.). In this study, varying SOA times were used due to varying distractor length. (442,543 and 643 ms). Even if a SOA time of 100 ms. Leadsto suppression of transparency effects in second constituent location, longer SOA time might have even overwritten the transparency effects. In the literature, it is notified that for semantic effects to rise when the distractor is presented shortly before or at the same time as the picture (SOA = -150/0 ms), but gets lost when it is presented after the picture (SOA = + 150 ms). (Tabossi et al.,2002). Obviously, to investigate semantic effects in further studies, SOA times should be reorganized. However, as morphological priming effects were the focus of attention in the current study, this result did not hamper main priming results.

Finally, another explanation was proposed by Plaut and Gonnerman (2000) for transparency effects. They used a distributed connectionist approach to represent lexical structure rather than a layered one, different from Levelt. et al(1999) model. They did not explicitly depict morphological units in their network, rather stated that morphological effects were due to acquired familiarity of native speakers to the systematic relation between orthography, phonology and semantic information of the words in their language. Depending on the computer simulations they conducted, they found out that priming effects increase as semantic transparency increase and in the absence of semantic transparency, a morphologically rich language such as Turkish would lead to more priming effects compared to an isolated language which depends on concatenation more, like English. However, Roelof et al.(2002) states that this model does not differentiate between comprehension and production, thus suggest that experimental findings may lead to contradictory findings. Also, the crucial assumption of the distributed networks depends on the high correlation between semantic and form representations. However, PNP experiments show that priming effects could be observed with no relation to semantic relatedness. In contrast to distributed networks, semantic effects are very short-lasting when manipulated through PNP.

3.2.6 Block

A significant main effect of block was found in all analysis types meaning that repeated picture presentation across the four blocks led to reduced picture naming latencies. This effect is in conformity with the previous findings (Zwitserlood et al., 2000, 2002 and Koester et al, 2008).What is more, the block effect, did not interact with any other within subject(compound type being the most important), between subject variables or covariates manipulated. Therefore, it could be proposed that facilitation effect of block is independent of the linguistic processes. It can be also proposed that subjects could not develop a strategy in the experiment and was not totally aware that some compounds had overlapping parts with the picture names. This repetition effect may be a reflection of the more efficient visual processing or changing familiarity degree with the pictures.

3.2.7 Gender

The main effect found for gender might be attributed to the fact that males conducted the experiment in a racing manner compared to females. Also in general, male voice is more easily detectable by the voice key device; the difference might be only due to characteristics of male voices. However, as this factor does not interact with any other predictors which are important in this study, the effect might be interpreted as casual and having no relation with linguistic performances of the two genders.

3.3 General Discussion and Future Implications

In this study, morphological priming effects in three different Turkish nominal compounds (JC,IC and DC) were investigated in a behavioral experiment using PNP. The present study points at clear evidence for morphological priming effects, which are distinct from phonological effects and comparatively stronger, in Turkish nominal compounds, thus supporting the decompositional accounts of compound processing. This result is also in line with other previous studies which provide further support for decompositional models, cross-linguistically.

The priming effect results also nicely fit with the Levelt's model of language production (1999). Insignificant difference between the priming effects of the JC,IC and DC type distractors suggest that prior to picture naming, morphological complexity in speech production is coded at the level of form representations, independent of semantic transparency. If that had not been the case, novel and more transparent DC distractors which have no lemma representation, thus directly share the same lexical item with the picture name should have led less naming latencies.

Other main finding of this study is that compound types in Turkish do not differ in terms of compound processing and thus priming effects, contrary to what was predicted prior to experiment. Absence of transparency effect was partially depended on the experimental paradigm and settings however, the common result obtained is an obvious morphological priming effect compared to semantic effects. This supports the autonomous morphology idea of Aronoff (1994) in which language production proceeds from conceptual level to morphological encoding level. And as soon as the word forms are constructed, these forms are isolated from semantic counterparts.

On the other hand, the findings related to transparency falsify connectionist approaches. (e.g., Plaut & Gonnerman,2000). If there had been a close relation with the morphological and semantic representations, more facilitation should have been obtained for more transparent, "less frozen" compounds.

In a separate analysis of distractor words, a second-constituent priming location effect was found if the inhibitory contribution of morpho-phonological complexity (phoneme number) was removed from the overall priming effects in the analysis of covariation. This finding proposes a possible head effect. However, this finding is still controversial and weakened by marginal significance values, thus further research on the issue is needed.

One another important finding which was not predicted prior to experiment is the animacy effect which taps into the compound processing in the conceptual stratum. It is predicted that animacy accelerates the initiation of compound processing by means of providing a faster conceptual accessibility to animate compounds compared to inanimate ones. Thus, animacy might be an important factor in the operations of the mental lexicon.

As a result, what was found for Turkish not only contributes to the Turkish literature but also validates cross-linguistic findings once more as well, as stated. Nevertheless, current study raises other research questions more than providing answers and this warrants further researches such as:

a Lagged version of the same experiment should be conducted to justify that priming effects are caused by morphological similarity. Also, it should be tested if animacy effect would survive even after lags of several trials.

b The role of compound marker should be investigated in JC and IC as syllable count effect could be eliminated in such a design. DC adds more complexity to the design due to their extra suffixation with GEN case.

c Priming location effect should be investigated with an experimental similar to the one stated in the second item or a stimulus set only composed of JC should be constructed. As in this study, priming location effect was contaminated by inhibitory effects of phoneme count; this factor should be tested in a more balanced set to observe strong or weak effects of priming location, secondly, the head constituent.

d Compound types other than nominal classes such as verbal and idiosyncratic should also be investigated in Turkish.

e Due to unavailability of sources, frequency effects in compound processing could not be measured. In a stimulus set with reliable frequency information, whole compound and constituent (modifier and head) frequency effects as well as constituent family and frequency effects should be investigated.

f Compound relations, bilingual processing of compounds are also open areas for research not only for Turkish, but all languages.

g Finally, ERP studies might be conducted. Neurocognitive correlates of compound processing may be revealed better as such studies may tap into linguistic processes which cannot be detected in behavioral studies. In the current study, during the experiment phase, some subjects reported that even though they noticed the overlap with the word and picture, they could not respond in time. It is expected that DCs would exhibit more N400 as they are novel and both constituents suffixed and thus more prone to morphosyntactic manipulation. Therefore, ERP studies with Turkish compounds may reveal differences between different compound types and morphological processing.

These are just a number of studies that could be proposed as the literature on compound processing is abundant and many issues in Turkish compounding have not been investigated experimentally so far. What is more, in many issues like frequency and transparency effects, there is not a cross-linguistic consensus on the results. Therefore, further investigations on compound processing not only in Turkish, but also with other languages are essential for cross-linguistic purposes.

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APPENDICES

APPENDIX A EXPERIMENT MATERIALS

Distractor Words

Possessive Compound Identification Survey

A.1.1.1 DC Selection Survey Form:

Cinsiyeti : ( )Kadın / ( )Erkek **Yaşı:**

Talimatlar: Verilen örnek doğrultusunda, aşağıdaki boşluklardan uygun olan yerlere 'tamlayan' ya da 'tamlanan' kelimeler getirerek belirtili isim tamlamaları oluşturunuz. (Belirtili isim tamlamaları her iki kelimenin de ek aldığı tamlamalardır.) Hiçbir kelimenin tek doğru cevabı yoktur. Önemli olan aklınıza gelen ilk kelimeyi , tamlama takılarıyla beraber yazmanızdır.

Örnek: kitabın__________ (kitabın sayfası)

________anahtarı (arabanın anahtarı)

1	**Ananın**	....
2	**ayağın**	....
3	**boyanın**	....
4	**dağın**	....
5	**delinin**	....
6	**dişin**	....

17	....	**gözü**
18	....	**kahvesi**
19	....	**kapısı**
20	....	**kuşağı**
21	....	**ağacı**
22	....	**balığı**

7	**gülün**	....
8	....	**dünyası**
9	....	**Eti**
10	....	**filmi**
11	....	**gemisi**
12	**koçun**	....
13	**şekerin**	....
14	**taşın**	....
15	....	**saati**
16	....	**tavuğu**

23	....	**başı**
24	....	**borusu**
25	....	**çayı**
26	....	**çizgisi**
27	....	**direği**
28	**yazının**	....
29	**yolun**	....
30	**yüzün**	....
31	....	**yağı**

Şimdiden teşekkür ederim,

Sibel ÖZER

Table 17 Identified Novel DCs (Valid and Invalid Items)

Compound	Valid Responses (#[45]count) :501	Constituent Collision (#count) :84	Derived from IC (#count):138	Derived from JC (#count) :1	IC (#count) :165	Derived from Idiomatic Expressions (#count) :56	Proper Name (#count) :25	Compound in One Constituent (#count) :15	Extra Inflectional Morpheme (#count) :38
AĞAÇ - 'TREE'	bağın ağacı (1)		armutun ağacı(1)		çam ağacı(1)				soyunun ağacı(1)
	bahçenin ağacı (7)		meyvanın ağacı(1)		çınar ağacı(1)				
	çocuğun ağacı (1)		portakalın ağacı(1)		dilek ağacı(2)				
	komşunun ağacı (2)				elma ağacı(1)				
	köyün ağacı (1)				ıhlamur ağacı(1)				
	kurumun ağacı (1)				kayın ağacı(1)				
	muhtarın ağacı (1)				limon ağacı(1)				

[45] Number of occurences

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
AĞAÇ - 'TREE'	ormanın ağacı (1)				soy ağacı(2)				
	sincabın ağacı (1)								
	tarlanın ağacı (2)								
	villanın ağacı (1)								
ANA- 'MOTHER'	ananın adı (2)	ananın kutusu(1)	ananın dili(1)			ananın duası (1)		ananın ayakkabısı	
	ananın ağıtı (1)	ananın yemeği(2)	ananın kucağı(1)			ananın dini(1)		ananın gözyaşları(1)	
	ananın aklı (1)		ananın kuzusu(1)						
	ananın böreği (1)		ananın yüreği(2)						
	ananın çantası (1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
ANA- 'MOTHER'	ananın dediği (1)								
	ananın emeği (1)								
	ananın evi (1)								
	ananın feryadı (1)								
	ananın hörekesi (1)								
	ananın işi (1)								
	ananın sevgisi (2)								
	ananın sopası (1)								
	ananın sütü (1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
ANA- 'MOTHER'	ananın teyzesi (1)								
	ananın yavrusu (1)								
AYAK - 'FOOT'	ayağın dışı (1)	ayağın ağrısı(1)	ayağın altı(5)			ayağın tozu(3)			
	ayağın kiri (2)	ayağın numarası(2)	ayağın arkası(1)						
	ayağın kokusu (1)		ayağın bağı(1)						
	ayağın ölçüsü (2)		ayağın bileği(1)						
	ayağın sahibi (1)		ayağın boyu(2)						
	ayağın şekli (1)		ayağın parmağı(1)						
	ayağın tırnağı (1)		ayağın tabanı(1)						

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
AYAK - 'FOOT'	ayağın topuğu (2)		ayağın ucu(3)						
			ayağın yolu(1)						
BALIK-'FISH'	akvaryumun balığı (4)	kedinin balığı(1)			dil balığı(1)		alinin balığı(1)	karadenizin balığı(3)	eniştemin akvaryumdaki balığı(1)
	buranın balığı (1)				dülger balığı(1)				kardeşimin balığı(1)
	çocuğun balığı (1)				fok balığı(1)				
	denizin balığı (3)				hamsi balığı(1)				
	gölün balığı (2)				japon balığı(1)				
	havuzun balığı (1)				köpek balığı(1)				
	ırmağın balığı (2)				somon balığı(1)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
BALIK-'FISH'	kızın balığı (1)				ton balığı(1)				
	pazarcının balığı (1)				tuna balığı(1)				
					yunus balığı(2)				
BAŞ-'HEAD'	çetenin başı (1)	kedinin başı(3)	dağın başı(7)		at başı(1)	çıbanın başı(2)			
	düşmanın başı (1)	filmin başı (1)	dersin başı(1)		ekip başı(1)	suyun başı(1)			
	gelinin başı (1)		sayfanın başı(1)		gelin başı(2)	yılanın başı(1)			
	halayın başı (2)				kurt başı(1)				
	hikayenin başı (1)				oymak başı(1)				
	ırmağın başı (1)				pınar başı(1)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
BAŞ-'HEAD'	işin başı (1)								
	kitabın başı (1)								
	sivilcenin başı (1)								
	sorunun başı (1)								
	teröristin başı (1)								
BORU-'PIPE'	banyonun borusu (2)		suyun borusu(6)		hücum borusu(3)	müdürün borusu(1)		doğalgazın borusu(1)	
	evin borusu (1)				kalk/ borazanın borusu(1)	öttürenin borusu(1)			
	kanalın borusu (1)				öztaki borusu(1)	ustanın borusu(1)			
	musluğun borusu (1)				soba borusu(2)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
BORU-'PIPE'	mutfağın borusu (1)				soluk borusu(1)				
	nargilenin borusu (1)				ti borusu(1)				
	sobanın borusu (5)				yemek borusu(1)				
	tesisatın borusu (1)								
BOYA-'PAINT'	boyanın astarı (2)	boyanın rengi(17)	boyanın kabı(1)						boyanın renkleri(1)
	boyanın dibi (1)	boyanın altı (1)	boyanın kutusu(2)						
	boyanın kalitesi (1)								
	boyanın kapağı (1)								
	boyanın kıvamı (1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
BOYA-'PAINT'	boyanın kokusu (3)								
	boyanın küpü (2)								
ÇAY-'TEA'	adamın çayı(1)				ada çayı(1)		rize çayı(3)	ayva yaprağının çayı(1)	annemin çayı(2)
	arabın çayı(2)				adanın çayı(1)		rizenin çayı(3)	karadenizin çayı(4)	halamın/beş çayı(1)
	çaycının çayı(1)				ankara çayı(1)				
	derenin çayı(1)				ekinezya çayı(1)				
	kadının çayı(1)				ikindi çayı(1)				
	kekiğin çayı(1)				keyif çayı(1)				
	komşunun çayı(1)				meyve çayı(1)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
ÇAY-'TEA'	köyün çayı(1)				rize çayı(3)				
	misafirin çayı(1)								
	şehrin çayı(1)								
	ustanın çayı(1)								
ÇİZGİ-'LINE'	defterin çizgisi(6)	yüzün çizgisi(1)	sınırın çizgisi(2)	doğrunun çizgisi(1)	hayat çizgisi(2)				hayatının çizgisi(1)
	doğruluğun çizgisi(1)				kader çizgisi(1)				kaderimin çizgisi(1)
	elbisenin çizgisi(1)				otoyol çizgisi(1)				
	gömleğin çizgisi(1)				oyun çizgisi(1)				
	kitabın çizgisi(1)				sınır çizgisi(1)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
ÇİZGİ-'LINE'	öğrencinin çizgisi(1)				ufuk çizgisi(2)				
	sahanın çizgisi(1)				ufuk/yolun çizgisi(1)				
	yazarın çizgisi(1)								
DAĞ-'MOUNTAIN'	dağın arkası(2)		dağın başı(1)						
	dağın karı(1)		dağın eteği(12)						
	dağın kokusu(1)		dağın havası(1)						
	dağın sisi(1)								
	dağın tepesi(2)								
	dağın üstü(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
DAĞ-'MOUNTAIN'	dağın yamacı(3)								
	dağın zirvesi(3)								
DELİ-'CRAZY PERSON'	delinin aklı(1)	delinin yüzü(1)	delinin gömleği(1)						
	delinin biri(4)								
	delinin düdüğü(1)								
	delinin eli(1)								
	delinin gülüşü(1)								
	delinin hunisi(2)								
	delinin işi(3)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
DELİ-'CRAZY PERSON'	delinin körü(1)								
	delinin köyü(1)								
	delinin neşesi(1)								
	delinin saçı(1)								
	delinin sopası(1)								
	delinin sözü(1)								
	delinin şakası(1)								
	delinin teki(6)								
	delinin yaptığı(2)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
DELİ-'CRAZY PERSON'	delinin zoru(3)								
DİREK-'POLE'	bahçenin direği(1)	geminin direği(3)			bayrak direği(2)	ailenin direği(1)			evimin direği(4)
	evin direği(13)				elektrik direği(1)				evinin direği(1)
	kalenin direği(3)				gemi direği(1)				
	lambanın direği(1)				telefon direği(1)				
	mahallenin direği(1)								
DİŞ-'TOOTH'	dişin beyazlığı(1)	dişin rengi(5)	dişin ağrısı(1)			dişin kovuğu(6)			
	dişin çürüğü(2)		dişin çürümesi (1)						
	dişin dolgusu(2)		dişin kökü(1)						

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
DİŞ-'TOOTH'	dişin kurdu(1)		dişin minesi(10)						
	dişin sağlığı(1)								
	dişin şişi(1)								
	dişin yapısı(1)								
DÜNYA-'EARTH'	adamın dünyası(1)	kedinin dünyası(1)			ayakkabı dünyası(1)		alinin dünyası(1)	ayakkabı dünyası(1)	evimin direği(4)
	çocuğun dünyası(7)				çocuk dünyası(1)		sibelin dünyası(2)	etme bulma dünyası(1)	evinin direği(1)
	fakirin dünyası(1)				etme bulma dünyası(1)		sofinin dünyası(2)		insanların dünyası(1)
	garibanın dünyası(1)				hayal dünyası(1)				kötülerin dünyası(1)
	hayalin dünyası(1)				internet dünyası(1)				ölülerin dünyası(1)

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
DÜNYA-'EARTH'	kadının dünyası(2)				iş dünyası(1)				
	karıncanın dünyası(1)				işler dünyası(1)				
	yazarın dünyası(1)				teknoloji dünyası(1)				
					yelken dünyası(1)				
ET-'MEAT'	bıldırcının eti(1)	etin yağı(2)	dananın eti(4)		balık eti(1)	kuşun eti(2)			
	hayvanın eti(1)	yemeğin eti(1)	koyunun eti(1)		bıldırcın eti(1)				
	ineğin eti(2)		kurbanın eti(1)		dana eti(1)				
	kasabın eti(2)		kuzunun eti(4)		domuz eti(1)				
	köpeğin eti(1)		sığırın eti(1)		kedi eti(1)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
ET-'MEAT'			tavuğun eti(2)		koyun eti(1)				
					kurban eti(1)				
					kuzu eti(1)				
					tavşan eti(1)				
					tavuk eti(1)				
FİLM-'FILM'	fotoğrafçının filmi(1)	dünyanın filmi(1)	savaşın filmi(1)		bilim filmi(1)		cemin filmi(1)		
	gecenin filmi(2)	eskinin filmi(1)			gerilim filmi(1)		kayganın filmi(1)		
	hayatın filmi(1)	makinenin filmi(1)			korku filmi(5)		keauna reaves'in filmi(1)		
	hüznün filmi(1)				macera filmi(1)		sibelin filmi(2)		

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
FİLM-'FILM'	onun filmi(1)				sinema filmi(1)		türkanın filmi(1)		
	tarihin filmi(1)				türk/yeşilçam’ın filmi(1)				
	yılın filmi(2)								
	yönetmenin filmi(4)								
GEMİ-'SHIP'	çocuğun gemisi(1)				aşk gemisi(1)	nuhun gemisi(17)	sibelin gemisi(2)		
	donanmanın gemisi(1)				aşk gemisi(2)				
	filonun gemisi(1)				hayal gemisi(1)				
	hayalin gemisi(1)				savaş gemisi(1)				

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
	kaptanın gemisi(3)				titanik gemisi(1)				
	köylünün gemisi(1)								
GÖZ-'EYE'	canavarın gözü(1)		öküzün gözü(2)		dana gözü(1)	ananın gözü(3)			anasının gözü(6)
	çekmecenin gözü(2)				gönül gözü(3)	aşkın gözü(2)			
	dananın gözü(3)				öküz gözü(1)	maymunun gözü(1)			
	devin gözü(1)								
	dolabın gözü(1)								
	eşeğin gözü(3)								
	fırtınanın gözü(2)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
GÖZ-'EYE'	sevgilinin gözü(1)								
	suyun gözü(1)								
	şeytanın gözü(1)								
	türkün gözü(1)								
GÜL-'ROSE'	gülün adı(5)		gülün rengi(3)						
	gülün bülbülü(1)								
	gülün dikeni(17)								
	gülün kokusu(5)								
	gülün ömrü(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
KAHVE- 'COFFEE'	dibeğin kahvesi(1)	sabahın kahvesi(1)	falın kahvesi(1)		alışkanlık kahvesi(1)		sibelin kahvesi(1)		amcamın kahvesi(1)
	gelinin kahvesi(1)		mahallenin kahvesi(1)		hatır kahvesi(1)		starbucksin kahvesi(1)		annemin kahvesi(2)
	köyün kahvesi(1)		türk'ün kahvesi(1)		türk kahvesi(11)				
	günün kahvesi(1)		türkün kahvesi(2)						
	izmir'in kahvesi(1)								
	Kolombiya -nın kahvesi(1)								
	komşunun kahvesi(1)								
	yemenin kahvesi(1)								
KAPI-'DOOR'	ahiretin kapısı(1)				çıkış kapısı(1)	hanın kapısı(1)			evimin kapısı(1)

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
KAPI-'DOOR'	apartmanın kapısı(1)				dost kapısı(1)				
	arabanın kapısı(1)				el kapısı(1)				
	bodrumun kapısı(1)				giriş kapısı(1)				
	cennetin kapısı(1)				han kapısı(3)				
	evin kapısı(13)				hangar kapısı(1)				
	kapıcının kapısı(1)				komşu kapısı(1)				
	mutfağın kapısı(1)				oda kapısı(1)				
	okulun kapısı(1)								
KOÇ-'RAM'	koçun fiyatı(1)	koçun başı(3)	koçun boynuzu (13)						koçun şartları(1)

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
KOÇ-'RAM'	koçun dramı(1)	koçun eti(1)	koçun yumurtası (2)						
	koçun düdüğü(2)								
	koçun irisi(1)								
	koçun kilosu(1)								
	koçun postu(3)								
	koçun siniri(1)								
	koçun takımı(2)								
	koçun tosu(1)								
	koçun tüyleri(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
KUŞAK-'BELT'	ağanın kuşağı(1)		altmış-sekizin kuşağı(1)		alaca-karanlık kuşağı(1)			alacakaranlık kuşağı(1)	anneannemin kuşağı(1)
	belin kuşağı(1)		gelinin kuşağı(2)		altmış sekiz/gayret kuşağı(1)			altmışsekizin kuşağı(1)	belinin kuşağı(1)
	elbisenin kuşağı(7)				ebem kuşağı(1)			anneannemin kuşağı(1)	dedemin kuşağı(1)
	haberin kuşağı(1)				gelin kuşağı(1)				
	hocanın kuşağı(1)				gök kuşağı(5)				
	karetecinin kuşağı(4)				haber kuşağı(1)				
	ninenin kuşağı(1)				ibrişim kuşağı(1)				
SAAT-'WATCH'	adamın saati(3)		duvarın saati(2)		cep saati(1)			bilgisayarın saati(1)	ablamın saati(1)
	arabanın saati(1)		meydanın saati(1)		çalışma saati(1)				duvar/eşref/alinin saati(1)

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
SAAT- 'WATCH'	arkadaşın saati(1)		oyunun saati(1)		duvar saati(1)				
	aşkın saati(1)				duvar/eşref saati(1)				
	buluşmanın saati(1)				guguk saati(1)				
	ebenin saati(1)				haber saati(1)				
	evin saati(2)				kol saati(2)				
	evrenin saati(1)				randevu saati(1)				
	günün (bu) saati(1)				uyku saati(2)				
	müzikalin saati(1)								
	sınavın saati(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
SAAT-'WATCH'	trenin saati(2)								
ŞEKER-'SUGAR'	şekerin eksikliği (1)	şekerin rengi(2)	şekerin kamışı(1)						
	şekerin fiyatı(1)		şekerin pancarı(1)						
	şekerin kabı(1)								
	şekerin kalitesi(1)								
	şekerin kalorisi(3)								
	şekerin kilosu(2)								
	şekerin ölçüsü(1)								
	şekerin tadı(18)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
ŞEKER-'SUGAR'	şekerin zararı(1)								
TAŞ-'STONE'	taşın ağırlığı(12)	taşın rengi(3)				taşın altı(2)			
	taşın deliği(1)					taşın gediği(2)			
	taşın dibi(1)					taşın suyu(3)			
	taşın kıymeti(1)								
	taşın mahiyeti(1)								
	taşın sertliği(1)								
	taşın şekli(3)								
	taşın yeri(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
TAŞ-'STONE'	taşın yüzeyi(2)								
TAVUK-'CHICKEN'	bahçıvanın tavuğu(1)				çerkez tavuğu(4)	komşunun tavuğu(12)	ayşe teyzenin tavuğu(1)		
	çiftçinin tavuğu(1)				et tavuğu(1)				
	çiftliğin tavuğu(1)				köy tavuğu(3)				
	evin tavuğu(1)				yumurta tavuğu(2)				
	hintlinin tavuğu(2)								
	köylünün tavuğu(1)								
	köyün tavuğu(2)								
	kümesin tavuğu(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
TAVUK-'CHICKEN'	teyzenin tavuğu(1)								
YAĞ-'OIL'	arabın yağı(1)	yemeğin yağı(1)	balığın yağı(3)		badem yağı(1)		lorenzonun yağı(2)		
	cevizin yağı(1)		fındığın yağı(4)		balık yağı(2)				
	çekirdeğin yağı(2)		soyanın yağı(1)		makine yağı(1)				
	kuzunun yağı(1)		zeytinin yağı(4)		masaj yağı(1)				
	mantının yağı(1)				oto yağı(1)				
	saçın yağı(1)				zeytin yağı(2)				
	sütün yağı(1)								
YAZI-'WRITING'	yazının açıklaması (1)	yazının başı(2)	yazının dili(1)						

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
YAZI- 'WRITING'	yazının boyu(1)	yazının başlığı(1)							
	yazının düzgünlüğü (1)	yazının çizgisi(1)							
	yazının güzeli(1)	yazının ortası(2)							
	yazının harfi(1)	yazının rengi(1)							
	yazının icadı(2)								
	yazının içeriği(1)								
	yazının konusu(2)								
	yazının okunurluğu (1)								
	yazının özeti(1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
YAZI-'WRITING'	yazının sonu(9)								
	yazının şekli(3)								
	yazının tarihi(1)								
	yazının üslubu(1)								
YOL-'ROAD'	yolun asfaltı(2)	yolun başı(8)	yolun haritası(1)			yolun yolcusu(1)			
	yolun bitimi(1)	yolun çizgisi(5)	yolun ortası(2)						
	yolun eni(1)	yolun taşı(1)							
	yolun karşısı(1)								
	yolun sonu(14)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
YOL-'ROAD'	yolun tümseği(1)								
	yolun yarısı(1)								
YÜZ-'FACE'	yüzün anlamı(1)	yüzün rengi(6)	yüzün akı(1)			yüzün astarı(1)			yüzünün yarası(1)
	yüzün aydınlığı(1)		yüzün kiri(1)			yüzün kızarması(1)			
	yüzün gölgesi(1)								
	yüzün görüntüsü(1)								
	yüzün güzelliği (2)								
	yüzün ifadesi(7)								
	yüzün kırışıklığı (1)								

Table 17 (continued)

Compound	Valid Responses	Constituent Collision	Derived from IC	Derived from JC	IC	Derived from Idiomatic Expressions	Proper Name	Compound in One Constituent	Extra Inflectional Morpheme
YÜZ-'FACE'	yüzün örtüsü(1)								
	yüzün şekli(6)								

A.1.2 Initial Compound Set Preliminary Analysis Survey

Table 18 Survey Form

Sıra No	Kelime	Birleşik kelimenin genel anlamının birleşik kelimeyi oluşturan iki kelimenin ortak katkısı ile ol anlamının birleşik kelimenin genel anlamı ile ilgisi var mı? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)	Birleşik sözcüğü oluşturan ILK kelimenin anlam katkısı varsa, sizce nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)	Birleşik sözcüğü oluşturan IKINCI kelimenin anlam katkısı varsa, sizce nedir?(4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)	Kelimenin bir bütün olarak canlılık derecesi nedir?(3-Canlı, 2-Ne canlı ne de cansız, 1-Cansız,0-Yorum Yok)	Kelimenin bir bütün olarak somutluk/soyutluk derecesi nedir?(3-Somut,2-Yarı Somut/Soyut, 1-Soyut,0-Yorum Yok)
1	**ana fikir**	Çok İlgili	İlgili	Az İlgili	Cansız	Yorum Yok
2	**ayak yalın**	Yorum Yok	İlgisi Yok	İlgili	Ne Canlı Ne de	Soyut
3	**Boyahane**					
4	**dağ bayır**					
5	**deli fişek**					
6	**Dişbudak**					

A.1.2.1 Survey Form Instructions

Talimatlar: Ankette 125 adet kelime listelenmektedir. Her kelime ile ilgili beş adet kısa – çoktan seçmeli soru bulunmaktadır.

1. Sorular Türkçe bilginizi ölçmeye yönelik değildir.
2. Lütfen her bir soruda aklınıza en çabuk ve ilk gelen çözümü işaretleyiniz.Her hücre pembe renklidir, sağda oluşan seçim kutusuyla ilgili seçeneği seçmeniz gerekmektedir. Yorum yapamadığınız soruları boş bırakabilirsiniz. Ama çalışmanın verimi açısından bütün soruların cevaplanması büyük önem taşımaktadır.
3. Bilmediğiniz kelimenin anlamına lütfen sözlükten bakmayınız. Genel olarak bilinmeyen kelimeler çalışmadan çıkarılacaktır.

Aşağıda bir örnek mevcut. Belirtilen cevaplar da doğru cevap olmayabilir. Herkesin özel yorumu burada önemlidir.Eğer sorularınız olursa araştırmacıya maille ulaşabilirsiniz.Şimdiden çok teşekkürler.

Örnek:Kelime: ayakkabı

Soru-1: Birleşik kelimenin genel anlamının birleşik kelimeyi oluşturan iki kelimenin ortak katkısı ile oluşma derecesi nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)

"**Ayakkabı**" yı, "**ayakların konulduğu kap**" gibi yorumlarsak bu soruya 4-Çok ilgili diyebiliriz.

Soru-2: Birleşik sözcüğü oluşturan ILK kelimenin anlam katkısı varsa, sizce nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)

İlk kelime yani "ayak", ayakkabı kelimesi ile 4-Çok ilgili denilebilir.

Soru-3: Birleşik sözcüğü oluşturan IKINCI kelimenin anlam katkısı varsa, sizce nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)

İkinci kelime yani "kap", ayakkabı kelimesi ile 4-Çok ilgili denilebilir.

Soru-4: Kelimenin bir bütün olarak canlılık derecesi nedir?(3-Canlı, 2-Ne canlı ne de cansız, 1-Cansız,0-Yorum Yok)

Ayakkabı kelimesi 1-Cansız bir kelimedir.

Soru-5: Kelimenin bir bütün olarak somutluk/soyutluk derecesi nedir?(3-Somut,2-Yarı Somut/Soyut, 1-Soyut,0-Yorum Yok)

Ayakkabı kelimesi elle tutulur bir nesneyi çağrıştırdığı için 3-Somut bir kelimedir.

Örnek:Kelime: ayak bağı

Soru-1: Birleşik kelimenin genel anlamının birleşik kelimeyi oluşturan iki kelimenin ortak katkısı ile oluşma derecesi nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)

"**Ayakbağı**" yı, "**bir işin yapılmasına engel**" gibi yorumlarsak,mecazi bir anlam olduğu için bu soruya 2-Az İlgili diyebiliriz.

Soru-2: Birleşik sözcüğü oluşturan ILK kelimenin anlam katkısı varsa, sizce nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)

İlk kelime yani "ayak", ayak bağı kelimesi ile 3-İlgili denilebilir.

Soru-3: Birleşik sözcüğü oluşturan IKINCI kelimenin anlam katkısı varsa, sizce nedir? (4-Çok ilgili, 3-İlgili, 2-Az İlgili, 1-İlgisi Yok,0-Yorum Yok)

İkinci kelime yani "bağ", ayak bağı kelimesi ile 3-İlgili denilebilir.

Soru-4: Kelimenin bir bütün olarak canlılık derecesi nedir?(3-Canlı, 2-Ne canlı ne de cansız, 1-Cansız,0-Yorum Yok)

Ayak bağı kelimesi 1-Cansız bir kelimedir.

Soru-5: Kelimenin bir bütün olarak somutluk/soyutluk derecesi nedir?(3-Somut,2-Yarı Somut/Soyut, 1-Soyut,0-Yorum Yok)

Ayak bağı elle tutulamayan bir olayı çağrıştırdığı için 1-Soyut bir kelimedir.

Table 19 Survey Material

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Anima cy	Concreteness
juxtaposed	first constituent	ana fikir	3,5	3,17	3,78	1,44	1,06
juxtaposed	first constituent	ayak yalın	3,59	3,65	3,35	2,12	2,47
juxtaposed	first constituent	boyahane	3,83	3,83	3,78	1,11	2,89
juxtaposed	first constituent	dağ bayır	3,72	3,61	3,56	1,28	2,61
juxtaposed	first constituent	deli fişek	2,56	2,89	2,17	2,22	1,39
juxtaposed	first constituent	dişbudak	2,29	1,71	2,29	2,14	2,93
juxtaposed	first constituent	gülbank	2,33	2,33	3	1	2,33
juxtaposed	first constituent	koç yiğit	2,94	2,28	3,5	2,39	1,94
juxtaposed	first constituent	şekerpare	2,94	3,39	2,69	1,17	3
juxtaposed	first constituent	taş toprak	3,72	3,72	3,83	1,11	3
juxtaposed	first constituent	yazı tura	3,56	3,39	3,5	1,33	2,11
juxtaposed	first constituent	yol yordam	3,33	3,11	3,59	1,33	1,17
juxtaposed	first constituent	yüznumara	1,5	1,56	1,5	1,28	2,61

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
juxtaposed	second constituent	kızıl ağaç	3,72	3,33	3,67	2,94	2,94
juxtaposed	second constituent	akbalık	3,44	3,31	3,63	3	3
juxtaposed	second constituent	alabaş	2,36	2,43	2,57	2,57	2,43
juxtaposed	second constituent	kılcal boru	3,41	3,35	3,47	1,38	3
juxtaposed	second constituent	yaprak çay	3,67	3,72	3,89	1,78	3
juxtaposed	second constituent	eğik çizgi	3,78	3,72	3,83	1,33	2,33
juxtaposed	second constituent	eski dünya	3,11	3	3	1,5	2
juxtaposed	second constituent	kaba et	2,61	2,11	3,11	2	3
juxtaposed	second constituent	polisiye film	3,67	3,61	3,89	1,33	2,17
juxtaposed	second constituent	buharlı gemi	3,56	3,67	3,89	1,22	3
juxtaposed	second constituent	açıkgöz	2,17	2,11	2	2,06	1,17
juxtaposed	second constituent	okkalı kahve	2,71	2	3,59	1,18	2,71
juxtaposed	second constituent	çelik kapı	3,67	3,67	3,83	1,11	3

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
juxtaposed	second constituent	orta kuşak	2,76	2,71	2,88	1,65	1,71
juxtaposed	second constituent	amper saat	3	3,222222	2,888889	1,375	2,333333
juxtaposed	second constituent	karatavuk	3,12	3,19	3	2,88	2,82
juxtaposed	second constituent	madeni yağ	3,28	2,89	3,78	1,17	2,94
indefinite	first constituent	ana kucağı	3,17	3,33	3,06	1,67	2,5
indefinite	first constituent	ayak oyunu	1,94	1,61	2,61	1,44	1,22
indefinite	first constituent	boya kutusu	3,83	3,78	3,83	1,11	2,89
indefinite	first constituent	dağ havası	3,61	3,56	3,67	1,28	2,5
indefinite	first constituent	deli gömleği	3,56	3,56	3,56	1,11	2,83
indefinite	first constituent	diş ağrısı	3,94	3,94	3,89	1,44	1,61
indefinite	first constituent	gül rengi	3,72	3,67	3,78	1,44	1,83
indefinite	first constituent	koç katımı	3	3,14	2,86	1,86	1,67
indefinite	first constituent	şeker pancarı	3,5	3,5	3,56	2,28	3

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
indefinite	first constituent	taş ocağı	3,28	3,67	3	1,11	3
indefinite	first constituent	yazı kağıdı	3,89	3,89	3,94	1,11	3
indefinite	first constituent	yol yorgunu	3,5	3,39	3,78	1,94	1,33
indefinite	first constituent	yüz görümlüğü	2,89	2,78	3	1,44	2,22
indefinite	second constituent	meyve ağacı	3,94	3,89	3,94	2,78	3
indefinite	second constituent	dil balığı	2,61	1,94	3,67	3	2,94
indefinite	second constituent	bekçi başı	3,13	3,63	2,88	2,81	2,59
indefinite	second constituent	yemek borusu	3,59	3,88	3,53	2	3
indefinite	second constituent	paşa çayı	2,33	1,67	3,67	1,28	2,78
indefinite	second constituent	ölçek çizgisi	3,72	3,67	3,72	1,28	2,44
indefinite	second constituent	geçim dünyası	2,72	3,28	2,67	1,39	1
indefinite	second constituent	koyun eti	3,94	3,94	3,94	1,35	3
indefinite	second constituent	televizyon filmi	3,83	3,78	3,89	1,39	2,22

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
indefinite	second constituent	ticaret gemisi	3,67	3,72	3,78	1,11	3
indefinite	second constituent	kedigözü	2,82	2,71	2,82	1,35	2,94
indefinite	second constituent	sabahçı kahvesi	3,27	2,93	3,53	1,33	3
indefinite	second constituent	devlet kapısı	2,72	3,56	2,22	1,44	1,17
indefinite	second constituent	deprem kuşağı	2,94	3,78	2,39	1,33	1,83
indefinite	second constituent	duvar saati	3,89	3,89	3,89	1,11	3
indefinite	second constituent	çerkez tavuğu	2,61	2,56	3,06	1,22	3
indefinite	second constituent	makine yağı	3,78	3,78	3,89	1,17	3
definite	first constituent	ananın emeği	3,82	3,82	3,71	1,53	1,5
definite	first constituent	ayağın sahibi	3,8	3,87	3,87	2,73	2,86
definite	first constituent	boyanın kıvamı	3,83	3,89	3,78	1,33	2,28
definite	first constituent	dağın zirvesi	3,94	3,94	3,94	1,17	2,83
definite	first constituent	delinin sopası	2,94	3,13	2,94	1,29	2,13

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
definite	first constituent	dişin yapısı	3,72	3,83	3,72	1,44	2,33
definite	first constituent	gülün adı	3,53	3,6	3,47	1,31	1,31
definite	first constituent	koçun fiyatı	3,83	3,83	3,83	1,5	2,06
definite	first constituent	şekerin kilosu	3,78	3,89	3,67	1,33	1,94
definite	first constituent	taşın yüzeyi	3,89	3,94	3,89	1,17	2,94
definite	first constituent	yazının tarihi	3,83	3,83	3,89	1,5	1,56
definite	first constituent	yolun bitimi	3,78	3,94	3,61	1,44	2,06
definite	first constituent	yüzün aydınlığı	2,94	3,44	2,83	1,67	1,5
definite	second constituent	bahçenin ağacı	3,89	3,89	3,83	2,61	3
definite	second constituent	gölün balığı	3,94	3,94	3,89	2,89	3
definite	second constituent	sorunun başı	3,44	3,89	3,11	1,33	1,39
definite	second constituent	banyonun borusu	3,83	3,83	3,72	1,11	2,94
definite	second constituent	ustanın çayı	3,61	3,56	3,56	1,22	2,89

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
definite	second constituent	defterin çizgisi	3,89	3,89	3,83	1,17	2,89
definite	second constituent	zalimin dünyası	3,22	3,56	3	1,61	1,28
definite	second constituent	türlünün eti	3,67	3,5	3,83	1,11	2,94
definite	second constituent	fotoğrafçının fi	3,78	3,83	3,83	1,22	2,94
definite	second constituent	donanmanın gemis	3,83	3,83	3,94	1,17	3
definite	second constituent	dolabın gözü	3,33	3,83	2,72	1,11	3
definite	second constituent	misafirin kahves	3,72	3,78	3,83	1,22	2,94
definite	second constituent	şehrin kapısı	3,06	3,44	2,61	1,22	2,11
definite	second constituent	ağanın kuşağı	3,5	3,56	3,39	1,17	2,89
definite	second constituent	konağın saati	3,83	3,89	3,89	1,17	3
definite	second constituent	çiftliğin tavuğu	3,89	3,83	3,94	2,78	3
definite	second constituent	çekirdeğin yağı	3,83	3,83	3,78	1,17	3
unrelated	.	kelaynak	2,24	2,65	1,85	3	3

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
unrelated	.	ipek böceği	3,67	3,44	3,83	3	3
unrelated	.	masanın vidası	3,89	3,83	3,78	1,11	3
unrelated	.	çiğ köfte	3,28	3,39	3,44	1,17	3
unrelated	.	bubi tuzağı	3,09	2,27	3,73	1	2,86
unrelated	.	kıl çadır	3,38	3,13	3,81	1,13	3
unrelated	.	ısı cam	2,76	2,82	3,28	1,11	2,94
unrelated	.	ütünün modeli	3,83	3,94	3,72	1,28	2,28
unrelated	.	lağım çukuru	3,88	3,82	3,94	1,11	2,89
unrelated	.	kuş ekmeği	3,21	3	3,21	1,21	2,92
unrelated	.	kısa dalga	3,11	3	3,06	1,33	1,67
unrelated	.	cebin deliği	3,78	3,67	3,94	1,28	2,83
unrelated	.	zarın incelmesi	3,76	3,82	3,82	1,56	2,28
unrelated	.	formanın eteği	3,72	3,83	3,72	1,22	2,78
unrelated	.	ay yıldız	3,67	3,61	3,61	1,33	2,56
unrelated	.	hamam tası	3,67	3,83	3,61	1,11	3
unrelated	.	bostanın ürünü	3,88	3,94	3,88	1,41	2,71
unrelated	.	kaput bezi	3,33	3,27	3,69	1,13	3

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
unrelated	.	beşiğin yastığı	3,78	3,78	3,83	1,22	2,94
unrelated	.	arka teker	3,78	3,72	3,89	1,11	3
unrelated	.	iğnenin ucu	3,83	3,94	3,78	1,22	3
unrelated	.	ansiklopedinin c	3,83	3,89	3,72	1,11	2,83
unrelated	.	karbonik asit	3,59	3,71	3,65	1,11	2,88

Table 19 (continued)

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Anima cy	Concreteness
unrelated	.	aslan payı	2,33	2,06	3,22	1,28	1,44
unrelated	.	çilingir sofrası	2,28	1,89	3,39	1,22	2,61
unrelated	.	beneğin sayısı	3,47	3,53	3,71	1,29	2,12
unrelated	.	kuyruk sokumu	2,56	2,61	2,78	1,61	2,72
unrelated	.	kesik koni	3,47	3,65	3,59	1,25	2,25
unrelated	.	köşe koltuğu	3,33	3,17	3,72	1,17	2,94
unrelated	.	merdiven altı	3,39	3,28	3,33	1,22	2,33
unrelated	.	sıra dayağı	3,44	3,28	3,83	1,5	1,78
unrelated	.	şifre anahtarı	3,35	3,65	3,24	1,5	2,22
unrelated	.	seçim sandığı	3,83	3,83	3,72	1,11	2,72
unrelated	.	senet sepet	2,12	2,88	1,71	1,19	1,81
unrelated	.	sinyal müziği	3,35	3,24	3,59	1,35	2,18

Table 20 Second Survey Material

Compound Type	Priming Location	Compound	Transparency	First Constituent Relatedness	Second Constituent Relatedness	Animacy	Concreteness
unrelated	.	karşılıksız çek	3,4	3,4	3,6	1,3	2,6
unrelated	.	basit faiz	2,8	2,2	3,4	1,4	1,4
unrelated	.	ayrık küme	3,3	3,1	3,4	1,6	1,4
unrelated	.	açık yeşil	3,2	2,6	3,5	1,4	2,4
unrelated	.	ağır iş	3,1	2,8	3,5	1,4	1,6
unrelated	.	ince kesim	2,8	2,8	3,2	1,2	2,1

A.1.3 Prime Picture Distractor Word Pairs Used in the Experiment

Table 21 Practice Session Pairs

	Prime Picture	Distractor Word
1	uçurtma	ŞİFONYER
2	yusufçuk	PARANTEZ
3	elma	DİSPANSER
4	balta	ULTRAVİYOLE
5	top	GARGARA
6	vantilatör	MAĞARA
7	kurbağa	HELİKOPTER
8	kürek	TENTÜRDİYOT
9	çatal	REVİZYON
10	deve	PANDOMİM
11	şemsiye	DİYAFRAM
12	kravat	PARABOL
13	mısır	ORİGAMİ
14	salıncak	KULAÇLAMA
15	taç	KENEVİR
16	tuzluk	ORYANTASYON
17	ördek	KAFETERYA
18	kulak	BUKALEMUN

Table 22 Filler Picture-Word Pairs

	Prime Picture	Distractor Word-Block-1	Distractor Word-Block-2	Distractor Word-Block-3	Distractor Word-Block-4
1	abaküs	VANİLYA	SİNÜZOİDAL	AFRİKA	SÜSPANSİYON
2	ahtapot	YELPAZELEMEK	NESNELLİK	FABRİKASYON	BAROMETRE
3	akordiyon	METEOROLOJİ	ALGORİTMA	KOMBİNASYON	BAKKALİYE
4	ampul	RAPTİYE	BRÜKSEL	DAKTİLOGRAFYA	RAFİNERİ
5	anahtar	VANTRİLOK	PATATES	MANİVELA	AKIŞKAN
6	arı	TEBEŞİR	KATEGORİ	TASARRUF	AFACANLAŞMAK
7	askı	MÜSABAKA	DEPOZİTO	LEBLEBİ	KOALİSYON
8	ataç	KROMOZOM	KAMİKAZE	DOMİNİKA	SİBERNETİK
9	balon	ANTROPOLOJİK	TRAVERTEN	TERCÜMANLIK	STERİLİZE
10	bardak	RASTLANTISAL	MÜCEVHERAT	DEKORASYON	DOĞAÇLAMA
11	baston	PATLICAN	ÇÖKELEK	GRENADA	ÇAMAŞIRLIK
12	bavul	SALATALIK	DİYETİSYEN	ZIMPARA	ABUDABİ
13	bayrak	ZENCEFİL	PANSİYON	ÇEPEÇEVRE	LOGARİTMA
14	biberon	PİRAMİT	KİMYAGER	İRLANDA	FLAMENKO
15	bisiklet	SİNGAPUR	BAKLAGİL	UYARLAMA	HİPOTENÜS
16	bulut	RÖPORTAJ	ÖDENEK	LİMONATA	PELERİN
17	çadır	OLİMPİYAT	KOLEKSİYONCULUK	ALMANYA	ELEŞTİRMENLİK
18	çan	ARKEOLOG	KIZAMIKÇIK	POLONYA	TEMSİLCİLİK
19	ceket	DANİMARKA	BÜYÜTEÇ	KARTONPİYER	SANTRİFÜJ

Table 22 (continued)

	Prime Picture	Distractor Word-Block-1	Distractor Word-Block-2	Distractor Word-Block-3	Distractor Word-Block-4
20	çekirge	OPTİMİZASYON	İNGİLTERE	STABİLİZE	MİTOKONDRİ
21	çıkrık	ZANAATKAR	AKAPUNKTUR	KARAKTEROLOJİ	BUDAPEŞTE
22	çit	TEFERRUAT	SENEGAL	REHABİLİTASYON	KADİFEMSİ
23	çizme	PARATONER	TIRABZAN	PORTEKİZ	SARMAŞIK
24	davul	ANTİBİYOTİK	TULUMBACI	TAHTEREVALLİ	OKALİPTÜS
25	dondurma	KOSTARİKA	DAMACANA	PRODÜKSİYON	JAMAİKA
26	düdük	ORTODONTİ	GASTRONOMİ	MEVDUAT	KAMERUN
27	düğme	TROLEYBÜS	NARENCİYE	VİYADÜK	ENSTANTANE
28	enginar	VARDİYA	ÇINGIRAK	MERKEZİYETÇİLİK	MERMERCİLİK
29	fıçı	LABİRENT	PASAPORT	KAPLICA	VAZELİN
30	fil	BİLLURİYE	TEKNİSYENLİK	SPAGETTİ	FELSEFECİ
31	fırın	SİRKÜLASYON	OMURGA	BUMERANG	DAVETİYE
32	fiş	KALORİFER	EJDERHA	HABİTAT	MADALYON
33	havuç	SÜVETER	AKADEMİSYEN	FEODALİTE	NAFTALİN
34	hayalet	SİRTAKİ	SAKLAMBAÇ	MAKRAME	KOLONYA
35	karınca	ALTERNATİF	JENERATÖR	RESTORASYON	TURNİKE
36	kelebek	NAPOLİTEN	İSTİKAMET	ENTERNASYONAL	PÖTİKARELİ
37	kilise	JELATİNSİ	PATİSKA	SPEKTRUM	LETONYA
38	kiraz	ASANSÖR	MEKANİZMA	EFSANE	FRANSA
39	kızak	KÜRDANLIK	KLOROPLAST	MEMORANDUM	GEÇİRGENLİK

Table 22 (continued)

	Prime Picture	Distractor Word-Block-1	Distractor Word-Block-2	Distractor Word-Block-3	Distractor Word-Block-4
40	lama	ADRENALİN	GRAMOFON	KOLOMBİYA	MEDİTASYON
41	makas	MÜSAMERE	UKRAYNA	FAHRENHAYT	KONSANTRASYON
42	mandal	PROJEKTÖR	FERMANTASYON	KAPASİTE	İSKANDİNAV
43	mıknatıs	BÖĞÜRTLEN	MİMOZA	TERMİNOLOJİ	APLİKASYON
44	mikroskop	ÇEKOSLOVAKYA	DESİNATÖR	İSTİRİDYE	LİBERYA
45	mikser	VEJETARYEN	TOPOLOJİ	BİJUTERİ	LEFKOŞA
46	mum	MERSERİZE	JİMNASTİKÇİ	İSTATİSTİKSEL	STANDARDİZASYON
47	muz	SİMÜLASYON	ERGONOMİK	MÜTEMADİYEN	DİSTRİBÜTÖRLÜK
48	müzik	FİBERGLAS	TADİLAT	BULGARİSTAN	PERAKENDECİ
49	örümcek	KANADA	HİYERARŞİ	TEŞRİFATÇI	FERMUARLI
50	palyaço	BARBUNYA	SİSTEMATİK	TABELA	PERİYODİK
51	paraşüt	ZÜCCACİYE	MACARİSTAN	BROKOLİ	TABLDOT
52	parmak	FESLEĞENLİ	KOMPARTIMAN	SPONSORLUK	KOREOGRAFİ
53	pipo	NAKARAT	PASTÖRİZE	LOJİSTİK	VİSKOZİTE
54	sandalye	MÜDÜRİYET	MUTABAKAT	KUMANYA	BAHREYN
55	şapka	FOKURDAMAK	SEKRETERLİK	HİNDİBA	ORGANİZATÖR
56	sepet	ANTARKTİKA	PANORAMA	MARATONCU	KONSOLİDASYON
57	süpürge	SEMPOZYUM	KANAVİÇE	İSTASYONCU	KARNAVAL
58	tarak	ÇEKECEK	TEMENNİ	PROSPEKTÜS	MEZUNİYET
59	telefon	LİTERATÜR	KESTANE	ÇEÇENİSTAN	VERANDA

Table 22 (continued)

	Prime Picture	**Distractor Word-Block-1**	**Distractor Word-Block-2**	**Distractor Word-Block-3**	**Distractor Word-Block-4**
60	teleskop	SÜRREALİZM	KURABİYE	HOKKABAZ	AMERİKA
61	testere	BATTANİYE	HOLLANDA	KARİKATÜR	DİFERANSİYEL
62	toynak	PROFESYONELLİK	MADAGASKAR	TAVSİYE	ALÜMİNYUM
63	trompet	KOOPERATİFÇİLİK	ARNAVUTLUK	AĞUSTOS	PİYANGOCU
64	vazo	TEDARİKÇİLİK	DEBRİYAJ	DEODORANT	TÜKÜRÜK
65	yüzük	KERTENKELE	PANDİSPANYA	ENDONEZYA	MOZAMBİK
66	zincir	KAPLUMBAĞA	GARSONİYER	ASPİRASYON	AFGANİSTAN
67	zürafa	SİGORTACILIK	BELARUS	DİNAMO	PORTATİF

Table 23 Experimental Target Picture-Distractor Word Pairs Across Conditions

	Prime Picture TR	Prime Picture EN	Condition	Distractor Word	
1	ağaç	tree	Juxtaposed	TR	kızıl ağaç
				ITL	red tree
				EN	redwood
			Indefinite	TR	meyve ağacı
				ITL	fruit tree + CM
				EN	fruit tree
			Definite	TR	Bahçe-nin ağacı
				ITL	garden + GEN + tree + 3SG. POSS
				EN	tree of the garden
			Unrelated	TR	formanın eteği
				ITL	uni-form + GEN skirt + 3SG.POSS
				EN	skirt of the uniform
2	ana	mother	Juxtaposed	TR	ana fikir
				ITL	main idea
				EN	central topic
			Indefinite	TR	ana kucağı
				ITL	mother hug + CM
				EN	mother's bosom
			Definite	TR	ananın emeği
				ITL	mother + GEN effort + 3SG. POSS
				EN	mother's effort
			Unrelated	TR	zarın incelmesi
				ITL	membrane + GEN thinning + 3SG.POSS
				EN	thining of the memb-rane

Table 23 (continued)

3	balık	fish	**Juxtaposed**	**TR**	akbalık
				ITL	white fish
				EN	dace
			Indefinite	**TR**	dil balığı
				ITL	tongue fish + CM
				EN	flounder
			Definite	**TR**	gölün balığı
				ITL	lake + GEN fish + 3SG. POSS
				EN	fish of the lake
			Unrelated	**TR**	ay yıldız
				ITL	moon + star
				EN	the star and cres-cent
4	baş	head	**Juxtaposed**	**TR**	alabaş
				ITL	colourful + head
				EN	turnip cabbage
			Indefinite	**TR**	bekçi başı
				ITL	guard head + CM
				EN	headguard
			Definite	**TR**	sorunun başı
				ITL	question + GEN head + 3SG. POSS
				EN	beginning of the question
			Unrelated	**TR**	hamam tası
				ITL	turkish bath bowl + CM
				EN	metal bowl (used for dousing oneself with water while washing oneself)

Table 23 (continued)

5	boru	pipe	**Juxtaposed**	**TR**	kılcal boru
				ITL	cabillary pipe
				EN	capillary tube
			Indefinite	**TR**	yemek borusu
				ITL	food pipe + CM
				EN	esophagus
			Definite	**TR**	banyonun borusu
				ITL	bathroom + GEN pipe + 3SG. POSS
				EN	pipe of the bathroom
			Unrelated	**TR**	bostanın ürünü
				ITL	garden + GEN crop + 3SG.POSS
				EN	crop of the garden
6	boya	paint	**Juxtaposed**	**TR**	boyahane
				ITL	paint + house
				EN	dyehouse
			Indefinite	**TR**	boya kutusu
				ITL	paint box + CM
				EN	paint box
			Definite	**TR**	boyanın kıvamı
				ITL	paint + GEN density + 3SG.POSS
				EN	density of the paint
			Unrelated	**TR**	masanın vidası
				ITL	table + GEN screw + 3SG.POSS
				EN	screw of the table

Table 23 (continued)

7	çay	tea	**Juxtaposed**	**TR**	yaprak çay
				ITL	leaf tea
				EN	tea leaves
			Indefinite	**TR**	paşa çayı
				ITL	general tea + CM
				EN	husband's tea
			Definite	**TR**	ustanın çayı
				ITL	craftsman + GEN tea + 3SG.POSS
				EN	craftsman's tea
			Unrelated	**TR**	kaput bezi
				ITL	hood (of a car) cloth + CM
				EN	canvas
8	çizgi	line	**Juxtaposed**	**TR**	eğik çizgi
				ITL	curved line
				EN	slash
			Indefinite	**TR**	ölçek çizgisi
				ITL	scale line + CM
				EN	scale line (drawn lower corner of a map)
			Definite	**TR**	defterin çizgisi
				ITL	notebook + GEN line + 3SG.POSS
				EN	lines of the notebook
			Unrelated	**TR**	beşiğin yastığı
				ITL	cradle + GEN pillow + 3SG.POSS
				EN	pillow of the cradle

Table 23 (continued)

9	dağ	mountain	**Juxtaposed**	**TR**	dağ bayır
				ITL	mountain hill
				EN	field/slopy area
			Indefinite	**TR**	dağ havası
				ITL	mountain air + CM
				EN	mountain air
			Definite	**TR**	dağın zirvesi
				ITL	mountain + GEN peak + 3SG.POSS
				EN	top of the mountain
			Unrelated	**TR**	çiğ köfte
				ITL	dew meatball
				EN	dish made of raw ground meat, pounded wheat, and red pepper
10	deli	crazy person	**Juxtaposed**	**TR**	deli fişek
				ITL	mad missile
				EN	giddy
			Indefinite	**TR**	deli gömleği
				ITL	madman shirt + CM
				EN	straitjacket
			Definite	**TR**	delinin sopası
				ITL	madman + GEN stick + 3SG.POSS
				EN	madman's stick
			Unrelated	**TR**	bubi tuzağı
				ITL	booby trap + CM
				EN	booby trap

Table 23 (continued)

11	dünya	earth	**Juxtaposed**	**TR**	eski dünya
				ITL	old earth
				EN	the old world
			Indefinite	**TR**	geçim dünyası
				ITL	livelihood world + CM
				EN	phrasal proverb indicating the idea " in this world you have to think first of how you're going to support yourself"
			Definite	**TR**	zalimin dünyası
				ITL	infant + GEN world + 3SG.POSS
				EN	world of the infant
			Unrelated	**TR**	arka teker
				ITL	back wheel
				EN	rear wheel
12	et	meat	**Juxtaposed**	**TR**	kaba et
				ITL	rough meat
				EN	hip
			Indefinite	**TR**	koyun eti
				ITL	sheep meat + CM
				EN	sheep meat
			Definite	**TR**	türlünün eti
				ITL	mixed vegetables + GEN meat + 3SG.POSS
				EN	meat of the stew made of mixed vegetables
			Unrelated	**TR**	iğnenin ucu
				ITL	needle + GEN point + 3SG.POSS
				EN	point of the needle

Table 23 (continued)

13	film	film	**Juxtaposed**	**TR**	polisiye film
				ITL	detective film
				EN	whodunit
			Indefinite	**TR**	televizyon filmi
				ITL	television film + CM
				EN	television film
			Definite	**TR**	fotoğrafçının filmi
				ITL	photographer + GEN film + 3SG.POSS
				EN	photographer's film
			Unrelated	**TR**	ansiklopedinin cildi
				ITL	encyclopaedia + GEN cover + 3SG.POSS
				EN	cover of the encyclopaedia
14	gemi	ship	**Juxtaposed**	**TR**	buharlı gemi
				ITL	steamy ship
				EN	steam ship
			Indefinite	**TR**	ticaret gemisi
				ITL	trade ship + CM
				EN	merchantship
			Definite	**TR**	donanmanın gemisi
				ITL	navy + GEN + ship + 3SG.POSS
				EN	ship of the navy
			Unrelated	**TR**	karbonik asit
				ITL	carbonic acid
				EN	carbonic acid

Table 23 (continued)

15	göz	eye	Juxtaposed	**TR**	açıkgöz
				ITL	open + eye
				EN	shrewd
			Indefinite	**TR**	kedigözü
				ITL	cat + eye + CM
				EN	reflector, red rearlight
			Definite	**TR**	dolabın gözü
				ITL	cupboard + GEN drawer + 3SG.POSS
				EN	drawer of the cupboard
			Unrelated	**TR**	aslan payı
				ITL	lion share+CM
				EN	lion's share
16	gül	rose	Juxtaposed	**TR**	gülbank
				ITL	rose + a row or panel of items stored or grouped together
				EN	hymn or prayer chanted in unison
			Indefinite	**TR**	gül rengi
				ITL	rose color + CM
				EN	rose color
			Definite	**TR**	gülün adı
				ITL	rose + GEN name + 3SG.POSS
				EN	name of the rose
			Unrelated	**TR**	ısı cam
				ITL	heat glass
				EN	thermopane

Table 23 (continued)

17	kahve	coffee	**Juxtaposed**	**TR**	okkalı kahve
				ITL	heavy coffee
				EN	very strong coffee
			Indefinite	**TR**	sabahçı kahvesi
				ITL	person who stays awake all night cafe + CM
				EN	a cafe, that either stays open all night or opens very early in the morning
			Definite	**TR**	misafirin kahvesi
				ITL	guest + GEN coffee + 3SG.POSS
				EN	guest's coffee
			Unrelated	**TR**	çilingir sofrası
				ITL	keysmith dinner table + CM
				EN	drinking bout
18	kapı	door	**Juxtaposed**	**TR**	çelik kapı
				ITL	steel door
				EN	steel door
			Indefinite	**TR**	devlet kapısı
				ITL	government door + CM
				EN	government service
			Definite	**TR**	şehrin kapısı
				ITL	city + GEN door + 3SG.POSS
				EN	door of the city
			Unrelated	**TR**	ayrık küme
				ITL	discrete set
				EN	discrete set

Table 23 (continued)

19	koç	ram	**Juxtaposed**	**TR**	koç yiğit
				ITL	ram brave
				EN	strapping young man
			Indefinite	**TR**	koç katımı
				ITL	male sheep joining + CM
				EN	mating of sheep
			Definite	**TR**	koçun fiyatı
				ITL	ram + GEN price + 3SG.POSS
				EN	price of the ram
			Unrelated	**TR**	ütünün modeli
				ITL	iron + GEN style + 3SG.POSS
				EN	style of the iron
20	kuşak	belt	**Juxtaposed**	**TR**	orta kuşak
				ITL	middle belt
				EN	the temperate zone
			Indefinite	**TR**	deprem kuşağı
				ITL	earthquake zone + CM
				EN	seismic zone
			Definite	**TR**	ağanın kuşağı
				ITL	landowner + GEN belt + 3SG.POSS
				EN	landowner's belt
			Unrelated	**TR**	kuyruk sokumu
				ITL	tail rump + CM
				EN	the end of the spinal column

Table 23 (continued)

21	saat	watch	**Juxtaposed**	**TR**	amper saat
				ITL	ampere watch
				EN	ampere-hour
			Indefinite	**TR**	duvar saati
				ITL	wall clock + CM
				EN	wall clock
			Definite	**TR**	konağın saati
				ITL	mansion + GEN clock + 3SG.POSS
				EN	clock of the mansion
			Unrelated	**TR**	kesik koni
				ITL	truncated cone
				EN	truncated cone
22	şeker	sugar	**Juxtaposed**	**TR**	şekerpare
				ITL	sugar + piece
				EN	baked soft pastry dipped in thick syrup
			Indefinite	**TR**	şeker pancarı
				ITL	sugar beetroot + CM
				EN	sugar beet
			Definite	**TR**	şekerin kilosu
				ITL	sugar + GEN weight + 3SG.POSS
				EN	weight of the sugar(this phrase is generally used while asking the price of a kilo of rice,fruit,sugar,etc.)
			Unrelated	**TR**	lağım çukuru
				ITL	sewer hole + CM
				EN	sinkhole

Table 23 (continued)

23	taş	stone	**Juxtaposed**	**TR**	taş toprak
				ITL	stone soil
				EN	field covered with stone and sand
			Indefinite	**TR**	taş ocağı
				ITL	stone quarry + CM
				EN	stone quarry
			Definite	**TR**	taşın yüzeyi
				ITL	stone + GEN surface + 3SG.POSS
				EN	surface of the stone
			Unrelated	**TR**	kuş ekmeği
				ITL	bird bread + CM
				EN	mallow
24	tavuk	chicken	**Juxtaposed**	**TR**	karatavuk
				ITL	black + chicken
				EN	blackbird
			Indefinite	**TR**	çerkez tavuğu
				ITL	circassian chicken + CM
				EN	chicken prepared with bread, pounded walnuts, and red pepper sauce
			Definite	**TR**	çiftliğin tavuğu
				ITL	farm + gen chicken + 3SG.POSS
				EN	chicken of the farm
			Unrelated	**TR**	köşe koltuğu
				ITL	corner armchair + CM
				EN	corner seat

Table 23 (continued)

25	yağ	oil	**Juxtaposed**	**TR**	madeni yağ
				ITL	metallic oil
				EN	mineral oil
			Indefinite	**TR**	makine yağı
				ITL	engine oil + CM
				EN	grease
			Definite	**TR**	çekirdeğin yağı
				ITL	seed + GEN oil + 3SG.POSS
				EN	oil of the seed
			Unrelated	**TR**	merdiven altı
				ITL	staircase below + CM
				EN	below stairs
26	yazı	writing	**Juxtaposed**	**TR**	yazı tura
				ITL	tail heads
				EN	head or tails
			Indefinite	**TR**	yazı kağıdı
				ITL	writing paper + CM
				EN	writing paper
			Definite	**TR**	yazının tarihi
				ITL	article + GEN date + 3SG.POSS
				EN	date of the article
			Unrelated	**TR**	kısa dalga
				ITL	short wave
				EN	shortwave

Table 23 (continued)

27	yol	road	**Juxtaposed**	**TR**	yol yordam
				ITL	method technique
				EN	convenances
			Indefinite	**TR**	yol yorgunu
				ITL	road exhausted + CM
				EN	wayworn
			Definite	**TR**	yolun bitimi
				ITL	road + GEN endpoint + 3SG.POSS
				EN	end of the road
			Unrelated	**TR**	cebin deliği
				ITL	pocket + GEN opening + 3SG.POSS
				EN	opening of the pocket
28	yüz	face	**Juxtaposed**	**TR**	yüznumara
				ITL	a hundred number
				EN	toilet
			Indefinite	**TR**	yüz görümlüğü
				ITL	face display item + CM
				EN	jewelry given by a bridegroom to his bride after he has unveiled her and seen her face for the first time
			Definite	**TR**	yüzün aydınlığı
				ITL	face + GEN brightining + 3SG.POSS
				EN	happy expression of the face
			Unrelated	**TR**	kelaynak
				ITL	bald + ibis
				EN	hermit ibis

A.2 Pictures

Table 24 Prime Pictures

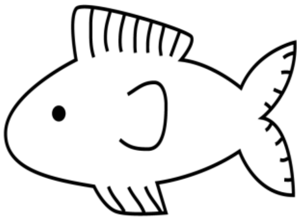
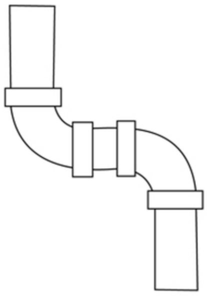
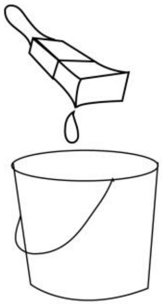
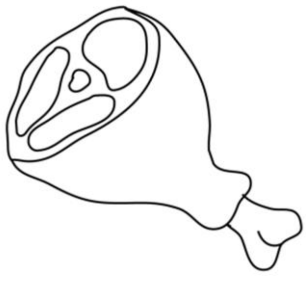
		
ağaç-‘tree’	Figure 26 ana-‘mother’	balık-‘fish’
		
Figure 27 baş-‘head’	boru-‘pipe’	boya-‘paint’
		
çay-‘tea’	çizgi-‘line’	dağ-‘mountain’
		
Figure 28 deli-‘crazy	dünya-‘earth’	et-‘meat’

Table 24 (continued)

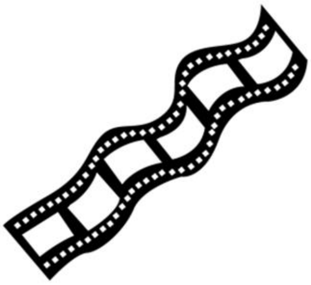
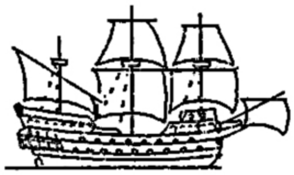
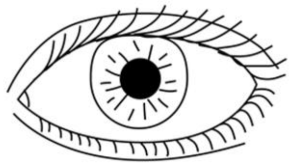
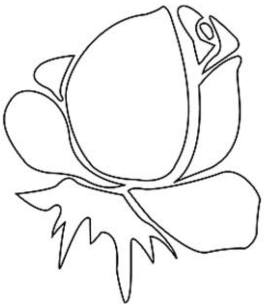
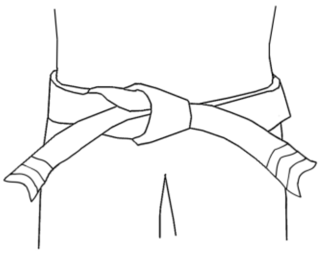
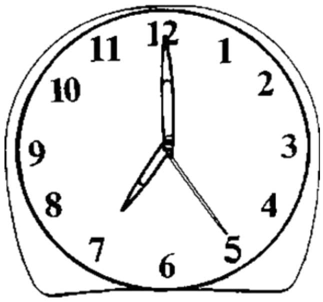
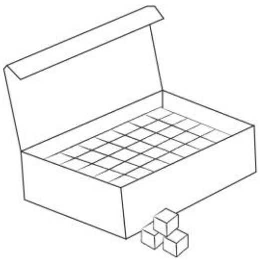
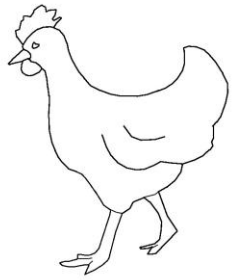
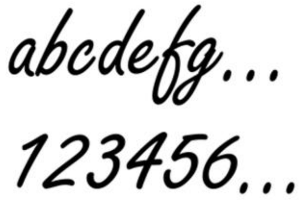
		
film-‘film’	gemi-‘ship’	göz-‘eye’
		
gül-‘rose’	kahve-‘coffee’	kapı-‘door’
		
Figure 29 koç-‘ram’	Figure 30 kuşak-‘belt’	saat-‘clock’
		
şeker-‘sugar’	Figure 31 taş-‘stone’	tavuk-‘chicken’

Table 24 (continued)

		
Figure 32 yağ-‘oil’	yazı-‘writing’	yol-‘road’

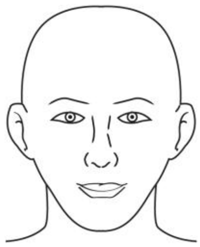



Figure 33 yüz-‘face’		

Table 25 Practice Pictures

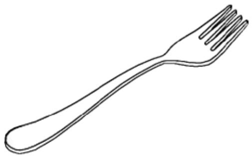
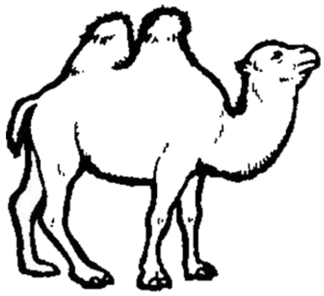
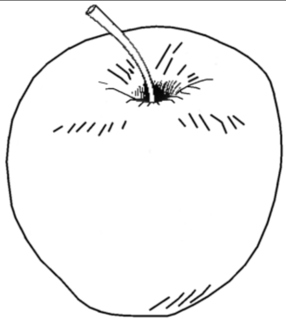
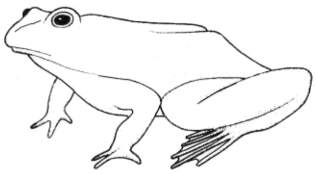
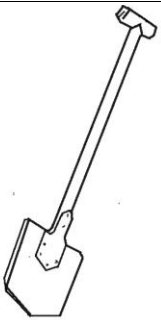
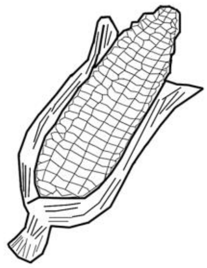
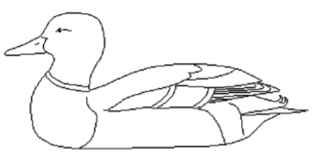
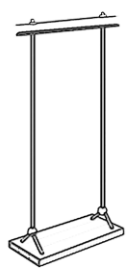
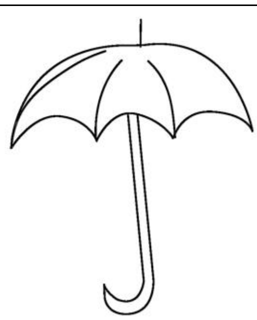
		
balta-‘axe’	çatal-‘fork’	deve-‘camel’
		
elma-‘apple’	kravat-‘tie’	kulak-‘ear’
		
kurbağa-‘frog’	kürek-‘shovel’	mısır-‘corn’
		
ördek-‘duck’	salıncak-‘swing’	şemsiye-‘umbrella’

Table 25 (continued)

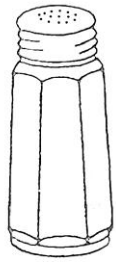
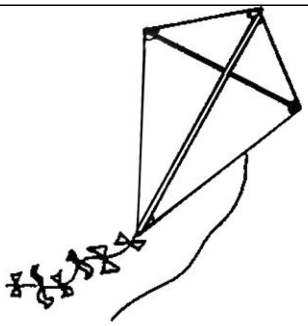
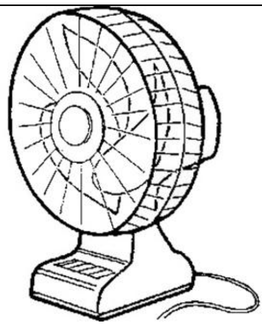
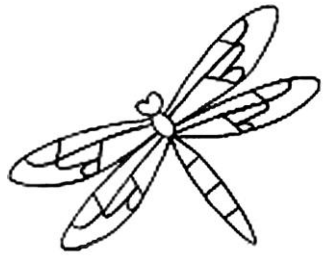
		
taç-‘crown’	top-‘ball’	tuzluk-‘saltcellar’
		
uçurtma-‘kite’	vantilatör-‘fan’	yusufçuk-‘dragonfly’

Table 26 Filler Pictures

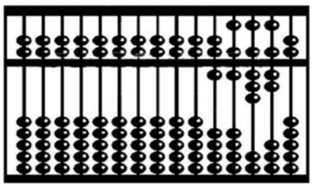
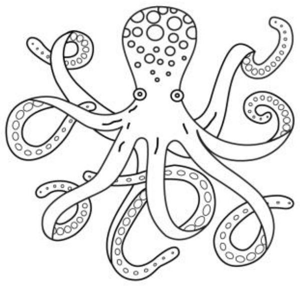
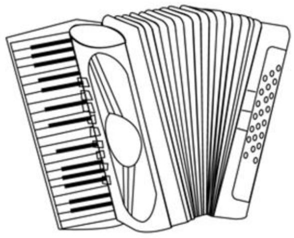
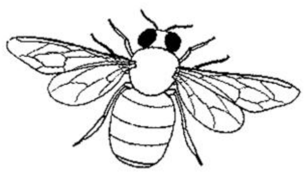
		
abaküs-‘abacus’	ahtapot-‘octopus’	akordiyon-‘accordion’
		
ampul-‘light bulb’	anahtar-‘key’	arı-‘bee’

Table 26 (continued)

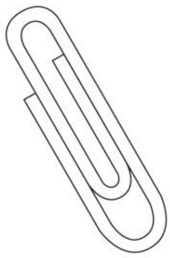
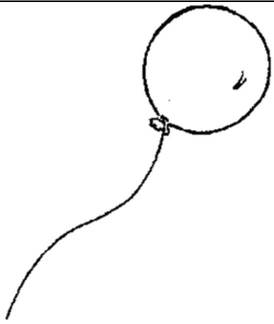
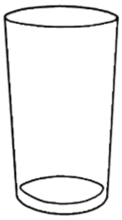
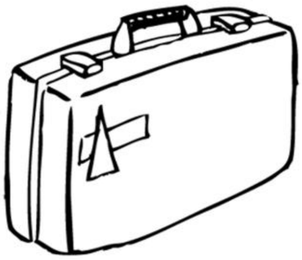
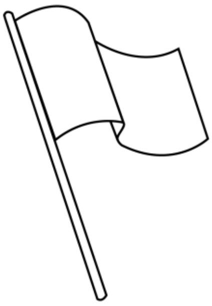
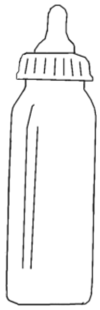
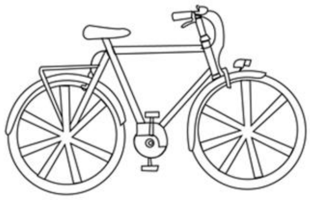
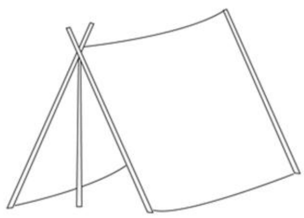
		
askı-‘hanger’	ataç-‘paper-clip’	balon-‘balloon’
		
bardak-‘glass’	baston-‘stick’	bavul-‘suitcase’
		
bayrak-‘flag’	biberon-‘baby bottle’	bisiklet-‘bicycle’
		
bulut-‘cloud’	ceket-‘jacket’	çadır-‘tent’

Table 26 (continued)

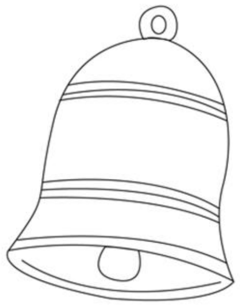
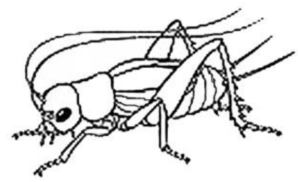
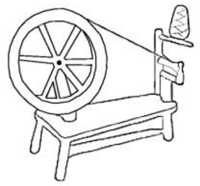
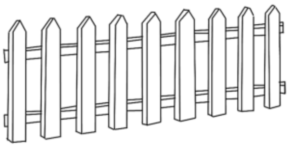
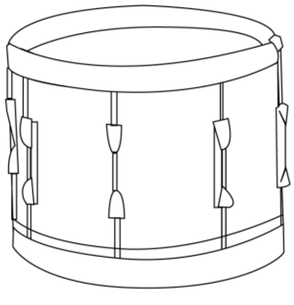
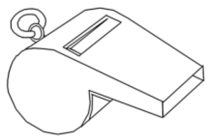
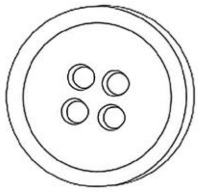
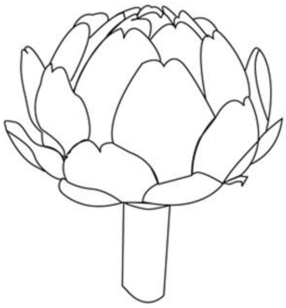
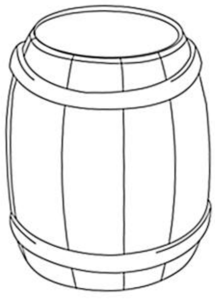
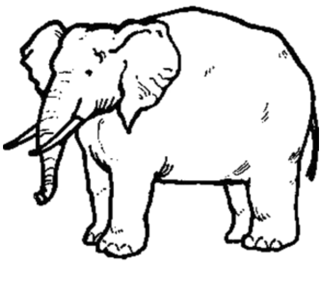
		
çan(zil)-‘bell’	çekirge-‘cricket’	çıkrık-‘spinning wheel’
		
çit-‘fence’	çizme-‘boot’	davul-‘drum’
		
dondurma-‘ice-cream’	düdük-‘whistle’	düğme-‘trimmings’
		
enginar-‘artichoke’	fıçı(varil)-‘barrel’	fil-‘elephant’

Table 26 (continued)

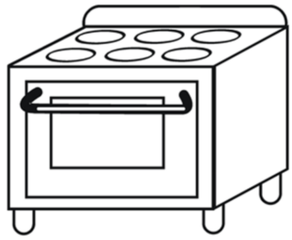
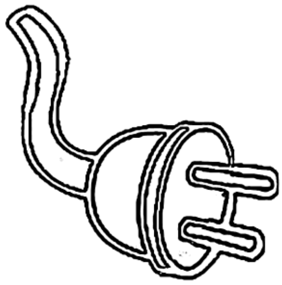
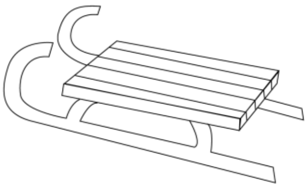
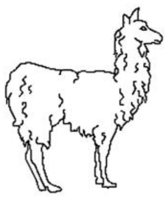
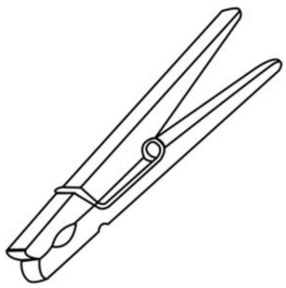
		
fırın-‘oven’	fiş-‘electric plug’	havuç-‘carrot’
		
hayalet-‘ghost’	karınca-‘ant’	kelebek-‘butterfly’
		
kızak-‘sled’	kilise-‘church’	kiraz-‘cherry’
		
lama-‘lama’	makas-‘scissors’	mandal-‘clip’

Table 26 (continued)

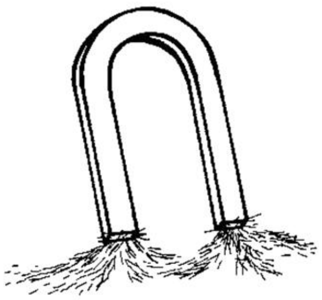
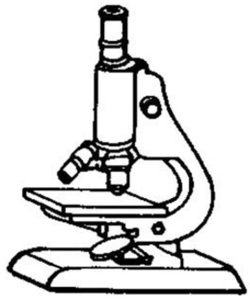
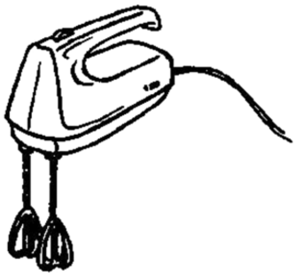
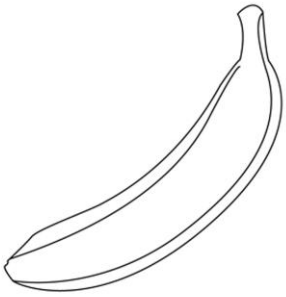
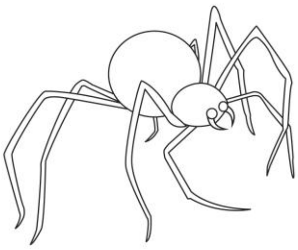
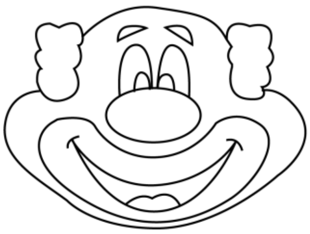
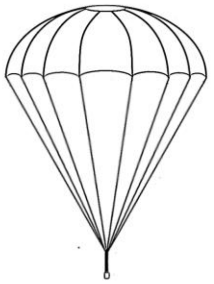
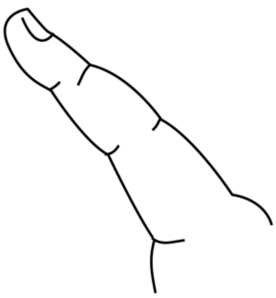
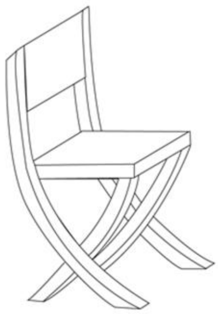
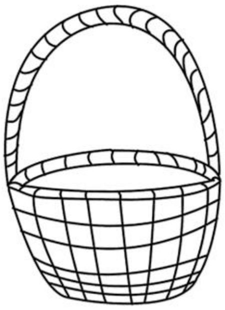
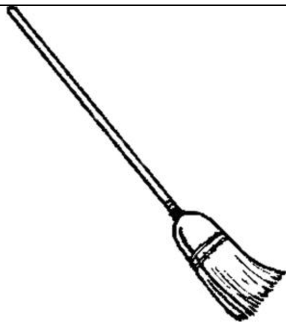
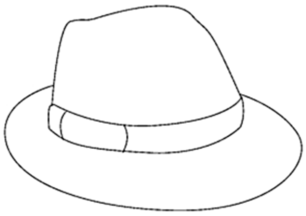
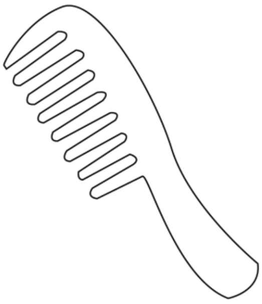
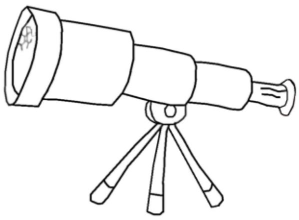
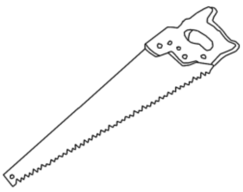
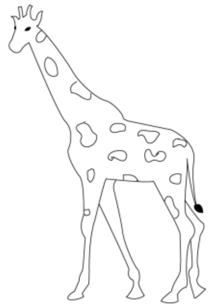
		
mıknatıs-‘magnet’	mikroskop-‘microscope’	mikser-‘blender’
		
mum-‘candle’	muz-‘banana’	müzik-‘music’
		
örümcek-‘spider’	palyaço-clawn’	paraşüt-‘parachute’
		
parmak-finger’	pipo-‘pipe’	sandalye-‘chair’

Table 26 (continued)

		
sepet-‘basket’	süpürge-‘broom’	şapka-‘hat’
		
tarak-‘comb’	telefon-‘phone’	teleskop-‘telescope’
		
testere-‘sew’	toynak-‘hoof’	trompet-‘trumpet’
		
yüzük-‘ring’	zincir-‘chain’	zürafa-‘giraffe’

A.3 Consent Form Used in the Experiment

Gönüllü Katılım Formu

Bu çalışma, Sibel ÖZER tarafından yürütülen, psikoloji-dilbilim konulu, ODTÜ yüksek lisans tezi kapsamında gerçekleştirilmek istenen bir deneydir. Çalışmanın amacı, Türkçe'nin dilbilimsel özellikleri hakkında bilgi toplamaktır. Deneyin Türkçe kullanımında yeterlilik vs gibi esktra psilojik-dilbilimsel başka herhangi bir ölçüm amacı kesinlikle bulunmamaktadır. Çalışmaya katılımın tamamıyla gönüllülük temeline dayanması amaçlanmaktadır. Deneyde, sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacı tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Deney, genel olarak kişisel rahatsızlık verecek kelimeler ve resimler içermemektedir. Ancak, katılım sırasında cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda deneyi uygulayan kişiye, deneyi tamamlamadığınızı söylemeniz yeterlidir. Deney sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Deneye katıldığınız için şimdiden teşekkür ederim. Çalışma hakkında daha fazla bilgi almak için Bilişsel Bilimler Bölümü yüksek lisans öğrencisi Sibel ÖZER (Tel: 0 506 691 05 42; E-posta: sozer@yahoo.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum.

Not: (Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

Ad-Soyad:

Yaş:

Cinsiyet: K/E

Eğitim Durumu:

İmza

Tarih

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Table 27 Word List Used in the Word Reading Test

Word	Syllable Number	Word	Syllable Count
AKBALIK	3	KOOPERATİFÇİLİK	7
ALABAŞ	3	ÇİLİNGİR SOFRASI	6
DİSPANSER	3	AY YILDIZ	3
DİYAFRAM	3	ÇİĞ KÖFTE	3
GARGARA	3	DAĞ BAYIR	3
MAĞARA	3	GÜL RENGİ	3
PANDOMİM	3	YOL YORDAM	3
PARABOL	3	KILCAL BORU	4
PARANTEZ	3	KISA DALGA	4
REVİZYON	3	KOÇ KATIMI	4
ŞİFONYER	3	ORTA KUŞAK	4
ALTERNATİF	4	PAŞA ÇAYI	4
ANTARKTİKA	4	YAZI TURA	4
ARKEOLOG	4	ÇEKİRDEĞİN YAĞI	5
BOYAHANE	4	ÇERKEZ TAVUĞU	5
BUKALEMUN	4	DEVLET KAPISI	5
HELİKOPTER	4	DOLABIN GÖZÜ	5
KAFETERYA	4	GEÇİM DÜNYASI	5
KULAÇLAMA	4	OKKALI KAHVE	5
ORİGAMİ	4	ÖLÇEK ÇİZGİSİ	5
ORYANTASYON	4	YÜZ GÖRÜMLÜĞÜ	5
SİMÜLASYON	4	BAHÇENİN AĞACI	6
ŞEKERPARE	4	BOSTANIN ÜRÜNÜ	6
TENTÜRDİYOT	4	DEFTERİN ÇİZGİSİ	6
ANTROPOLOJİK	5	TİCARET GEMİSİ	6
TEDARİKÇİLİK	5	FOTOĞRAFÇININ FİLMİ	7
ULTRAVİYOLE	5		

APPENDIX B PROVIDING TIME PRECISION IN E-PRIME

In experiments depending on collecting time-critical data such as picture naming paradigm, it is essential for the researcher to check the system reliability prior to the experiment. E-prime experimental software provides several facilities to the researchers to test, check and tune system for time precision to reduce timing errors as much as possible.

Also in the current thesis, depending on the experiment design and timing needs, strategies suggested by E-prime developers were applied. Timing methodology regulations can be listed as follows in the order of implementation:

1 E-prime software runs in high priority mode during the execution of an experiment. Nevertheless, it cannot totally prevent operating system from stealing cycles and sustaining the experiment for other programs such as explorer status bar or virus check. To monitor and take precautions that would compensate for clock and refresh cycle loses; the first step is to stop execution of processes other than E-prime as much as possible. Next, E-prime provides a Refresh Clock Test program which provides a good diagnostic of a computer's suitability for data collection, and assesses E-prime's capability of identifying computer's clock and refresh cycles. The experiment is available from the PST web site (http://www.pstnet.com).

2 Results of the test states that the performance of the computer which were used for this thesis is overally good in providing time precision in terms of clock cycles and some regulations to object presentation onset and durations should be made due to the refresh cycle underestimations. (Table 26) Computer operating system which is Windows vista Home premium states that rehresh rate is 60 Hertz while the measured refresh rate by E-prime is indeed 59, 7. Even though

the difference is small, it may lead to deviations in object presentation times which may result in error percentages of 50%.

3 Timing needs of the experiment program were identified. For several timing paradigms, E-prime provides suitable timing adjustments. For the current thesis, ‘Critical and varying duration of an event in a sequence’ timing paradigm was selected as picture naming paradigm is used and the duration of each distractor word and picture varied depending on the stimulus length in letters.

4 Preparing the stimuli such as text or picture file may take considerable time depending on the computer processor and the stimulus may not be ready to present when it is recalled from the computer memory during the experimental trial. E-prime provides a PreRelease property for each stimulus object which allows an event to be prepared prior to the effective termination of the previous event. In this way, even though the presentation onset delays may not be eliminated totally, it may be reduced considerably.

5 In the table below, the PreRelease time settings for the objects used in the experiment can be seen. E-Prime suggests a value of 100-200 ms for picture presentations. For the other values, the program was run without any PreRelease adjustments and OnsetDelays of the objects were taken and these values were identified as PreRelease for these objects.[46] (Table 28)

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[46]There is a problematic point which should be considered while using PreRelease properties such as the following situation.For experimental designs such as the one in this thesis, if after presenting the stimulus(Prime Picture) , a time frame is also provided to the subject for response (picture naming), this time frame starts from the first onset of the stimulus. As the stimulus is prepeared prior to its actual presentation by means of its PreRelease property, time-out duration already starts with a loss of the duration stated in the PreRelease property of this stimulus object which is 150 ms for this experiment. So, this PreRelease value was also added to the time-out duration to compensate for the loss. For other objects, as no response is collected in the following ones, no such adjustment was made.

Table 28 Clock Cycle Test[47]

Test ID	ClockTestStatus	% Extra Trials 'Required	TicksMissedPercent	TicksDetected	TicksMissed	TicksMaxMissed	TimingVariance	SquaredErr
EXPLANATION	+' indicates that the computer can provide milisecond accuracy, 'x' indicates a failure in providing successful result in the tests following that column,'?' refers to timing concerns which might be neglected.	Extra trials required to catch the performance of an ideal machine performance	Percetange of missed millisecond clock ticks, this value should be below 0.1%.	Total number of detected millisecond clock ticks	Total number of detected missed millisecond clock ticks	Maximum duration of missed ticks, should be small (e.g., less than or equal to 5ms). Counts over 10ms should be viewed as a serious timing problem.	Difference between expected and actual duration variance. The measurement error variance below 1 is negligible.	Squared error of the variance in the previous column
1	?	0	0.26	9974	26	7	0.0076	0.0076198

[47] Clock Test: First part of the timing test monitors the clock for a period of 10000 milliseconds and checks if there is any occurence of failure to identify sequential clock ticks in continuous readings of the clock . Even though E-Prime runs itself in high priority mode,it cannot completely stop the operating system from suspending an executing experiment.

Table 28 (continued)

Test ID	ClockTestStatus	% Extra Trials 'Required	TicksMissedPercent	TicksDetected	TicksMissed	TicksMaxMissed	TimingVariance	SquaredErr
2	+	0	0.08	9992	8	2	0.001	0.0010008
3	+	0	0	10000	0	2,23E-295	0.0	0.0
4	+	0	0	10000	0	2,23E-295	0.0	0.0
5	+	0	0.07	9993	7	4	0.0025	0.0025018
6	+	0	0	10000	0	2,23E-295	0.0	0.0
7	?	0	0.07	9993	7	6	0.0037	0.0037026
8	+	0	0	10000	0	2,23E-295	0.0	0.0
9	+	0	0	10000	0	2,23E-295	0.0	0.0
10	+	0	0.02	9998	2	1	0.0002	0.0002
11	+	0	0	10000	0	2,23E-295	0.0	0.0
12	+	0	0	10000	0	2,23E-295	0.0	0.0
13	?	0	0.18	9982	18	9	0.0146	0.0146263
14	+	0	0	10000	0	2,23E-295	0.0	0.0
15	+	0	0	10000	0	2,23E-295	0.0	0.0
16	+	0	0.02	9998	2	1	0.0002	0.0002
17	+	0	0	10000	0	2,23E-295	0.0	0.0
18	?	0	0.09	9991	9	9	0.0081	0.0081073
19	+	0	0.06	9994	6	4	0.002	0.0020012

Table 28 (continued)

Test ID	ClockTestStatus	% Extra Trials 'Required	TicksMissedPercent	TicksDetected	TicksMissed	TicksMaxMissed	TimingVariance	SquaredErr
20	+	0	0	10000	0	2,23E-295	0.0	0.0
21	?	0	0.07	9993	7	6	0.0037	0.0037026
22	+	0	0	10000	0	2,23E-295	0.0	0.0
23	+	0	0	10000	0	2,23E-295	0.0	0.0
24	+	0	0	10000	0	2,23E-295	0.0	0.0
25	+	0	0	10000	0	2,23E-295	0.0	0.0
26	?	0	0.08	9992	8	7	0.005	0.005004
27	+	0	0.05	9995	5	3	0.0013	0.0013007
28	?	0	0.09	9991	9	9	0.0081	0.0081073
29	+	0	0	10000	0	2,23E-295	0.0	0.0
30	+	0	0	10000	0	2,23E-295	0.0	0.0
31	+	0	0.01	9999	1	1	0.0001	0.0001
32	+	0	0.06	9994	6	4	0.002	0.0020012
33	?	0	0.09	9991	9	9	0.0081	0.0081073
34	?	0	0.09	9991	9	9	0.0081	0.0081073
35	+	0	0	10000	0	2,23E-295	0.0	0.0
36	+	0	0	10000	0	2,23E-295	0.0	0.0
37	+	0	0	10000	0	2,23E-295	0.0	0.0

Table 28 (continued)

Test ID	ClockTestStatus	% Extra Trials 'Required	TicksMissedPercent	TicksDetected	TicksMissed	TicksMaxMissed	TimingVariance	SquaredErr
38	+	0	0.06	9994	6	4	0.0018	0.0018011
39	+	0	0.07	9993	7	4	0.0025	0.0025018
40	+	0	0	10000	0	2,23E-295	0.0	0.0
41	+	0	0	10000	0	2,23E-295	0.0	0.0
42	+	0	0.05	9995	5	3	0.0013	0.0013007
43	+	0	0	10000	0	2,23E-295	0.0	0.0
44	+	0	0	10000	0	2,23E-295	0.0	0.0
45	+	0	0	10000	0	2,23E-295	0.0	0.0
46	+	0	0	10000	0	2,23E-295	0.0	0.0
47	+	0	0	10000	0	2,23E-295	0.0	0.0
48	+	0	0.06	9994	6	5	0.0026	0.0026016
49	+	0	0.07	9993	7	4	0.0025	0.0025018
50	+	0	0	10000	0	2,23E-295	0.0	0.0

Table 29 Refresh Rate Test[48]

RefreshRate	RefreshDuration(in milliseconds)	RefreshDurationSD(in milliseconds)	RefreshDurationMax	RefreshMissedPercent	RefreshMissedCount
Refresh frequency in Hertz (cycles per second)	Mean time between two refresh cycles	Standard deviation in refresh durations	Max Refresh Duration observed. This value should be close to normal Refresh rate.	Percentages of the refreshes that were missed. The values below are all less than 0.1% which means that the refresh rate is underestimated in this computer. This problem was overcome with regulations to stimulus onset times.	Count of times when the onset of a refresh cycle was missed
597.034	167.495	0.017	16.904	0.637	0.0
597.039	167.493	0.024	16.906	0.637	0.0
597.035	167.494	0.003	16.759	0.783	0.0
597.035	167.494	0.005	16.83	0.71	0.0
597.035	167.494	0.003	16.762	0.78	0.0
597.035	167.494	0.003	16.756	0.782	0.0

[48] RefreshClockTest: Overall result is that the timing precision of the machine used in this thesis is good

Table 29 (continued)

RefreshRate	RefreshDuration(in milliseconds)	RefreshDurationSD(in milliseconds)	RefreshDurationMax	RefreshMissedPercent	RefreshMissedCount
597.035	167.494	0.009	16.933	0.606	0.0
597.035	167.494	0.003	16.757	0.782	0.0
597.035	167.494	0.008	16.87	0.672	0.0
597.035	167.494	0.003	16.764	0.776	0.0
597.035	167.494	0.003	16.775	0.763	0.0
597.035	167.494	0.003	16.781	0.756	0.0
597.035	167.494	0.007	16.886	0.656	0.0
597.035	167.494	0.003	16.757	0.782	0.0
597.035	167.494	0.007	16.88	0.662	0.0
597.035	167.494	0.003	16.757	0.782	0.0
597.035	167.494	0.003	16.778	0.758	0.0
597.035	167.494	0.004	16.824	0.72	0.0
597.035	167.494	0.008	16.923	0.616	0.0
597.035	167.494	0.012	16.915	0.624	0.0
597.035	167.494	0.006	16.852	0.684	0.0
597.035	167.494	0.003	16.764	0.78	0.0
597.035	167.494	0.008	16.912	0.63	0.0
597.035	167.494	0.011	16.973	0.566	0.0

Table 29 (continued)

RefreshRate	RefreshDuration(in milliseconds)	RefreshDurationSD(in milliseconds)	RefreshDurationMax	RefreshMissedPercent	RefreshMissedCount
597.035	167.494	0.003	16.77	0.765	0.0
597.035	167.494	0.003	16.756	0.782	0.0
597.035	167.494	0.004	16.788	0.753	0.0
597.035	167.494	0.003	16.756	0.78	0.0
597.035	167.494	0.003	16.758	0.78	0.0
597.035	167.494	0.007	16.899	0.647	0.0
597.035	167.494	0.003	16.756	0.782	0.0
597.035	167.494	0.009	16.884	0.654	0.0
597.035	167.494	0.006	16.879	0.66	0.0
597.035	167.494	0.003	16.757	0.782	0.0
597.035	167.494	0.003	16.763	0.779	0.0
597.035	167.494	0.009	16.939	0.596	0.0
597.035	167.494	0.007	16.Eyl	0.637	0.0
597.035	167.494	0.003	16.764	0.776	0.0
597.035	167.494	0.008	16.907	0.633	0.0
597.035	167.494	0.003	16.765	0.771	0.0
597.035	167.494	0.003	16.756	0.782	0.0
597.035	167.494	0.005	16.831	0.713	0.0

Tabel 29 (continued)

RefreshRate	RefreshDuration(in milliseconds)	RefreshDurationSD(in milliseconds)	RefreshDurationMax	RefreshMissedPercent	RefreshMissedCount
597.035	167.494	0.003	16.756	0.782	0.0
597.035	167.494	0.01	16.956	0.583	0.0
597.035	167.494	0.012	16.999	0.541	0.0
597.035	167.494	0.003	16.757	0.783	0.0
597.035	167.494	0.006	16.876	0.666	0.0
597.035	167.494	0.011	16.99	0.547	0.0
597.035	167.494	0.003	16.776	0.763	0.0
597.035	167.494	0.006	16.869	0.666	0.0

Table 30 Release Values Identified for the Objects

Object Name / Presentation Duration	Fixation Point	Blank Screen	Distractor Word	Prime Picture	Time-out for Response
Pre-Release	18	18	18	150	18

6 Synchronization to the refresh cycle of the monitor was maintained. Because, a stimulus cannot be presented in the half of a refresh cycle. The display hardware, in order to make itself ready for object presentation, refreshes the screen only periodically, which takes place after complete refresh duration. For example, if the refresh duration is assumed to be 16 ms and if the object presentation is set to 50 ms, the display hardware either displays the object for 48 ms (16ms *3) or 64 ms (16 ms*4) depending on the position of the object. E-prime developers suggest that stimulus duration should be adjusted 10ms below the expected total duration of all refresh cycles desired for the stimulus. (10 ms is taken as an adjustment for varying stimulus positions on the screen). Thus, the following formula was used in object duration calculations;

Stimulus Duration to Specify =

$$\text{(Refresh Duration ms/cycle * Number of cycles) - 10ms} \quad (1.1)$$

Refresh duration can be calculated as follows:

$$\text{Refresh Duration (ms)} = 1000 / \text{Refresh Rate (Hz)} \quad (1.2)$$

For example, as each of the prime picture's presentation duration should be 500 ms ideally, to synchronize this value with the refresh clock cycle of the machine, following calculations were performed:

Counts of refresh cycles were identified. As the timing test of the E-prime depicted, the actual refresh duration the computer used in this thesis is 59,704 Hertz.

Using the (1.2) equation, the refresh duration is calculated as:

Refresh Duration= 1000/59,704

= 16, 7493 ms

Count of refresh cycles= 500 ms / Refresh Duration=500/16, 7493˜=30

Using the equation in (1.1);

Stimulus Duration to Specify = (Refresh Duration ms/cycle * Count of cycles) - 10ms

The stimulus duration to specify˜= (16, 7493* 30)-10

= 492 ms

Same calculations were made for the other object durations(Table 28)

Table 31 Object Duration Calculation

Exact Durations:	Refresh Cycle Count	Rounded Refresh Cycle Count (Half cycles more than and equal to 0.5 were completed, less than 0.5 were cut off)	Calculated Durations
250	14,92599691	15	(15*16,75)-10 ˜= 241
500	29,85199381	30	(30*16,75)-10 ˜= 492
1100	65,67438639	66	(66*16,75)-10 ˜= 1095
1400	83,58558268	84	(84*16,75)-10 ˜= 1397

Table 31 (continued)

Exact Durations:	Refresh Cycle Count	Rounded Refresh Cycle Count (Half cycles more than and equal to 0.5 were completed, less than 0.5 were cut off)	Calculated Durations
1700	101,496779	101	(101*16,75)-10 ˜= 1682
1600	95,52638021	96	(96*16,75)-10 ˜= 1598
1900	113,4375765	113	(C10*16,75)-10 ˜= 1883
2200	131,3487728	131	(C11*16,75)-10 ˜= 2184
450	26,86679443	27	(C12*16,75)-10 ˜= 442
550	32,8371932	33	(C13*16,75)-10 ˜= 543
650	38,80759196	39	(C14*16,75)-10 ˜= 643

7 Proper timing mode was selected. E-prime provides two timing modes, namely event and cumulative. In the first mode, durations of the individual object presentations are maintained as stated in the experiment design. Thus, any onset delay caused by an individual object may lead to deviations in the current experiment trial. On the other hand, the former timing mode, actual duration of the trial is maintained depending on the experiment design which implies that if any onsets delay occurs in the presentation of an object, this delay causes same amount of decrease in the object presentation duration. As the individual object presentations are important for picture naming paradigm, event mode timing was selected.

APPENDIX C EXPERIMENT RESULTS

Table 32 Picture Naming True/False Percentages[49]

Block Type	Picture	FALSE	TRUE	Total
filler	abakus	15	101	116
		13%	87%	
real	agac	2	114	116
		2%	98%	
filler	ahtapot	2	114	116
		2%	98%	
filler	akordiyon	28	88	116
		24%	76%	
filler	ampul	1	115	116
		1%	99%	
real	ana	4	112	116
		3%	97%	
filler	anahtar	5	111	116
		4%	96%	
filler	ari	64	52	116
		55%	45%	
filler	aski	13	103	116
		11%	89%	
filler	atac	10	106	116
		9%	91%	
real	balik	3	113	116
		3%	97%	
filler	balon	2	114	116
		2%	98%	
practice	balta	5	24	29
		17%	83%	

[49] For several pictures, due to common usage alternatives, more than one answer was accepted for some filler pictures: ampul (ampul and lamba), ana (ana and anne), çan (çan and zil), fıçı (fıçı and varil), fırın (fırın, fırınlı ocak and ocak)

Table 32 (continued)

filler	bardak	1	115	116
		1%	99%	
real	bas	39	77	116
		34%	66%	
filler	baston	11	105	116
		9%	91%	
filler	bavul	16	100	116
		14%	86%	
filler	bayrak	3	113	116
		3%	97%	
filler	biberon	0	116	116
		0%	100%	
filler	bisiklet	1	115	116
		1%	99%	
real	boru	5	111	116
		4%	96%	
real	boya	10	106	116
		9%	91%	
filler	bulut	12	104	116
		10%	90%	
filler	cadir	3	113	116
		3%	97%	
filler	can	1	115	116
		1%	99%	
practice	catal	4	25	29
		14%	86%	
real	cay	9	107	116
		8%	92%	
filler	ceket	2	114	116
		2%	98%	
filler	cekirge	53	63	116
		46%	54%	
filler	cikrik	68	48	116
		59%	41%	
filler	cit	14	102	116
		12%	88%	
real	cizgi	18	98	116
		16%	84%	
filler	cizme	12	104	116
		10%	90%	

Table 32 (continued)

Block Type	Picture	FALSE	TRUE	Total
real	dag	6	110	116
		5%	95%	
filler	davul	15	101	116
		13%	87%	
real	deli	3	113	116
		3%	97%	
practice	deve	3	26	29
		10%	90%	
filler	dondurma	1	115	116
		1%	99%	
filler	duduk	3	113	116
		3%	97%	
filler	dugme	2	114	116
		2%	98%	
real	dunya	1	115	116
		1%	99%	
practice	elma	3	26	29
		10%	90%	
filler	enginar	44	72	116
		38%	62%	
real	et	1	115	116
		1%	99%	
filler	fil	1	115	116
		1%	99%	
real	film	2	114	116
		2%	98%	
filler	firin	1	115	116
		1%	99%	
filler	fis	15	101	116
		13%	87%	
real	gemi	1	115	116
		1%	99%	
real	goz	5	111	116
		4%	96%	
real	gul	17	99	116
		15%	85%	
filler	havuc	1	115	116
		1%	99%	

Table 32 (continued)

Block	Picture	FALSE	TRUE	Total
filler	hayalet	2	114	116
		2%	98%	
real	kahve	20	96	116
		17%	83%	
real	kapi	5	111	116
		4%	96%	
filler	karinca	55	61	116
		47%	53%	
filler	kelebek	7	109	116
		6%	94%	
filler	kilise	13	103	116
		11%	89%	
filler	kiraz	22	94	116
		19%	81%	
filler	kizak	20	96	116
		17%	83%	
real	koc	15	101	116
		13%	87%	
practice	kravat	3	26	29
		10%	90%	
practice	kulak	1	28	29
		3%	97%	
practice	kurbaga	2	27	29
		7%	93%	
practice	kurek	7	22	29
		24%	76%	
real	kusak	17	99	116
		15%	85%	
filler	lama	32	84	116
		28%	72%	
filler	makas	2	114	116
		2%	98%	
filler	mandal	24	92	116
		21%	79%	
filler	miknatis	4	112	116
		3%	97%	
filler	mikroskop	25	91	116
		22%	78%	

Table 32 (continued)

Block	Picture	FALSE	TRUE	Total
filler	mikser	16	100	116
		14%	86%	
practice	misir	2	27	29
		7%	93%	
filler	mum	0	116	116
		0%	100%	
filler	muz	1	115	116
		1%	99%	
filler	muzik	22	94	116
		19%	81%	
practice	ordek	3	26	29
		10%	90%	
filler	orumcek	16	100	116
		14%	86%	
filler	palyaco	18	98	116
		16%	84%	
filler	parasut	37	79	116
		32%	68%	
filler	parmak	2	114	116
		2%	98%	
filler	pipo	7	109	116
		6%	94%	
real	saat	0	116	116
		0%	100%	
practice	salincak	10	19	29
		34%	66%	
filler	sandalye	5	111	116
		4%	96%	
filler	sapka	4	112	116
		3%	97%	
real	seker	13	103	116
		11%	89%	
practice	semsiye	2	27	29
		7%	93%	
filler	sepet	2	114	116
		2%	98%	
filler	supurge	13	103	116
		11%	89%	

Table 32 (continued)

Block Type	Picture	FALSE	TRUE	Total
practice	tac	6	23	29
		21%	79%	
filler	tarak	1	115	116
		1%	99%	
real	tas	8	108	116
		7%	93%	
real	tavuk	3	113	116
		3%	97%	
filler	telefon	1	115	116
		1%	99%	
filler	teleskop	16	100	116
		14%	86%	
filler	testere	2	114	116
		2%	98%	
practice	top	5	24	29
		17%	83%	
filler	toynak	37	79	116
		32%	68%	
filler	trompet	62	54	116
		53%	47%	
practice	tuzluk	2	27	29
		7%	93%	
practice	ucurtma	1	28	29
		3%	97%	
practice	vantilator	5	24	29
		17%	83%	
filler	varil	38	78	116
		33%	67%	
filler	vazo	6	110	116
		5%	95%	
real	yag	18	98	116
		16%	84%	
real	yazi	3	113	116
		3%	97%	
real	yol	6	110	116
		5%	95%	
practice	yusufcuk	13	16	29
		45%	55%	

Table 32 (continued)

Block Type	Picture	FALSE	TRUE	Total
real	yuz	14	102	116
		12%	88%	
filler	yuzuk	6	110	116
		5%	95%	
filler	zincir	9	107	116
		8%	92%	
filler	zurafa	11	105	116
		9%	91%	
	Total	1.283	10259	11542
		11%	89%	100%

Table 33 Performance of the Subjects

Subject ID	Gender	Age	True Records	Status
1	F	31	91	Valid
2	M	41	84	Valid
3	F	29	101	Valid
4	F	32	88	Valid
5	M	20	105	Valid
6	M	20	42	Eliminated
7	M	18	85	Valid
8	M	22	102	Valid
9	M	21	82	Eliminated
10	M	24	79	Eliminated
11	M	18	90	Valid
12	F	24	96	Valid
13	F	30	92	Valid
14	F	25	104	Valid
15	F	29	86	Valid
16	M	30	95	Valid
17	M	32	99	Valid
18	M	31	92	Valid
19	M	31	105	Valid
20	M	29	85	Valid
21	M	32	106	Valid
22	M	30	67	Eliminated
23	F	35	104	Valid
24	F	33	101	Valid
25	M	32	97	Valid
26	M	40	103	Valid
27	M	31	98	Valid
28	F	34	98	Valid
29	M	26	52	Eliminated

Table 34 Outlier Analysis Results

	95% of trials which fall outside of ± 2 standard deviations from the mean					
	Block Number					
Condition	**1**	**2**	**3**	**4**	**Total Otlier Count**	**Total Valid Trial Count (Before Outlier Analysis)**
JC * Prime Picture	13	8	3	5	29	584
IC * Prime Picture	11	4	7	6	28	580
DC * Prime Picture	19	10	3	2	34	574
Unrelated Compound * Prime Picture	13	5	8	8	34	569

Table 35 Subject RT Data

SUBJECT	BLOCK1 –JUXT-APOSED	BLOCK1 – JUXT-APOSED SAMPLE COUNT	BLOCK1 - INDEFINITE	BLOCK1 - INDEFINITE SAMPLE COUNT	BLOCK1 - DEFINITE	BLOCK1 - DEFINITE SAMPLE COUNT	BLOCK1 - UNRELATED	BLOCK1 - UNRELATED SAMPLE COUNT	BLOCK2 –JUXT-APOSED	BLOCK2 –JUXT-APOSED SAMPLE COUNT
1	1133,500	2	1092,667	6	1001,400	5	1079,000	6	859,000	6
2	800,750	4	766,286	7	755,500	6	880,400	5	762,833	6
3	791,857	7	866,667	3	717,167	6	785,000	3	713,167	6
4	837,333	3	826,500	6	859,400	5	866,400	5	682,167	6
5	769,400	5	767,167	6	733,143	7	722,571	7	634,500	6
7	756,200	5	837,600	5	769,250	4	722,667	3	724,400	5
8	674,200	5	653,500	4	692,750	4	739,000	5	589,000	6
11	720,833	6	777,000	4	676,250	4	827,500	2	609,000	5
12	735,833	6	785,000	6	937,250	4	762,000	5	748,600	5
13	713,000	6	681,667	3	684,400	5	772,000	7	685,750	4
14	718,000	6	711,000	7	779,667	6	782,000	5	640,857	7
15	846,429	7	845,400	5	852,000	6	867,200	5	762,400	5
16	819,667	6	723,833	6	788,000	4	690,500	2	688,333	6
17	724,833	6	713,200	5	682,200	5	664,333	6	641,000	5
18	752,667	3	743,167	6	715,200	5	813,333	6	599,286	7
19	634,000	7	586,286	7	606,000	5	618,200	5	489,143	7
20	644,400	5	776,000	3	725,000	2		0	719,000	5
21	576,400	5	563,200	5	568,667	6	574,200	5	573,400	5
23	764,600	5	806,333	6	852,500	6	794,167	6	781,571	7
24	663,833	6	635,400	5	633,000	2	702,167	6	622,600	5
25	580,714	7	530,167	6	579,286	7	688,667	6	521,200	5
26	664,167	6	701,143	7	813,250	4	840,429	7	696,800	5

Table 35 (continued)

SUBJECT	BLOCK 1 – JUXT-APOSED	BLOCK1 – JUXT-APOSED SAMPLE COUNT	BLOCK1 - INDEFINITE	BLOCK1 - INDEFINITE SAMPLE COUNT	BLOCK1 - DEFINITE	BLOCK1 - DEFINITE SAMPLE COUNT	BLOCK1 - UNRELATED	BLOCK1 - UNRELATED SAMPLE COUNT	BLOCK2 –JUXT-APOSED	BLOCK2 – JUXT-APOSED SAMPLE COUNT
27	752,000	6	793,200	5	756,167	6	804,333	6	730,833	6
28	931,000	7	928,333	6	1000,500	4	938,000	5	820,667	6

SUBJECT	BLOCK 2 - INDEFINITE	BLOCK2 - INDEFINITE SAMPLE COUNT	BLOCK2 - DEFINITE	BLOCK2 - DEFINITE SAMPLE COUNT	BLOCK2 - UNRELATED	BLOCK2 - UNRELATED SAMPLE COUNT	BLOCK3 - JUXTAPOSED	BLOCK3 - JUXTAPOSED SAMPLE COUNT	BLOCK3 - INDEFINITE	BLOCK3 - INDEFINITE SAMPLE COUNT
1	959,167	6	1011,857	7	900,500	6	759,571	7	762,500	6
2	791,333	6	844,000	6	779,500	4	616,500	6	721,333	6
3	800,000	7	735,667	3	752,429	7	803,143	7	743,167	6
4	767,000	3	772,167	6	826,600	5	785,200	5	682,000	6
5	681,429	7	647,429	7	758,200	5	621,571	7	644,167	6
7	694,143	7	620,000	3	773,667	3	661,571	7	742,000	1
8	647,667	6	632,000	7	692,833	6	616,333	6	593,143	7
11	627,600	5	732,333	6	655,286	7	612,600	5	617,200	5
12	707,800	5	714,571	7	734,000	6	674,750	4	637,167	6
13	651,833	6	662,500	6	710,000	5	638,143	7	660,143	7
14	634,167	6	659,000	7	692,167	6	625,429	7	633,714	7
15	742,167	6	826,500	2	774,200	5	735,714	7	862,000	3
16	653,333	6	679,600	5	829,833	6	593,333	6	712,333	6
17	708,167	6	640,800	5	712,714	7	687,429	7	687,000	6
18	762,000	6	721,833	6	680,000	3	655,800	5	688,500	6

Table 35 (continued)

SUBJECT	BLOCK2 - INDEFINITE	BLOCK2 - INDEFINITE SAMPLE COUNT	BLOCK2 - DEFINITE	BLOCK2 - DEFINITE SAMPLE COUNT	BLOCK2 - UNRELATED	BLOCK2 - UNRELATED SAMPLE COUNT	BLOCK3 - JUXTAPOSED	BLOCK3 - JUXTAPOSED SAMPLE COUNT	BLOCK3 - INDEFINITE	BLOCK3 - INDEFINITE SAMPLE COUNT
19	515,429	7	534,000	6	607,143	7	486,714	7	437,833	6
20	607,333	6	687,286	7	733,167	6	662,400	5	561,800	5
21	486,667	6	556,429	7	551,429	7	513,714	7	513,667	6
23	748,000	6	728,667	6	725,571	7	780,571	7	725,500	6
24	652,400	5	560,857	7	604,714	7	587,500	4	626,429	7
25	447,714	7	489,800	5	692,333	6	499,333	6	451,000	5
26	788,714	7	562,600	5	698,333	6	689,000	7	576,667	6
27	704,429	7	718,000	4	778,571	7	692,400	5	695,500	6
28	891,200	5	779,400	5	743,429	7	731,800	5	663,600	5

SUBJECT	BLOCK3 - DEFINITE	BLOCK3 - DEFINITE SAMPLE COUNT	BLOCK3 - UNRELATED	BLOCK3 - UNRELATED SAMPLE COUNT	BLOCK4 - JUXTAPOSED	BLOCK4 - JUXTAPOSED SAMPLE COUNT	BLOCK4 - INDEFINITE	BLOCK4 - INDEFINITE SAMPLE COUNT	BLOCK4 - DEFINITE	BLOCK4 - DEFINITE SAMPLE COUNT
1	884,333	6	713,250	4	922,200	5	687,400	5	908,600	5
2	775,200	5	735,500	4	765,333	3	740,667	3	733,000	3
3	752,714	7	754,429	7	739,167	6	693,167	6	713,857	7
4	695,143	7	880,400	5	633,571	7	574,600	5	728,800	5
5	707,286	7	632,500	6	583,286	7	595,833	6	603,000	4
7	613,400	5	637,667	6	767,600	5	650,200	5	590,833	6
8	625,000	6	659,429	7	584,143	7	537,857	7	609,143	7
11	634,571	7	612,750	4	637,400	5	568,143	7	646,200	5

Table 35 (continued)

SUBJECT	BLOCK3 - DEFINITE	BLOCK3 - DEFINITE SAMPLE COUNT	BLOCK3 - UNRELATED	BLOCK3 - UNRELATED SAMPLE COUNT	BLOCK4 - JUXTAPOSED	BLOCK4 - JUXTAPOSED SAMPLE COUNT	BLOCK4 - INDEFINITE	BLOCK4 - INDEFINITE SAMPLE COUNT	BLOCK4 - DEFINITE	BLOCK4 - DEFINITE SAMPLE COUNT
12	624,833	6	717,286	7	655,200	5	695,000	7	678,571	7
13	640,750	4	617,333	3	662,400	5	666,667	6	632,400	5
14	665,667	6	671,500	6	698,000	7	660,250	4	617,667	6
15	780,000	6	890,143	7	809,000	3	748,000	4	763,333	6
16	650,286	7	796,000	5	606,571	7	605,500	6	684,167	6
17	642,500	6	649,800	5	672,000	6	682,571	7	680,167	6
18	658,250	4	616,800	5	644,800	5	561,600	5	596,571	7
19	404,667	6	549,500	6	451,833	6	446,571	7	412,429	7
20	615,000	5	803,000	5	621,857	7	557,286	7	581,000	7
21	559,143	7	559,833	6	508,714	7	496,000	6	487,333	6
23	729,667	6	699,286	7	634,200	5	661,143	7	777,000	7
24	601,286	7	666,143	7	534,714	7	601,857	7	601,429	7
25	450,250	4	587,750	4	502,857	7	489,429	7	489,333	6
26	716,500	6	721,286	7	625,571	7	709,833	6	665,286	7
27	626,333	6	739,286	7	715,167	6	645,167	6	631,857	7
28	799,000	6	827,667	6	775,143	7	735,286	7	712,333	6

Table 35 (continued)

SUBJECT	BLOCK4 - UNRELATED	BLOCK4 - UNRELATED SAMPLE COUNT	GENDER	AGE	AGE (IN INTERVALS' OF 10, 1:18-28, 2:29-39, 3:40-50	EXPERIMENT DURATION
1	908,143	7	FEMALE	31	2,000	850.135,000
2	771,000	6	MALE	41	3,000	910.315,000
3	737,286	7	FEMALE	29	2,000	899.580,000
4	848,500	4	FEMALE	32	2,000	920.734,000
5	671,429	7	MALE	20	1,000	813.085,000
7	715,429	7	MALE	18	1,000	761.028,000
8	607,500	6	MALE	22	1,000	836.685,000
11	629,571	7	MALE	18	1,000	839.181,000
12	781,000	5	FEMALE	24	1,000	777.090,000
13	666,286	7	FEMALE	30	2,000	765.584,000
14	653,000	6	FEMALE	25	1,000	704.147,000
15	872,750	4	FEMALE	29	2,000	833.452,000
16	723,333	6	MALE	30	2,000	1.105.715,000
17	654,500	6	MALE	32	2,000	752.837,000
18	615,857	7	MALE	31	2,000	815.212,000
19	562,200	5	MALE	31	2,000	758.532,000
20	655,000	5	MALE	29	2,000	961.870,000
21	535,286	7	MALE	32	2,000	699.272,000
23	789,833	6	FEMALE	35	2,000	729.890,000
24	545,333	6	FEMALE	33	2,000	951.821,000
25	602,800	5	MALE	32	2,000	845.898,000
26	733,200	5	MALE	40	3,000	730.192,000
27	736,250	4	MALE	31	2,000	824.157,000
28	716,600	5	FEMALE	34	2,000	905.626,000

Table 36 Picture RT Data

PRIME PICTURE	PRIMING LOCATION (Constituent)	BLOCK1 - JUXTAPOSED	BLOCK1 - JUXTAPOSED SAMPLE COUNT	BLOCK1 - INDEFINITE	BLOCK1 - INDEFINITE SAMPLE COUNT	BLOCK1 - DEFINITE
Agac	second	716,857	7	724,500	4	671,143
Ana	first	819,000	3	882,200	5	819,600
Balik	second	746,833	6	676,000	6	727,750
Boru	second	712,286	7	787,500	4	688,600
Boya	first	621,750	4	744,200	5	871,500
Cay	second	855,500	4	676,250	4	679,667
Cizgi	second	642,000	3	713,333	6	874,500
Dag	first	729,714	7	716,000	6	760,333
Deli	first	806,000	7	720,000	4	685,800
Dunya	second	673,000	4	729,857	7	704,600
Et	second	790,000	7	819,500	6	818,800
Film	second	717,000	3	708,000	5	817,750
Gemi	second	664,250	4	753,714	7	769,250
Goz	second	751,500	6	695,500	4	644,000
Gul	first	834,500	2	894,333	3	667,000
Kahve	second	637,200	5	728,667	3	892,667
Kapi	second	714,750	4	659,000	6	699,167
Koc	first	822,333	3	905,750	4	904,750
Kusak	second	835,500	4	866,500	2	1001,000
Saat	second	723,286	7	743,714	7	732,800
Seker	first	717,000	6	697,667	3	807,333

Table 36 (continued)

PRIME PICTURE	PRIMING LOCATION (Constituent)	BLOCK1 - JUXTAPOSED	BLOCK1 - JUXTAPOSED SAMPLE COUNT	BLOCK1 - INDEFINITE	BLOCK1 - INDEFINITE SAMPLE COUNT	BLOCK1 - DEFINITE
Tas	first	785,000	6	678,600	5	756,000
Tavuk	second	763,800	5	710,000	4	684,750
Yag	second	678,500	4	925,750	4	847,571
Yazi	first	739,400	5	883,200	5	775,000
Yol	first	739,200	5	715,167	6	747,000
Yuz	first	712,333	3	766,250	4	662,500

PRIME PICTURE	BLOCK1 - DEFINITE SAMPLE COUNT	BLOCK1 - UNRELATED	BLOCK1 - UNRELATED SAMPLE COUNT	BLOCK2 - JUXTAPOSED	BLOCK2 - JUXTAPOSED SAMPLE COUNT	BLOCK2 - INDEFINITE
agac	7	707,500	6	633,833	6	580,167
ana	5	841,333	6	708,167	6	691,500
balik	4	723,500	4	549,000	5	638,000
boru	5	740,000	2	624,000	4	706,333
boya	2	961,750	4	795,167	6	787,000
cay	3	765,800	5	662,429	7	832,667
cizgi	4	771,400	5	674,000	5	649,600
dag	3	711,167	6	662,000	3	635,571
deli	5	786,000	4	682,500	4	597,667
dunya	5	700,500	6	602,000	6	743,750
et	5	815,250	4	687,167	6	768,571
film	4	822,800	5	676,000	5	731,571
gemi	4	833,000	5	790,000	7	680,000

Table 36 (continued)

PRIME PICTURE	BLOCK1 - DEFINITE SAMPLE COUNT	BLOCK1 - UNRELATED	BLOCK1 - UNRELATED SAMPLE COUNT	BLOCK2 - JUXTAPOSED	BLOCK2 - JUXTAPOSED SAMPLE COUNT	BLOCK2 - INDEFINITE
goz	6	660,333	6	639,667	3	683,667
gul	3	943,333	3	697,000	3	677,667
kahve	3	863,500	2	727,667	3	770,500
kapi	6	673,250	4	613,333	6	717,167
koc	4	913,667	3	714,667	6	731,000
kusak	1	724,333	3	745,750	4	789,167
saat	5	747,250	4	599,000	4	664,000
seker	3	832,000	5	676,800	5	714,600
tas	6	763,250	4	707,286	7	578,000
tavuk	4	784,333	6	691,167	6	648,000
yag	7	905,000	3	699,200	5	687,333
yazi	6	863,000	3	744,000	3	775,000
yol	4	771,167	6	588,429	7	667,500
yuz	4	749,500	4	748,250	4	623,667

PRIME PICTURE	BLOCK2 - INDEFINITE SAMPLE COUNT	BLOCK2 - DEFINITE	BLOCK2 - DEFINITE SAMPLE COUNT	BLOCK2 - UNRELATED	BLOCK2 - UNRELATED SAMPLE COUNT	BLOCK3 - JUXTAPOSED
agac	6	631,000	3	689,143	7	664,333
ana	4	752,400	5	726,500	6	700,143
balik	7	613,333	6	635,000	2	659,429

Table 36 (continued)

PRIME PICTURE	BLOCK2 - INDEFINITE SAMPLE COUNT	BLOCK2 - DEFINITE	BLOCK2 - DEFINITE SAMPLE COUNT	BLOCK2 - UNRELATED	BLOCK2 - UNRELATED SAMPLE COUNT	BLOCK3 - JUXTAPOSED
boru	6	747,000	5	707,333	6	675,600
boya	3	722,400	5	804,833	6	706,000
cay	3	662,200	5	726,833	6	645,000
cizgi	5	679,000	4	713,667	3	661,500
dag	7	649,200	5	697,286	7	620,500
deli	6	731,286	7	716,286	7	625,000
dunya	4	655,333	6	718,333	6	614,286
et	7	804,333	3	747,400	5	594,750
film	7	687,800	5	734,667	3	694,571
gemi	3	663,167	6	708,857	7	728,714
goz	6	587,571	7	656,000	6	569,833
gul	6	618,000	2	751,400	5	682,250
kahve	4	659,667	6	739,400	5	681,714
kapi	6	695,250	4	680,500	6	627,667
koc	4	688,750	4	737,600	5	712,333
kusak	6	781,800	5	820,750	4	672,500
saat	7	637,000	6	649,333	6	558,333
seker	5	751,000	4	784,429	7	615,667
tas	5	611,250	4	722,600	5	687,500
tavuk	6	702,429	7	638,500	4	630,000

Table 36 (continued)

PRIME PICTURE	BLOCK2 - INDEFINITE SAMPLE COUNT	BLOCK2 - DEFINITE	BLOCK2 - DEFINITE SAMPLE COUNT	BLOCK2 - UNRELATED	BLOCK2 - UNRELATED SAMPLE COUNT	BLOCK3 - JUXTAPOSED
yag	6	762,250	4	727,750	4	628,833
yazi	6	782,714	7	700,833	6	647,333
yol	6	680,200	5	694,250	4	671,167
yuz	3	581,200	5	851,667	3	703,333

PRIME PICTURE	BLOCK3 - JUXTAPOSED SAMPLE COUNT	BLOCK3 - INDEFINITE	BLOCK3 - INDEFINITE SAMPLE COUNT	BLOCK3 - DEFINITE	BLOCK3 - DEFINITE SAMPLE COUNT	BLOCK3 - UNRELATED
agac	3	585,857	7	671,333	6	664,571
ana	7	611,800	5	711,250	4	758,857
balik	7	606,000	4	586,833	6	568,400
boru	5	725,333	6	624,000	7	692,500
boya	6	694,333	6	741,143	7	750,667
cay	4	546,333	3	591,800	5	689,000
cizgi	4	690,600	5	669,667	3	671,200
dag	6	623,333	3	626,857	7	610,333
deli	6	649,000	7	673,167	6	640,333
dunya	7	559,833	6	742,000	4	699,000
et	4	591,333	6	718,000	5	708,000
film	7	666,400	5	593,667	3	655,250

Table 36 (continued)

PRIME PICTURE	BLOCK3 - JUXTAPOSED SAMPLE COUNT	BLOCK3 - INDEFINITE	BLOCK3 - INDEFINITE SAMPLE COUNT	BLOCK3 - DEFINITE	BLOCK3 - DEFINITE SAMPLE COUNT	BLOCK3 - UNRELATED
gemi	7	583,800	5	671,667	6	780,000
goz	6	588,571	7	574,333	6	592,250
gul	4	691,800	5	668,250	4	732,500
kahve	7	669,500	6	787,000	3	786,200
kapi	6	697,833	6	662,000	5	691,750
koc	6	672,200	5	709,500	4	870,857
kusak	6	738,000	3	791,500	6	795,667
saat	6	736,250	4	608,714	7	673,833
seker	3	657,500	6	676,833	6	745,800
tas	4	674,500	6	591,750	4	681,500
tavuk	4	628,333	6	593,333	6	637,800
yag	6	595,000	4	590,250	4	819,400
yazi	6	710,667	3	734,833	6	737,000
yol	6	597,500	4	594,286	7	613,333
yuz	3	674,000	3	787,800	5	590,333

Table 36 (continued)

PRIME PICTURE	BLOCK3 - UNRELATED SAMPLE COUNT	BLOCK4 - JUXTAPOSED	BLOCK4 - JUXTAPOSED SAMPLE COUNT	BLOCK4 - INDEFINITE	BLOCK4 - INDEFINITE SAMPLE COUNT	BLOCK4 - DEFINITE
agac	7	560,333	6	578,857	7	626,857
ana	7	672,667	6	582,571	7	592,000
balik	5	622,000	3	552,333	6	569,000
boru	4	630,667	6	621,667	6	711,500
boya	3	620,333	3	605,857	7	694,857
cay	6	683,400	5	577,429	7	652,500
cizgi	5	706,000	6	671,333	3	644,833
dag	6	668,857	7	567,000	6	627,143
deli	3	584,143	7	681,571	7	620,333
dunya	7	638,143	7	584,571	7	553,333
et	6	634,667	6	571,000	3	701,667
film	4	586,167	6	622,000	3	601,667
gemi	2	611,000	3	655,333	6	664,143
goz	4	646,143	7	604,667	6	542,667
gul	2	803,000	5	905,000	1	641,833
kahve	5	703,500	2	677,600	5	713,167
kapi	4	631,500	6	674,500	4	619,286
koc	7	784,250	4	660,571	7	646,600
kusak	6	630,167	6	740,500	4	699,833

Table 36 (continued)

PRIME PICTURE	BLOCK3 - UNRELATED SAMPLE COUNT	BLOCK4 - JUXTAPOSED	BLOCK4 - JUXTAPOSED SAMPLE COUNT	BLOCK4 - INDEFINITE	BLOCK4 - INDEFINITE SAMPLE COUNT	BLOCK4 - DEFINITE
saat	6	591,000	7	556,833	6	687,750
seker	5	648,500	6	655,600	5	689,000
tas	6	672,000	4	683,500	4	577,571
tavuk	5	621,600	5	561,833	6	632,000
yag	5	718,250	4	516,333	3	732,800
yazi	7	653,143	7	671,833	6	613,667
yol	6	602,667	3	598,833	6	611,833
yuz	3	569,000	5	634,800	5	641,500

Table 36 (continued)

PRIME PICTURE	BLOCK4 - DEFINITE SAMPLE COUNT	BLOCK4 - UNRELATED	BLOCK4 - UNRELATED SAMPLE COUNT
agac	7	586,000	4
ana	6	665,750	4
balik	6	605,571	7
boru	4	665,500	6
boya	7	723,833	6
cay	6	702,750	4
cizgi	6	730,333	6
dag	7	646,000	3
deli	3	636,000	6
dunya	6	781,000	2
et	6	701,000	7
film	3	748,857	7
gemi	7	636,333	6
goz	3	637,333	6
gul	6	842,750	4
kahve	6	618,000	4
kapi	7	648,800	5
koc	5	876,000	5
kusak	6	805,667	3
saat	4	654,571	7
seker	7	696,500	4
tas	7	656,500	4
tavuk	4	658,600	5
yag	5	739,714	7
yazi	3	736,167	6
yol	6	692,667	6
yuz	2	683,667	6

Table 37 Distractor Word RT Data

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
ANSİKLOPEDİNİN CİLDİ	No	Two	Unrelated	No Overlap	8	19	6	15	0	3,833
ARKA TEKER	No	Two	Unrelated	No Overlap	4	9	4	9	0	3,778
ASLAN PAYI	No	Two	Unrelated	No Overlap	4	9	3	8	0	2,333
AY YILDIZ	No	Two	Unrelated	No Overlap	3	8	3	8	0	3,667
AYRIK KÜME	No	Two	Unrelated	No Overlap	4	9	4	9	0	3,300
BEŞİĞİN YASTIĞI	No	Two	Unrelated	No Overlap	6	14	4	11	0	3,778
BOSTANIN ÜRÜNÜ	No	Two	Unrelated	No Overlap	6	13	4	10	0	3,882
BUBİ TUZAĞI	No	Two	Unrelated	No Overlap	5	10	4	9	0	3,091
CEBİN DELİĞİ	No	Two	Unrelated	No Overlap	5	11	3	8	0	3,778

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
ÇİĞ KÖFTE	No	Two	Unrelated	No Overlap	3	8	3	8	0	3,278
ÇİLİNGİR SOFRASI	No	Two	Unrelated	No Overlap	6	15	5	13	0	2,278
FORMANIN ETEĞİ	No	Two	Unrelated	No Overlap	6	13	4	9	0	3,722
ISI CAM	No	Two	Unrelated	No Overlap	3	6	3	6	0	2,765
İĞNENİN UCU	No	Two	Unrelated	No Overlap	5	10	3	6	0	3,833
KAPUT BEZİ	No	Two	Unrelated	No Overlap	4	9	3	8	0	3,333
KARBONİK ASİT	No	Two	Unrelated	No Overlap	5	12	5	12	0	3,588
KELAYNAK	No	Single	Unrelated	No Overlap	3	8	3	8	0	2,235
KESİK KONİ	No	Two	Unrelated	No Overlap	4	9	4	9	0	3,471

Table 37 (continued)

istractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
KISA DALGA	No	Two	Unrelated	No Overlap	4	9	4	9	0	3,111
KÖŞE KOLTUĞU	No	Two	Unrelated	No Overlap	5	11	4	10	0	3,333
KUŞ EKMEĞİ	No	Two	Unrelated	No Overlap	4	9	3	8	0	3,214
KUYRUK SOKUMU	No	Two	Unrelated	No Overlap	5	12	4	11	0	2,556
LAĞIM ÇUKURU	No	Two	Unrelated	No Overlap	5	11	4	10	0	3,882
MASANIN VİDASI	No	Two	Unrelated	No Overlap	6	13	4	8	0	3,889
MERDİVEN ALTI	No	Two	Unrelated	No Overlap	5	12	4	11	0	3,389
ÜTÜNÜN MODELİ	No	Two	Unrelated	No Overlap	6	12	4	8	0	3,833
ZARIN İNCELMESİ	No	Two	Unrelated	No Overlap	6	14	4	10	0	3,765

Table 37 (continued)

Distractor Word	**Morphology Change**	**Word Count**	**Condition**	**Priming Location (First or Second)**	**Word Syllable Count**	**Word Phoneme Count**	**Stem Syllable Count**	**Stem Phoneme Count**	**Overlapping Syllable Position**	**Transparency Degree**
AÇIKGÖZ	No	Single	Juxtaposed	Second	3	7	3	7	3	2,167
AKBALIK	No	Single	Juxtaposed	Second	3	7	3	7	2	3,438
AMPER SAAT	No	Two	Juxtaposed	Second	4	9	4	9	3	3,000
ANA FİKİR	No	Two	Juxtaposed	First	4	8	4	8	1	3,500
BOYAHANE	No	Single	Juxtaposed	First	4	8	4	8	1	3,833
BUHARLI GEMİ	No	Two	Juxtaposed	Second	5	11	5	11	4	3,556
ÇELİK KAPI	No	Two	Juxtaposed	Second	4	9	4	9	3	3,667
DAĞ BAYIR	No	Two	Juxtaposed	First	3	8	3	8	1	3,722
DELİ FİŞEK	No	Two	Juxtaposed	First	4	9	4	9	1	2,556

Table 37 (continued)

Distractor Word	**Morphology Change**	**Word Count**	**Condition**	**Priming Location (First or Second)**	**Word Syllable Count**	**Word Phoneme Count**	**Stem Syllable Count**	**Stem Phoneme Count**	**Overlapping Syllable Position**	**Transparency Degree**
EĞİK ÇİZGİ	No	Two	Juxtaposed	Second	4	9	4	9	3	3,778
ESKİ DÜNYA	No	Two	Juxtaposed	Second	4	9	4	9	3	3,111
GÜLBANK	No	Single	Juxtaposed	First	2	7	2	7	1	2,333
KABA ET	No	Two	Juxtaposed	Second	3	6	3	6	3	2,611
KARATAVUK	No	Single	Juxtaposed	Second	4	9	4	9	3	3,118
KILCAL BORU	No	Two	Juxtaposed	Second	4	10	4	10	3	3,412
KIZIL AĞAÇ	No	Two	Juxtaposed	Second	4	9	4	9	3	3,722
KOÇ YİĞİT	No	Two	Juxtaposed	First	3	8	3	8	1	2,944
MADENİ YAĞ	No	Two	Juxtaposed	Second	4	9	4	9	4	3,278

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
OKKALI KAHVE	No	Two	Juxtaposed	Second	5	11	5	11	4	2,706
ORTA KUŞAK	No	Two	Juxtaposed	Second	4	9	4	9	3	2,765
POLİSİYE FİLM	No	Two	Juxtaposed	Second	5	12	5	12	5	3,667
ŞEKERPARE	No	Single	Juxtaposed	First	4	9	4	9	1	2,941
TAŞ TOPRAK	No	Two	Juxtaposed	First	3	9	3	9	1	3,722
YAPRAK ÇAY	No	Two	Juxtaposed	Second	3	9	3	9	3	3,667
YAZI TURA	No	Two	Juxtaposed	First	4	8	4	8	1	3,556
YOL YORDAM	No	Two	Juxtaposed	First	3	9	3	9	1	3,333
YÜZNUMARA	No	Single	Juxtaposed	First	4	9	4	9	1	1,500

Table 37 (continued)

Distractor Word	**Morphology Change**	**Word Count**	**Condition**	**Priming Location (First or Second)**	**Word Syllable Count**	**Word Phoneme Count**	**Stem Syllable Count**	**Stem Phoneme Count**	**Overlapping Syllable Position**	**Transparency Degree**
ANA KUCAĞI	No	Two	Indefinite	First	5	9	4	8	1	3,167
BOYA KUTUSU	No	Two	Indefinite	First	5	10	4	8	1	3,833
ÇERKEZ TAVUĞU	Yes	Two	Indefinite	Second	5	12	4	11	3	2,611
DAĞ HAVASI	No	Two	Indefinite	First	4	9	3	7	1	3,611
DELİ GÖMLEĞİ	No	Two	Indefinite	First	5	11	4	10	1	3,556
DEPREM KUŞAĞI	Yes	Two	Indefinite	Second	5	12	4	11	3	2,944
DEVLET KAPISI	No	Two	Indefinite	Second	5	12	4	10	3	2,722
DİL BALIĞI	Yes	Two	Indefinite	Second	4	9	3	8	2	2,611
DUVAR SAATİ	No	Two	Indefinite	Second	5	10	4	9	3	3,889

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
GEÇİM DÜNYASI	No	Two	Indefinite	Second	5	12	4	10	3	2,722
GÜL RENGİ	No	Two	Indefinite	First	3	8	2	7	1	3,722
KEDİGÖZÜ	No	Single	Indefinite	Second	4	8	3	7	3	2,824
KOÇ KATIMI	No	Two	Indefinite	First	4	9	3	8	1	3,000
KOYUN ETİ	No	Two	Indefinite	Second	4	8	3	7	3	3,944
MAKİNE YAĞI	No	Two	Indefinite	Second	5	10	4	9	4	3,778
MEYVE AĞACI	Yes	Two	Indefinite	Second	5	10	4	9	3	3,944
ÖLÇEK ÇİZGİSİ	No	Two	Indefinite	Second	5	12	4	10	3	3,722
PAŞA ÇAYI	No	Two	Indefinite	Second	4	8	3	7	3	2,333

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
SABAHÇI KAHVESİ	No	Two	Indefinite	Second	6	14	5	12	4	3,267
ŞEKER PANCARI	No	Two	Indefinite	First	5	12	4	11	1	3,500
TAŞ OCAĞI	No	Two	Indefinite	First	4	8	3	7	1	3,278
TELEVİZYON FİLMİ	No	Two	Indefinite	Second	6	15	5	14	5	3,833
TİCARET GEMİSİ	No	Two	Indefinite	Second	6	13	5	11	4	3,667
YAZI KAĞIDI	No	Two	Indefinite	First	5	10	4	9	1	3,889
YEMEK BORUSU	No	Two	Indefinite	Second	5	11	4	9	3	3,588
YOL YORGUNU	No	Two	Indefinite	First	4	10	3	9	1	3,500
YÜZ GÖRÜMLÜĞÜ	No	Two	Indefinite	First	5	12	4	11	1	2,889

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
AĞANIN KUŞAĞI	Yes	Two	Definite	Second	6	12	4	8	4	3,500
ANANIN EMEĞİ	No	Two	Definite	First	6	11	4	7	1	3,824
BAHÇENİN AĞACI	Yes	Two	Definite	Second	6	13	4	9	4	3,889
BANYONUN BORUSU	No	Two	Definite	Second	6	14	4	9	4	3,833
BOYANIN KIVAMI	No	Two	Definite	First	6	13	4	9	1	3,833
ÇEKİRDEĞİN YAĞI	No	Two	Definite	Second	6	14	4	11	5	3,833
ÇİFTLİĞİN TAVUĞU	Yes	Two	Definite	Second	6	15	4	12	4	3,889
DAĞIN ZİRVESİ	No	Two	Definite	First	5	12	3	8	1	3,944

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
DEFTERİN ÇİZGİSİ	No	Two	Definite	Second	6	15	4	11	4	3,889
DELİNİN SOPASI	No	Two	Definite	First	6	13	4	8	1	2,938
DOLABIN GÖZÜ	No	Two	Definite	Second	5	11	3	8	4	3,333
DONANMANIN GEMİSİ	No	Two	Definite	Second	7	16	5	11	5	3,833
FOTOĞRAFÇININ FİLMİ	No	Two	Definite	Second	7	18	5	14	6	3,778
GÖLÜN BALIĞI	Yes	Two	Definite	Second	5	11	3	8	3	3,944
GÜLÜN ADI	No	Two	Definite	First	4	8	2	5	1	3,533
KOÇUN FİYATI	No	Two	Definite	First	5	11	3	8	1	3,833
KONAĞIN SAATİ	No	Two	Definite	Second	6	12	4	9	4	3,833
MİSAFİRİN KAHVESİ	No	Two	Definite	Second	7	16	5	12	5	3,722

Table 37 (continued)

Distractor Word	Morphology Change	Word Count	Condition	Priming Location (First or Second)	Word Syllable Count	Word Phoneme Count	Stem Syllable Count	Stem Phoneme Count	Overlapping Syllable Position	Transparency Degree
ŞEHRİN KAPISI	No	Two	Definite	Second	5	12	4	9	3	3,056
ŞEKERİN KİLOSU	No	Two	Definite	First	6	13	4	9	1	3,778
TAŞIN YÜZEYİ	No	Two	Definite	First	5	11	3	8	1	3,889
TÜRLÜNÜN ETİ	No	Two	Definite	Second	5	11	3	7	4	3,667
USTANIN ÇAYI	No	Two	Definite	Second	5	11	3	7	4	3,611
YAZININ TARİHİ	No	Two	Definite	First	6	13	4	9	1	3,833
YOLUN BİTİMİ	No	Two	Definite	First	5	11	3	8	1	3,778
YÜZÜN AYDINLIĞI	No	Two	Definite	First	6	14	4	11	1	2,944
ZALİMİN DÜNYASI	No	Two	Definite	Second	6	14	4	10	4	3,222

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
ANSİKLOPEDİNİN CİLDİ	3,889	3,722	1,111	2,833	746,368	822,800	734,667	655,250	748,857
ARKA TEKER	3,722	3,889	1,111	3,000	712,762	700,500	718,333	699,000	781,000
ASLAN PAYI	2,056	3,222	1,278	1,444	640,500	660,333	656,000	592,250	637,333
AY YILDIZ	3,611	3,611	1,333	2,556	624,722	723,500	635,000	568,400	605,571
AYRIK KÜME	3,100	3,400	1,600	1,400	673,000	673,250	680,500	691,750	648,800
BEŞİĞİN YASTIĞI	3,778	3,833	1,222	2,944	722,947	771,400	713,667	671,200	730,333
BOSTANIN ÜRÜNÜ	3,941	3,882	1,412	2,706	693,722	740,000	707,333	692,500	665,500
BUBİ TUZAĞI	2,273	3,733	1,000	2,857	694,750	786,000	716,286	640,333	636,000
CEBİN DELİĞİ	3,667	3,944	1,278	2,833	692,727	771,167	694,250	613,333	692,667

Table 37 (continued)

Distractor Word	**First Constituent Relatedness Degree**	**Second Constituent Relatedness Degree**	**Animacy Degree**	**Concreteness Degree**	**Overall Mean RT**	**Block-1 Mean RT**	**Block-2 Mean RT**	**Block-3 Mean RT**	**Block-4 Mean RT**
ÇİĞ KÖFTE	3,389	3,444	1,167	3,000	670,364	711,167	697,286	610,333	646,000
ÇİLİNGİR SOFRASI	1,889	3,389	1,222	2,611	739,188	863,500	739,400	786,200	618,000
FORMANIN ETEĞİ	3,833	3,722	1,222	2,778	669,375	707,500	689,143	664,571	586,000
ISI CAM	2,824	3,278	1,111	2,944	815,929	943,333	751,400	732,500	842,750
İĞNENİN UCU	3,944	3,778	1,222	3,000	734,227	815,250	747,400	708,000	701,000
KAPUT BEZİ	3,267	3,688	1,125	3,000	720,714	765,800	726,833	689,000	702,750
KARBONİK ASİT	3,706	3,647	1,111	2,875	725,250	833,000	708,857	780,000	636,333
KELAYNAK	2,647	1,846	3,000	3,000	714,125	749,500	851,667	590,333	683,667
KESİK KONİ	3,647	3,588	1,250	2,250	674,348	747,250	649,333	673,833	654,571

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
KISA DALGA	3,000	3,056	1,333	1,667	744,091	863,000	700,833	737,000	736,167
KÖŞE KOLTUĞU	3,167	3,722	1,167	2,944	687,100	784,333	638,500	637,800	658,600
KUŞ EKMEĞİ	3,000	3,214	1,214	2,923	704,263	763,250	722,600	681,500	656,500
KUYRUK SOKUMU	2,611	2,778	1,611	2,722	790,438	724,333	820,750	795,667	805,667
LAĞIM ÇUKURU	3,824	3,944	1,111	2,889	769,810	832,000	784,429	745,800	696,500
MASANIN VİDASI	3,833	3,778	1,111	3,000	803,737	961,750	804,833	750,667	723,833
MERDİVEN ALTI	3,278	3,333	1,222	2,333	784,263	905,000	727,750	819,400	739,714
ÜTÜNÜN MODELİ	3,944	3,722	1,278	2,278	845,250	913,667	737,600	870,857	876,000
ZARIN İNCELMESİ	3,824	3,824	1,556	2,278	755,739	841,333	726,500	758,857	665,750

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
AÇIKGÖZ	2,111	2,000	2,056	1,167	653,182	751,500	639,667	569,833	646,143
AKBALIK	3,313	3,625	3,000	3,000	652,762	746,833	549,000	659,429	622,000
AMPER SAAT	3,220	2,890	1,380	2,330	622,750	723,286	599,000	558,333	591,000
ANA FİKİR	3,167	3,778	1,444	1,056	711,045	819,000	708,167	700,143	672,667
BOYAHANE	3,833	3,778	1,111	2,889	702,895	621,750	795,167	706,000	620,333
BUHARLI GEMİ	3,667	3,889	1,222	3,000	720,048	664,250	790,000	728,714	611,000
ÇELİK KAPI	3,667	3,833	1,111	3,000	640,636	714,750	613,333	627,667	631,500
DAĞ BAYIR	3,611	3,556	1,278	2,611	673,870	729,714	662,000	620,500	668,857
DELİ FİŞEK	2,889	2,167	2,222	1,389	675,458	806,000	682,500	625,000	584,143

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
EĞİK ÇİZGİ	3,722	3,833	1,333	2,333	676,556	642,000	674,000	661,500	706,000
ESKİ DÜNYA	3,000	3,000	1,500	2,000	627,958	673,000	602,000	614,286	638,143
GÜLBANK	2,333	3,000	1,000	2,333	750,286	834,500	697,000	682,250	803,000
KABA ET	2,111	3,111	2,000	3,000	688,696	790,000	687,167	594,750	634,667
KARATAVUK	3,188	3,000	2,882	2,824	679,700	763,800	691,167	630,000	621,600
KILCAL BORU	3,353	3,471	1,375	3,000	665,636	712,286	624,000	675,600	630,667
KIZIL AĞAÇ	3,333	3,667	2,944	2,944	644,364	716,857	633,833	664,333	560,333
KOÇ YİĞİT	2,278	3,500	2,389	1,944	745,579	822,333	714,667	712,333	784,250
MADENİ YAĞ	2,889	3,778	1,167	2,944	676,632	678,500	699,200	628,833	718,250

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
OKKALI KAHVE	2,000	3,588	1,176	2,706	679,294	637,200	727,667	681,714	703,500
ORTA KUŞAK	2,706	2,882	1,647	1,706	707,050	835,500	745,750	672,500	630,167
POLİSİYE FİLM	3,611	3,889	1,333	2,167	662,381	717,000	676,000	694,571	586,167
ŞEKERPARE	3,389	2,688	1,167	3,000	671,200	717,000	676,800	615,667	648,500
TAŞ TOPRAK	3,722	3,833	1,111	3,000	719,000	785,000	707,286	687,500	672,000
YAPRAK ÇAY	3,722	3,889	1,778	3,000	702,800	855,500	662,429	645,000	683,400
YAZI TURA	3,389	3,500	1,333	2,111	685,000	739,400	744,000	647,333	653,143
YOL YORDAM	3,111	3,588	1,333	1,167	650,000	739,200	588,429	671,167	602,667
YÜZNUMARA	1,556	1,500	1,278	2,611	672,333	712,333	748,250	703,333	569,000

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
ANA KUCAĞI	3,333	3,056	1,667	2,500	681,619	882,200	691,500	611,800	582,571
BOYA KUTUSU	3,778	3,833	1,111	2,889	689,952	744,200	787,000	694,333	605,857
ÇERKEZ TAVUĞU	2,556	3,056	1,222	3,000	630,409	710,000	648,000	628,333	561,833
DAĞ HAVASI	3,556	3,667	1,278	2,500	637,136	716,000	635,571	623,333	567,000
DELİ GÖMLEĞİ	3,556	3,556	1,111	2,833	657,500	720,000	597,667	649,000	681,571
DEPREM KUŞAĞI	3,778	2,389	1,333	1,833	776,267	866,500	789,167	738,000	740,500
DEVLET KAPISI	3,556	2,222	1,444	1,167	688,273	659,000	717,167	697,833	674,500
DİL BALIĞI	1,944	3,667	3,000	2,944	620,000	676,000	638,000	606,000	552,333
DUVAR SAATİ	3,889	3,889	1,111	3,000	672,500	743,714	664,000	736,250	556,833

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
GEÇİM DÜNYASI	3,278	2,667	1,389	1,000	647,292	729,857	743,750	559,833	584,571
GÜL RENGİ	3,667	3,778	1,444	1,833	740,867	894,333	677,667	691,800	905,000
KEDİGÖZÜ	2,706	2,824	1,353	2,941	636,174	695,500	683,667	588,571	604,667
KOÇ KATIMI	3,143	2,857	1,857	1,667	726,600	905,750	731,000	672,200	660,571
KOYUN ETİ	3,944	3,944	1,353	3,000	707,182	819,500	768,571	591,333	571,000
MAKİNE YAĞI	3,778	3,889	1,167	3,000	691,529	925,750	687,333	595,000	516,333
MEYVE AĞACI	3,889	3,944	2,778	3,000	605,500	724,500	580,167	585,857	578,857
ÖLÇEK ÇİZGİSİ	3,667	3,722	1,278	2,444	683,947	713,333	649,600	690,600	671,333
PAŞA ÇAYI	1,667	3,667	1,278	2,778	640,235	676,250	832,667	546,333	577,429

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
SABAHÇI KAHVESİ	2,933	3,533	1,333	3,000	704,056	728,667	770,500	669,500	677,600
ŞEKER PANCARI	3,500	3,556	2,278	3,000	678,368	697,667	714,600	657,500	655,600
TAŞ OCAĞI	3,667	3,000	1,111	3,000	653,200	678,600	578,000	674,500	683,500
TELEVİZYON FİLMİ	3,778	3,889	1,389	2,222	692,950	708,000	731,571	666,400	622,000
TİCARET GEMİSİ	3,722	3,778	1,111	3,000	674,619	753,714	680,000	583,800	655,333
YAZI KAĞIDI	3,889	3,944	1,111	3,000	761,450	883,200	775,000	710,667	671,833
YEMEK BORUSU	3,882	3,529	2,000	3,000	703,182	787,500	706,333	725,333	621,667
YOL YORGUNU	3,389	3,778	1,944	1,333	649,045	715,167	667,500	597,500	598,833
YÜZ GÖRÜMLÜĞÜ	2,778	3,000	1,444	2,222	675,467	766,250	623,667	674,000	634,800

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
AĞANIN KUŞAĞI	3,556	3,389	1,167	2,889	769,889	1.001,000	781,800	791,500	699,833
ANANIN EMEĞİ	3,824	3,706	1,529	1,500	712,850	819,600	752,400	711,250	592,000
BAHÇENİN AĞACI	3,889	3,833	2,611	3,000	652,478	671,143	631,000	671,333	626,857
BANYONUN BORUSU	3,833	3,722	1,111	2,944	685,333	688,600	747,000	624,000	711,500
BOYANIN KIVAMI	3,889	3,778	1,333	2,278	733,667	871,500	722,400	741,143	694,857
ÇEKİRDEĞİN YAĞI	3,833	3,778	1,167	3,000	750,350	847,571	762,250	590,250	732,800
ÇİFTLİĞİN TAVUĞU	3,833	3,944	2,778	3,000	654,476	684,750	702,429	593,333	632,000
DAĞIN ZİRVESİ	3,944	3,944	1,167	2,833	650,227	760,333	649,200	626,857	627,143
DEFTERİN ÇİZGİSİ	3,889	3,833	1,167	2,889	711,294	874,500	679,000	669,667	644,833

Table 37 (continued)

Distractor Word	First Constituent Relatedness Degree	Second Constituent Relatedness Degree	Animacy Degree	Concreteness Degree	Overall Mean RT	Block-1 Mean RT	Block-2 Mean RT	Block-3 Mean RT	Block-4 Mean RT
DELİNİN SOPASI	3,125	2,938	1,294	2,125	688,000	685,800	731,286	673,167	620,333
DOLABIN GÖZÜ	3,833	2,722	1,111	3,000	593,227	644,000	587,571	574,333	542,667
DONANMANIN GEMİSİ	3,833	3,944	1,167	3,000	684,130	769,250	663,167	671,667	664,143
FOTOĞRAFÇININ FİLMİ	3,833	3,833	1,222	2,944	686,400	817,750	687,800	593,667	601,667
GÖLÜN BALIĞI	3,944	3,889	2,889	3,000	614,818	727,750	613,333	586,833	569,000
GÜLÜN ADI	3,600	3,467	1,313	1,313	650,733	667,000	618,000	668,250	641,833
KOÇUN FİYATI	3,833	3,833	1,500	2,056	732,059	904,750	688,750	709,500	646,600
KONAĞIN SAATİ	3,889	3,889	1,167	3,000	659,000	732,800	637,000	608,714	687,750
MİSAFİRİN KAHVESİ	3,778	3,833	1,222	2,944	737,556	892,667	659,667	787,000	713,167

Table 37 (continued)

Distractor Word	**First Constituent Relatedness Degree**	**Second Constituent Relatedness Degree**	**Animacy Degree**	**Concreteness Degree**	**Overall Mean RT**	**Block-1 Mean RT**	**Block-2 Mean RT**	**Block-3 Mean RT**	**Block-4 Mean RT**
ŞEHRİN KAPISI	3,444	2,611	1,222	2,111	664,591	699,167	695,250	662,000	619,286
ŞEKERİN KİLOSU	3,889	3,667	1,333	1,944	715,500	807,333	751,000	676,833	689,000
TAŞIN YÜZEYİ	3,944	3,889	1,167	2,944	637,667	756,000	611,250	591,750	577,571
TÜRLÜNÜN ETİ	3,500	3,833	1,111	2,944	753,000	818,800	804,333	718,000	701,667
USTANIN ÇAYI	3,556	3,556	1,222	2,889	643,368	679,667	662,200	591,800	652,500
YAZININ TARİHİ	3,833	3,889	1,500	1,556	744,500	775,000	782,714	734,833	613,667
YOLUN BİTİMİ	3,944	3,611	1,444	2,056	646,364	747,000	680,200	594,286	611,833
YÜZÜN AYDINLIĞI	3,444	2,833	1,667	1,500	673,625	662,500	581,200	787,800	641,500
ZALİMİN DÜNYASI	3,556	3,000	1,611	1,278	654,429	704,600	655,333	742,000	553,333